SUNSET

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www.sunset-project.eu

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Summary

The main objective of this deliverable is to examine the SUNSET service from a business perspective. This is done to provide recommendations about how a SUNSET type of service could be transferred from one living lab to another and from the living labs to other, different, areas of deployment. By doing so, this deliverable gives an indication of how such a service might be prolonged after the conclusion of the SUNSET project. The deliverable builds on the results produced through site-by-site business analysis of the SUNSET service applied in the three living lab cities. Based on the results from these three analyses, business models for each three cities have been constructed along with a generic business model for the SUNSET service. The generic model is then used to derive two alternative business cases for the SUNSET service. This goes beyond the deployment of the service in the living labs, showing the potential value of the SUNSET service if it is transferred to other regions, cities or areas of deployment. In summary, this deliverable provides business recommendations based on the business analysis performed, the business models derived, and the business cases developed regarding the SUNSET service as a business.

The business analysis for the different living lab cities has been performed by employing the business model canvas proposed by Osterwalder & Pigneur (2010). This model was chosen because it covers the majority of the structural elements that, according to literature, a business model could have and because it was the only model, of the ones considered, that facilitated support from stakeholders in each Living Lab in the modelling of business aspects.
However, the business model canvas, in its original form, did not match all of the conditions that the SUNSET project addresses. Therefore the canvas's structure, representation and implementation were adapted accordingly. The key adaptions were the addition of two building blocks considering social and environmental benefits and costs (linking it more to the SUNSET key objectives) and the renaming of the block customer segment to user segment (because there are multiple groups of people that use the SUNSET service, which do not constitute only the customers segment). Besides that, for each building block a set of modelling questions were defined to facilitate the analysis of the SUNSET service in the three living labs. By answering the same set of questions, it is possible to capture both similarities and differences of the business case of the SUNSET service in all three regions.

Based on the three business analyses performed it appears that there are a lot of similarities between the three LL sites. Especially regarding the potential user groups and the value of the SUNSET service for them are comparable in the three cities. Besides that the social and environmental benefits and costs are comparable too because these clearly relate to the SUNSET objectives (reduced congestion, increased safety, environmental protection and citizen well-being).
Nevertheless, a range of differences have also been observed through this analysis. The fact that the City of Enschede is one of the SUNSET-partners and the local government in Leeds and Göteborg is only a companion to the project for instance leads to different options regarding the revenue model of the SUNSET service, which could be mainly funded through the public sector in Enschede while founded around market based finance mechanisms in the other cities. In Enschede a model with three pillars is suggested, where public finance should act as a major pillar, while micro payments and third party payments as the two additional ones. In Göteborg, third party incentive providers could be invited to subscribe to the service in order to receive a reliable channel to reach the identified user groups with incentives based on the users' travel behaviour and receive aggregated information about the commute habits of those targeted

users. Alternative revenue streams may include using the service as a channel for advertisements and to integrate the whole SUNSET service or parts of the service in existing external digital services.

The deliverable ends with an illustration of an extended business model for the SUNSET service. This model has its foundations on the business analyses performed as part of this deliverable and the business models derived for the living lab cities. It provides a more generic framework to be utilized in order to understand the SUNSET service as a business case if it is extended into other areas of deployment beyond the contexts provided by the three living labs. Its usefulness is illustrated through two alternative business cases (with a large scale event with many visitors and a large retail area with lots of congestion as a deployment subject), which also provide practical insights in the potential of the SUNSET service if applied in other areas of deployment. Finally, the opportunity for SUNSET to evolve into an open service marketplace that can mediate supply and demand of a range of mobility data for a variety of public and private stakeholders and diverse end-user groups is elaborated.

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1 Introduction

This deliverable is the third deliverable in Work Package (WP5) of the SUNSET Project. The work package covers a variety of aspects regarding the development of the SUNSET service. It contains the analysis of the SUNSET service from a business perspective. This chapter introduces the deliverable and discusses its goals, main results and innovations, the approach applied and concludes with a brief overview of the document structure.

1.1 Goals

The goals of this deliverable are to:

- Select and adapt a work model for analysing the SUNSET service from a business perspective (chapter 2 and 3).
- Present the business analyses performed for the SUNSET service deployed in the Living Lab (LL) sites Enschede, Göteborg and Leeds (chapter 4).
- Give an overview of similarities and differences in regard to business aspects between the three LL sites (chapter 5).
- Propose tentative and generic business cases for a future deployment and semi-commercialization of SUNSET (chapter 6).

The work in this deliverable is related to on the following other parts of the project:

- D1.1 – User and stakeholder scenarios, target groups, data availability for the LL's are defined here. Also, the use cases are important as it gives indications of which value the service will possess.
- D2.1 – The deliverable provides the architecture of the service, which supports the analysis of the value with the service for different stakeholders.
- D3.1 – The goals of LL sites are described in this deliverable. These are an important input for understanding the value of the system for different user groups in the LL;
- T3.3 – The empirical work performed in parallel to T5.3 about how tentative users view the SUNSET service and the incentives to be provided through the service have been of importance to understand the value delivered through the system to users but also the need for key activities and key partners.
- D4.1 – The initial design of the SUNSET service is presented here which provides input in the business analysis to grasp the value of the service to different user groups; however, especially the end users.
- D5.1 and D5.2 – The SUNSET system and the different components and applications from the other work packages are integrated in these deliverables. The system that is being analysed is designed here.
- D7.1 – This deliverable provides insights to the characteristics of the LL sites and also which types of users that originally are being recruited to these sites. It supports the definition of key user groups, as also the identification of key partners who have to be involved in order to promote the success of the service in each LL.

In addition to these sources the work presented in this deliverable is based on interaction with the City of Enschede as a potential operator of the system in that area, as well as consultation with Göteborg Region and Leeds City Council acting as companions to the SUNSET project in the Göteborg region as well as the City of Leeds.

1.2 Main Results and Innovations

The main results of this document are an analysis of the SUNSET service from a business perspective in each living lab along with a generic business model for the service, illustrated through two examples on business cases if the system is transferred to an alternative area beyond the three living labs. The target group for the deliverable is decision makers aiming to improve how people travel by utilizing digital services. It gives these decision makers a description of the SUNSET service from a business perspective highlighting important aspects of the service if it should be deployed and semi-commercialised.

This deliverable has not been considered as a major one among the set of project deliverables, nevertheless it is an important contribution in order to create a sustainable system and also to be able to transfer the system to other regions/areas/cities. It has therefore no direct contribution to the defined core innovation of the project, yet it may be in itself a fifth SUNSET innovation as it describes potential business values of the system, beyond the core innovations original identified for the project. In addition it contributes indirectly to both the key innovation of providing social mobility services that motivate people to travel more sustainably in urban areas and to organize and sustain intelligent distribution of incentives (rewards) to balance system and personal goals (c.f. table 1).

SUNSET innovations	Contribution of this deliverable
Social mobility services that motivate people to travel more sustainably in urban areas	Direct contribution: N/A Indirect contribution: The deliverable presents business recommendation on how to package the service in order to transfer social mobility services from one development context to other regions/areas/cities and how it can be facilitated (see comment above).
Intelligent distribution of incentives (rewards) to balance system and personal goals	Direct contribution: N/A Indirect contribution: The deliverable provides insights on how to organize the service as a business in order to promote and manage the incentives design
Algorithms for calculating personal mobility patterns using info from mobile and infrastructure sensors	N/A
Evaluation methodologies and impact analysis based on LL evaluations	Direct contribution: N/A Indirect contribution: the deliverable provides a useful introduction for WP6, in particular regarding the calculation of costs, benefits and impacts of the system to the financial flow as well as to a wider business context.

Table 1.1: Contributions of this deliverable to SUNSET innovations

1.3 Approach applied in Task 5.3

The main objective of Task 5.3 is to create business recommendations that facilitate turning the SUNSET service into a value creating business and in addition promote the transferring of the service from the development sites to other regions/areas/cities. In

order to generate grounded and sound business recommendations, a structured approach was designed for task 5.3 (c.f. figure 1.1).

First a literature study on business modelling and tools for business modelling has been performed. Based on this study the tool that was most appropriate to use within SUNSET was determined and later adapted to be able to use it to reach the goals for this deliverable. Based on the conditions defined in the other work packages (see section 1.1), representatives of the different LL locations performed the business analysis of SUNSET service in each LL site. It is important to keep in mind that the site-by-site business analysis is performed by members of the SUNSET consortium and prior to the test of the SUNSET service in the three Living Labs. Therefore the analysis done is based on the experience of the working team rather than revealed preference of users of the system. The business models hence will be tested when the Living Labs are operated.

Each analysis is described in terms of the categories used in the business analysis model. After this step a comparison was done and similarities and differences between the sites have been analysed resulting in the possibility to derive business recommendations about service transfer.

In parallel to the work performed for this deliverable, the SUNSET project was concurrently evaluated for the first time by the EC and the three external experts. The review resulted in the recommendation by the review panel to develop illustrative business cases that shows the value of the SUNSET service beyond the Living Labs. Consequently a generic business model, illustrated by tentative business cases, was developed for SUNSET.

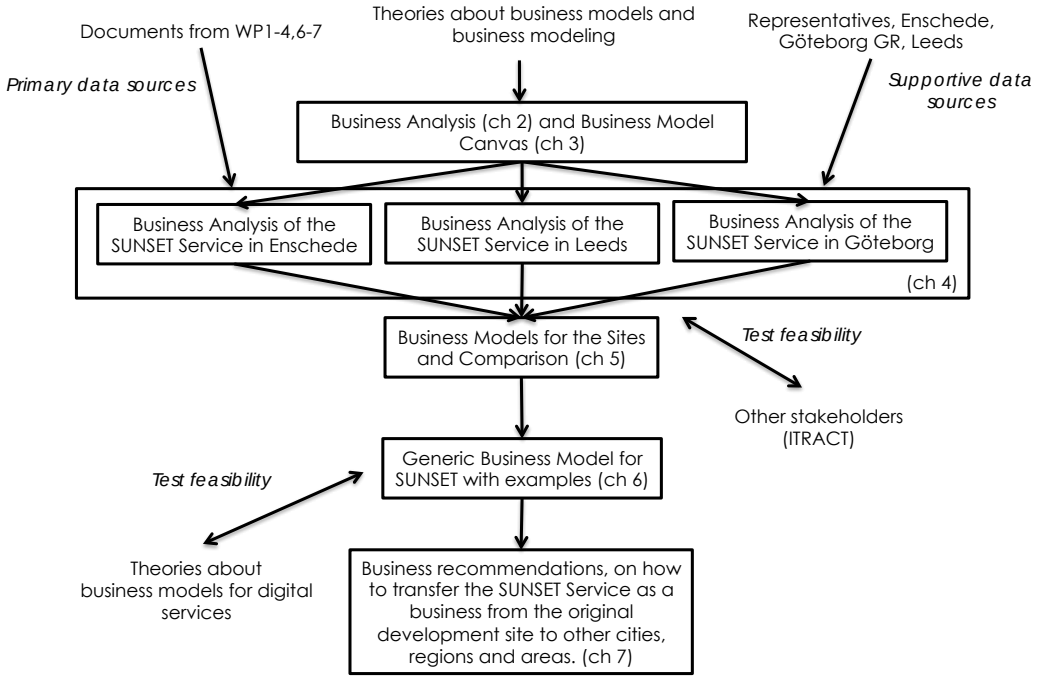

Figure 1.1: Approach applied for Task 5.3

A structured process was followed in M10-M18 to perform the business aspect analysis of the SUNSET service in the three Living Labs (c.f. figure 1.2).

The planning of Task 5.3 commenced in the fall of 2011 prior to the scheduled start of the task. Pre-work was done in order to structure the work to be done in M12-18. A tentative plan for the task was presented and discussed by the involved partners at

the #3 internal workshop in Leeds in December 2011. After this workshop, the planning continued during December and January. The Göteborg region and the City Council of Leeds (companions to the project, not partners) were contacted and asked if they could support in providing input needed in M13-M15 to perform the business analysis in Göteborg and Leeds correspondingly. The partners in Enschede in addition made representatives in this city aware that similar input would be needed. In the beginning of January the lead partner performed a literature review with the purpose to identify, motivate and adapt the tool for business modelling to be used in the task. The adoption and adaption of the tool was performed in January. This final preparation resulted in the onsite kick off of Task 5.3 in each Living Labs site in late January. During these on-site visits the Lead Partner instructed the on-site partners (University of Leeds and City of Enschede) about the tool, and the final approach of the task was also jointly designed and agreed upon.

Coordinated by tele-conferences, business analysis for each site was performed from M13 to M15 by the three partners. The City of Enschede as well as the companions to the project Göteborg Region and City Council of Leeds were consulted in this process providing input in the modelling actions performed, as well as reflecting on the feasibility of the models being developed. In the middle of this work sequence, the #4 internal workshop was arranged in Brussels. During this workshop a work meeting was arranged for Task 5.3 and experiences as well as results from the modelling activities were shared amongst the partners during this occasion. At this meeting a decision was also made to further examine the feasibility of the results produced in Task 5.3; beyond the Living Labs. The lead partner, Viktoria, which also is a member in the Interreg IVB North See Region Programme funded project ITRACT[1], took the initiative to present SUNSET and T5.3 in particular at the 1st internal ITRACT workshop which took place in Göteborg on June 7-8 2011. During the Brussels workshop it was agreed that this was an opportunity to examine the feasibility of the results further. The project members of ITRACT became consequently potential stakeholders to the SUNSET service. Their views on SUNSET were used as input to further understand SUNSET as a business, beyond the three living labs within the SUNSET project. In the last months (M17-M18) the added-on tasks including the extended and example business cases have been completed.

SUNSET Detailed Work Structure of Task 5.3	Task 5.3 M12-M18									
	YEAR 1		YEAR 2							
Lead partner: Viktoria (2 man month) Resources: Leeds (1 mm), Enschede (1 mm), Novay (1 mm)	N	D	J	F	M	A	M	J	J	A
	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19
Tele-conference meetings to coordinate task 5.3				Tc	Tc	Tc	Tc	Tc	Tc	
Work sessions on task 5.3 in the internal workshops					Bru			Ens		
Planning of task 5.3										
Selection and Adaption of Business Analysis Model										
Kickoff meetings on site in Leeds, Enschede and Göteborg										
Business analysis of SUNSET in Enschede										
Business analysis of SUNSET in Leeds										
Business analysis of SUNSET in Göteborg										
Comparison										
Design of Business models for each site										
Design of Generic business model for SUNSET, illustrative cases, and business recommendations										
Internal review										
Submission of D5.3 to EC										D5.3

[1] Improving Transport and Accessibility through new Communication Technologies – ITRACT: ITRACT aims to improve the connectivity and accessibility of remote areas in the North Sea Region through the integration of innovative transport and communication infrastructure. The project will focus on the development and use of novel ICT applications and brings together technology experts - in the fields of ICT, Transport and Wireless technology. (http://www.northsearegion.eu/ivb/projects/details/&tid=132)

Figure 1.2: Time planning of Task 5.3

1.4 Document Structure

Task 5.3 is documented in the report D5.3. The report starts with a review of models for business analysis and the choice of the tool to use in T5.3 (chapter 2). In chapter 3 this tool is described in more detail and adaptions made by the team are described. In chapter 4 the business analysis of the SUNSET service in Enschede, Göteborg and Leeds is presented. Similarities and differences between the LLs leading to recommendations on what to address when transferring the SUNSET service from one development site to another are presented in chapter 5. Extended business cases for SUNSET are discussed in chapter 6 and the report is completed with conclusions in chapter 7.

2 Selecting a tool for modelling business aspects in SUNSET

The first step to reach the goals mentioned in chapter 1 is to make an inventory and examination of existing models to use for the business analysis. In this chapter business model analysis and different business models are explored. This has resulted in an inventory of tools for Business Model Analysis. Finally, the choice is made to use the Business Model Canvas as the tool to perform the business analysis in task 5.3.

2.1 Business Models and Business Modelling

Business modelling allows analysing, developing and comparing different value creation approaches (Osterwalder et. al. 2005) for an entity (a firm, a service or a product) in focus. As a consequence, business modelling could help companies and consortiums to understand that entity as a business and also develop novel approaches to creating and capturing value based on that entity in the form of specific Business Cases. A business case is a supported argument that a business-related concept is both practical and profitable (in any sense), while a business model contains and demonstrates the (financial) steps necessary to create or grow a successful business or successfully carry out a business activity.

Osterwalder et. al. (2005) present a survey of literature which shows that the topic of business models and business modelling often is discussed superficially and frequently without any understanding of its roots, its role, and its objectives. Thus, the aim of this section is to make a brief introduction into the business model concept and create a bridge to an inventory of potential models to use in order to analyse the business aspects of SUNSET. This in turn has provided the measure to make an informed selection of the business modelling technique to use in order to model business aspects in SUNSET.

In this section we describe the nature of a business model by defining the concept and also introduce business models as an activity, a structure and a representation.

Osterwalder et. al. (2005) define Business Models as a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific entity; hence a firm, a service or a product. Using the notion of Business Models means allowing simplified description and representation of what is the value provided to customers through the service or the product, how this is achieved and which are the financial consequences that adhere from this provision of the service or the product.

A *Business Model* is in other words a product of a conceptual activity in which an entity is analysed in order to create an overall representation of the business logic for that entity. Over the years the research on Business Models has continually matured (c.f. Burkhart et. al. 2011). In the early 2000s much of the research was devoted to creating definitions and taxonomies for business models (e.g. Rappa 2004; Timmers 1998). This generated research aimed to list components for developing business models (e.g. Linder & Cantrell 2000), which in turn made it possible to describe business model elements (e.g. Well & Vitale 2001) and generate reference models and ontologies for business model analysis (e.g. Osterwalder 2002). From 2000 until now this evolution of business model research has ended up in the design of conceptual tools for performing advanced modelling of business aspects. Horsti et. al. (2004) for example provides five electronic business models based on the application of conceptual tools for business modelling and Osterwalder & Pigneur

(2010) presents a canvas model for understanding a firm, product or a service based on nine conceptual building blocks.

The research on business analysis as an activity has consequently ended up with different tools that generate business models which follows a certain *structure* (see section 2.1.1), generates some form of *representation* (see section 2.1.2) and is performed through a certain sequences of steps; i.e. a *modelling process* (see section 2.1.3). In order to make an informed selection of a tool for modelling business aspects these three criteria's can be used as a lens to compare different tools.

2.1.1 Business models as structure

Zolnowski & Böhman (2011) state that overall the structure of a business model can be summarized by nine elements. The first and most prevalent element of the business model structure is the value proposition for the entity modelled (e.g. a service). This element is intended to describe how value is created for the consumer of the service. The second element is value capturing, defining the revenue model for the service. The third element can be summed up under funding and costs. This element considers the financing and cost aspects of a service. The fourth element identifies the target consumers. The elements networks and activities examine the activities required to implement the service as a business. Technology, resources and skills are the sixth element and define the prerequisites for implementing the business model. The seventh element describes aspects such as strategy, scope, sustainability and leadership and therefore the strategic perspective of a business model. In some models (e.g. Gordijn & Akkermans 2001) the value flow is added as an eighth element, specifying the exchange relationships between different business actors. Finally the eighth element considers the legal aspects of the business model.

2.1.2 Business models as representation

A possible expression of this second criterion is according to Zolnowski & Böhman (2011) a data model depicting the business model. This model is a detailed elaboration of the different elements of a business model technique (such as Osterwalder & Pigneur 2010), which makes it possible to generate a computer-supported tool for generation and analysis of business models. A variant to the data model is the graphical notation form. This form supports the modelling process of business models using predefined objects representing the elements in the structure of the business model technique.

2.1.3 Business models as modelling process

Both Osterwalder et. al. (2005) and Zolnowski & Böhman (2011) state that when applying a narrow lens no dedicated modelling processes can be found within tools providing support for business model analysis in the creation of business models. All approaches are instead on a general level based on a free creative and artistic process. Approaching the activity with a wider lens, however points towards two different techniques that governs the process to generate a business model. The first technique uses questions and thus supports the generation of a business model using a data collection approach (interview, focus groups, questionnaires, literature review) or a simple categorical system, such as the business model canvas, by Osterwalder & Pigneur (2010) to trigger questions and interaction with stakeholders. This approach works as a guide and should help to structure the answers given and to enable the widest possible view of the business model. The second approach attempts to structure the modelling process by a graphical structure thus providing a concept to organize answers or create the business model by using a previously defined structure.

2.2 An inventory of tools for Business Model Analysis

Using the three elements structure, representation and modelling process as a lens with the aspects provided by Zolnowski & Böhman (2011) as criteria different tools for Business Model Analysis can be examined, classified and compared. This in turn makes it possible to make an informed choice about which tool to use when modelling the business aspects of a specific entity such as a digital service.

When reviewing approaches to develop business models for services, Zolnowski & Böhman (2011) identifies a set of potential tools for modelling business aspects in a service such as SUNSET. Amongst them the following five approaches were found and selected as possible tools to use for analysing the business aspects of SUNSET (c.f. table 2.1) as they explicitly are directed towards analysing digital services.

Main source	General Description
Harreld et. al. (2007)	Harreld et al. (2007) describes the transformation of IBM and its management in a time of crisis to a successful new start and how dynamic skills helped in this transformation.
Ballon (2007)	Ballon (2007) introduces a theoretical framework for the development and analysis of business models for systems and services in the (mobile) information and communication technology.
Candrasekra (2008)	Candrasekra (2008) investigates how to adapt existing business models of mobile operators to prepare them for future mobile technologies and other trends.
Bask et al. (2010)	Bask et. al. (2010) analyse service strategies, service-related business models and business processes in logistics services.
Osterwalder & Pigneur (2010)	Osterwalder & Pigneur (2010) present a generic canvas of how business models can be analysed, described and illustrated.

Table 2.1: A selection of five possible tools for modelling business aspects in SUNSET (based on Zolnowski & Böhman 2011)

Using the lens and criteria presented in 2.1.1-2.1.3 as a method for comparison, table 2.2 is generated describing the different emphasis in the five approaches and also classifying them based on the resources that they provide for modelling business aspects for a digital service such as the SUNSET service.

None of the approaches covers the structural dimension value flow amongst actors when viewing the service as a business. In addition, only Harreld et. al. (2007) and Ballon (2007) provide thorough components for analysing strategy, scope, sustainability and leadership when the service is viewed as a business. Osterwalder & Pigneur (2010) view 1) strategy as a key resource within the service and leadership as a key activity, 2) provide also an add-on with elements to capture the environmental and social costs as well as benefits viewing a service as a business. Harreld et. al. (2007) provide no support to capture funding and costs, as well as no support to capture key partners or resources in order to successfully implement the service as a business. The only tool that provides support to represent the business model as well as perform the modelling process is Osterwalder & Pigneur (2010).

	Structure									Representation		Modelling process	
	Value proposition	Value appropriation	Funding and costs	Consumers	Networks and activities	Technologies, resources & skills	Strategy, scope, sustainability and leadership	Value flow	Legal	Data model	Grapichal notation	Questions	Graphical structuring
Harreld et. al. (2007)	✗	✗	-	✗	-	-	✗	-	-	-	-	-	-
Ballon (2007)	✗	✗	✗	✗	✗	✗	✗	-	-	-	-	-	-
Candrasekra (2008)	✗	✗	✗	✗	✗	✗	-	-	-	-	-	-	-
Bask et al. (2010)	✗	✗	✗	✗	✗	✗	-	-	-	-	-	-	-
Osterwalder & Pigneur (2010)	✗	✗	✗	✗	✗	✗	(✗)	-	-	✗	✗	✗	✗

✗ covered by the approach (✗) partly covered – not covered by the approach

Table 2.2: A comparison of tools for Business Analysis

2.3 The selection of a tool to model business aspects in SUNSET

Based on the review of the business model concept the inventory of tools for business model analysis the partners involved in Task 5.3 made the informed choice to select Osterwalder & Pigneur's Business Model Canvas as the joint model to use in order to 1) model business aspects of the SUNSET service for the Living Labs in Enschede, Leeds and Göteborg, and in 2) develop business cases that show the business value with the SUNSET service if it is transferred to other contexts beyond the ones represented by the living lab sites.

The main argument for selecting the Osterwalder & Pigneur (2010) approach is that it covers the majority of the structural elements of a business model (c.f. table 2.2) and in addition, it provides exclusively the facilitating support, to interact with stakeholders in the Living Labs involving them in the modelling of business aspects.

Nevertheless Candrasekra (2008) and especially Bask et. al. (2010) provide also invaluable input to Task 5.3, especially in developing supplementary business cases. Hence, their contribution is evident in the second part of this task where the alternative business cases has been developed showing the potential of the SUNSET service beyond the Living Labs of Enschede, Leeds and Göteborg.

3 Using the Business Model Canvas to Model Business Aspects of SUNSET

In this chapter, an overview of what the existing Business Model Canvas contains is offered. Then, a description of the adaptation of that model to make it more usable for the required business analysis in the different LL sites and to be able to compare the outcomes of the different Living Labs with each other is presented. The adaption includes the renaming of one building block, the addition of two new building blocks and the design of questions that should be answered to fill the different building blocks in a comparable way.

3.1 Characteristics of the Business Model Canvas (BMC)

The work model selected for generating business recommendations is the Business Model Canvas provided by Osterwalder & Pigneur (2010). This model is based on Design Science Research work previously performed by Alexander Osterwalder (c.f. Osterwalder 2004). This previous work presents an ontology of categories which Osterwalder argues constitute the building blocks of a viable business model.

These building blocks are based on four ontological pillars for defining a business (Osterwalder 2004) – Product, Customer Interface, Infrastructure Management and Financial Aspects. Osterwalder theoretically grounds these categories in different managerial tools for organizational governance such as the balanced scorecard (Kaplan & Norton 1992). Yet, the four pillars were not enough for Osterwalder's purpose to derive a graphical tool for business modelling. He instead split these four pillars into nine core elements as depicted in table 3.1.

Pillar	Building block of Business Analysis	Description
Product	1 Value Proposition	A *Value Proposition* is an overall view of a company's bundle of products and services that are of value to the customer.
Customer interface	2 Target Customer	The *Target Customer* is a segment of customers a company wants to offer value to.
	3 Distribution Channel	A *Distribution Channel* is a means of getting in touch with the customer.
	4 Relationship	The *Relationship* describes the kind of links a company establishes between itself and the customer.
Infrastructure management	5 Value Configuration; i.e. key activities	The *Value Configuration* describes the arrangement of activities and resources that are necessary to create value for the customer.
	6 Capability; i.e. key resources	A *Capability* is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.
	7 Partnership; i.e. key partners	A *Partnership* is a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.
Financial aspects	8 Cost Structure	The *Cost Structure* is the representation in money of all the means employed in the business model.
	9 Revenue Model	The *Revenue Model* describes the way a company makes money through a variety of revenue flows.

Table 3.1: Characteristics of nine building blocks for business modelling

In order to make Business model innovation easy Osterwalder & Pigneur (2010) evolved these building blocks into a graphical canvas to facilitate analysis, comparison and design of business models. The aim was to create a shared language allowing the users to easily capture and model business ideas into a blueprint and by this understand a product or a service as a business. In figure 3.1 the Business Model Canvas proposed by Osterwalder & Pigneur (2010) is displayed.

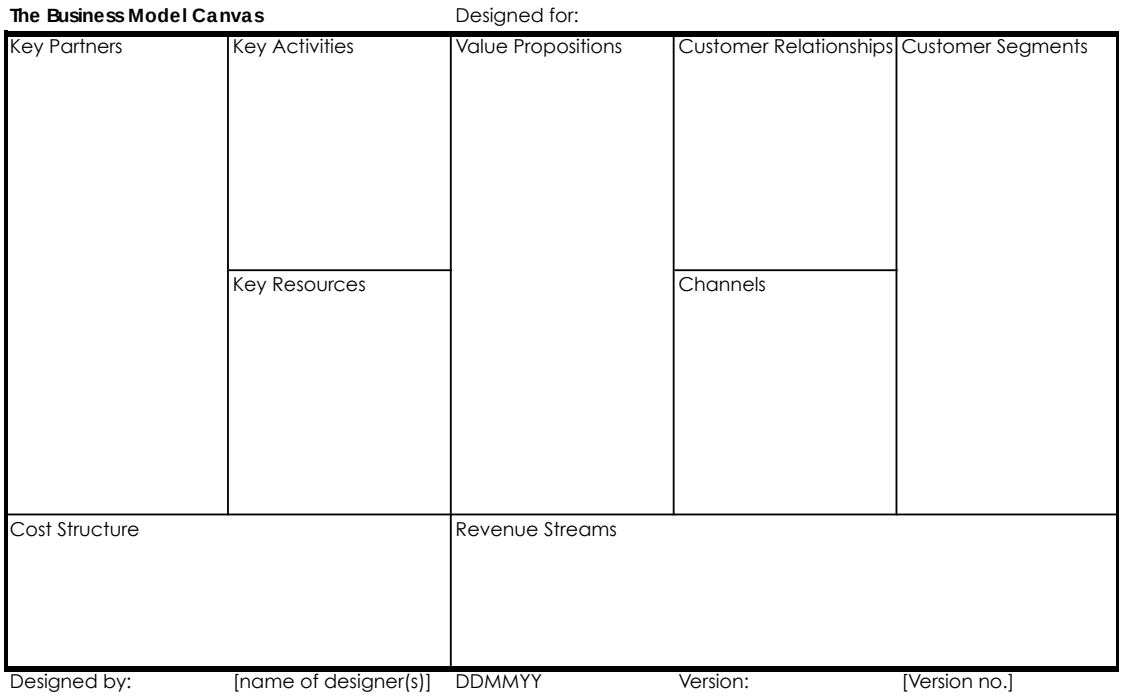

Figure 3.1: The Business Model Canvas (based on Osterwalder & Pigneur 2010)

3.2 Adaptation of the Structure, Representation and Process to fit the SUNSET service

As the unit of analysis in Task 5.3 is the SUNSET digital service, the team in Task 5.3 decided that the Osterwalder & Pigneur (2010) canvas could not be applied without adaption. The unit of analysis required changes in the canvas structure, the canvas representation and also an adaption of the modelling process; e.g. the questions to be asked when the canvas model was used to model the SUNSET service as a business.

3.2.1 Adaptation of the BMC structure

One of the primary pillars in the business model canvas ontology is the customer interface. Customers are indeed the core of a digital service such as the SUNSET service. However, as the SUNSET service ecosystem evolves not one particular customer but a number of different types of users are important, so the structure of the canvas was alternated in regard to the building block *customer segments*.

The change was hence made to further align the canvas model to the SUNSET service by re-labelling the building block Customer Segments to User Segments and therefore going beyond the original description of this block to only capture the customer segments that SUNSET as business will provide value for. In such, it provides a modelling tool that in a wider sense captures different users which SUNSET can provide value for.

Being a digital service that should enhance sustainability within a society and not only provide profit to its owner this triggered a second change of the business model canvas structure. Building on Osterwalder & Pigneur' (2010:264-265) own vision that the application of their canvas tool in no way should be just limited to for-profit corporations, the canvas was extended to a triple bottom line business model. This meant that the canvas structure was extended with one additional pillar and two additional building blocks: the social and environmental costs of SUNSET as a service and the social and environmental benefits of SUNSET as a service. Just as earnings are increased by minimizing financial costs and maximizing income, the triple bottom line model seeks to minimize negative social and environmental impacts and maximize the positive benefits. This is pivotal in the SUNSET vision.

Pillar	Building blocks	Description
Sustainability	Social and environmental costs	These costs are the representation in different social and environmental variables of the negative impact of the SUNSET service as a business.
	Social and environmental benefits	These benefits are the representation in different social and environmental variables of the positive impact of the SUNSET service as a business.

Table 3.2: Characteristics of the added two building blocks

3.2.2 Adaptation of the BMC representation

The structural changes of the canvas model made to further align the tool to the SUNSET project initiated an adaptation of the graphical representation of the canvas model. The block Customer Segments was adjusted to User Segments and hereby provided a wider lens to analyze different direct and indirect users of the SUNSET service.

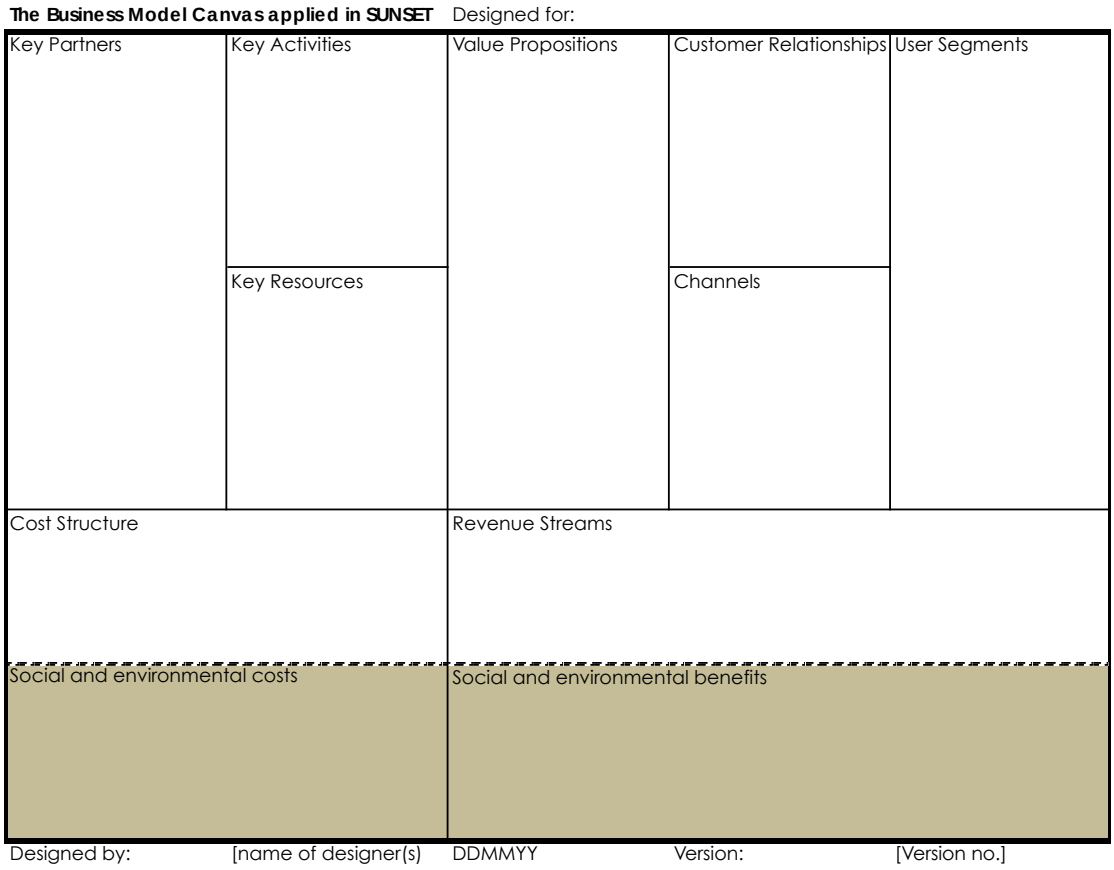

Figure 3.2: The SUNSET adapted Business Model Canvas

In addition, the two added building blocks were also added to the canvas representation (c.f. figure 3.2). Social and environmental benefits was placed below the block Revenue Streams, following Osterwalder & Pigneur (2010) recommendations, and social and environmental costs were placed below the block Cost structure.

Pillar	Building Blocks	Questions used in the Modelling Process
Product	1 Value Proposition	• Which user challenges is the SUNSET Service helping to solve in Enschede/Leeds/Göteborg? • What user needs should the service meet? • What value does the SUNSET Service deliver to different user segments and usage situations? • What bundle of services should SUNSET provide to different user segments and in different usage situations?
User interface	2 Target Users	• For whom is the service intended to create value? • Which user segments can be defined for the service in Enschede/Leeds/Göteborg?
	3 Distribution Channel	• Through which channels should the service be delivered to users? • Through which channels should the service be marketed to users? • In what way can existing channels be used in order to reach the users? • If parallel channels exist, how can they be integrated?
	4 Relationship	• What type of CRM do different user segments expect from the provider of SUNSET? • Are there any existing CRM channels that could be utilized or improved?

Infrastructure management	5 Value Configuration; i.e. key activities	• What Key Activities does the SUNSET Service require in Enschede/Leeds/Göteborg?
	6 Capability; i.e. key resources	• What Key Resources does the SUNSET Service require in Enschede/Leeds/Göteborg?
	7 Partnership; i.e. key partners	• What Key Partners does the SUNSET Service require in Enschede/Leeds/Göteborg?
Financial aspects	8 Cost Structure	• What are the most inherent costs for the SUNSET Service in Enschede/Leeds/Göteborg? • What are the costs for the key activities? • What are the costs for the key resources?
	9 Revenue Model	• How is Revenue generated from the SUNSET Service in Enschede/Leeds/Göteborg? • What are the Revenue streams for the SUNSET Service in Enschede/Leeds/Göteborg? • Who should pay? • For what should they pay?
Sustainability	10 Social and environmental costs	• What are the social costs for the SUNSET service in Enschede/Leeds/Göteborg?
	11 Social and environmental benefits	• What are the social benefits from the SUNSET service in Enschede/Leeds/Göteborg?

Table 3.3: The SUNSET adapted Modelling Questions

3.2.3 Adaptation of the BMC Modelling Process

The adapted structure and representation of the BMC had created a basic tool for analysing SUNSET as a business. However as the task was done in a distributed way and in parallel in Enschede (the main living lab) and Leeds and Göteborg (the two reference living labs), the adapted structure and representation were not sufficient to guide the partners using the tool.

As a complement to the structure and the representation the BMC Modelling Process was also adapted with refined questions to govern the parallel analysis and facilitate the development of a result, which was easy to compare. These questions are presented in table 3.3 in relation to the building blocks that they operationalize.

4 Business analysis of the SUNSET service: site-by-site

4.1 Introduction

In this chapter each Living Lab site is analysed in regard to business aspects based on the Business Model Canvas. It provides an overview of the SUNSET service from a business perspective in Enschede, Leeds and Göteborg. It comprises the site-by-site analysis performed in M13-15 by using the adapted Business Model Canvas as a tool for Business analysis (c.f. Appendices). This analysis creates the base for the comparison and comprehensive business models presented in chapter 5, as well as the generic business model for SUNSET presented in chapter 6.

In the business analysis different terms are used that could be interpreted in different ways. Therefore a short list of the terms used and how they have been operationalised is offered below:

- (SUNSET-)system: The entire system in a certain living lab/setting that is currently under development by the SUNSET-consortium, which includes: a mobile application, a web-portal, social network-applications, a city dashboard, incentives, experience-sampling questions and a third party control panel.
- (SUNSET-)service: The service that is delivered to a certain user of the SUNSET system. This generally consists of a selection of different parts of the SUNSET-system.
- Deployment: The deployment/operation of the system providing the service in a Living Lab or in another setting.
- (Mobile) application: The application an individual user of the SUNSET service can download for his/her Smartphone.

4.2 Business analysis of the SUNSET service in Enschede

4.2.1 The deployment of SUNSET in Enschede

In Enschede the SUNSET service will be deployed by the City of Enschede. This means that the city is the central organisation in the service that is responsible for the general management. The goals of the city are comparable to the SUNSET-goals (Reduced peak-hour car kilometres, increased road safety, environment protection and increased wellbeing of its citizens). The Enschede Living Lab will last for 12 months starting in July 2012. The first six months the beta version of the service will be tested and, based on the outcomes in that period, the full service will be developed and deployed in the subsequent six months.

4.2.2 The Business Model Canvas for the SUNSET service in Enschede

Since the test service will de deployed by the City of Enschede the business analysis is done from the city's point of view.

4.2.3 User segments in Enschede

In Enschede there are a number of user segments. They are:

- *Commuters in Enschede*: Since the service aims to reduce the number of peak-hour car kilometres in Enschede people that commute within the city are key users of the service. This user group can contain inhabitants of

Enschede, but also people that live in another municipality and work in Enschede. Within this group there are two sub-groups:
    - *Car commuters*: Although a lot has been done to promote sustainable ways of commuting still many people working in Enschede use the car to travel to their work. SUNSET particularly aims to change the travel behaviour of these people. In general we define a car commuter as someone who uses his/her own car at least three times a week to commute to and from work.
    - *Congestion busters*: This user segment includes people who have adopted less carbon intensive methods of travel or reduced their travel either because they are concerned about the environmental impacts of travel or for other reasons. These people use sustainable modes (like bicycle, public transport or walking) or share a car/ride to commute to work most of the times or work from home regularly. The aim with the service is that this group maintains and optimises its sustainable behaviour.
- *Fun app users*: Many, mostly young, people like to use apps and also spend a lot of time on social networking sites as Facebook and Twitter. These people will probably also be interested in using the service even if they do not belong to the user group of commuters. With their networks, these people can generate more additional interest and promote SUNSET in the wider community resulting in more users in Enschede.
- *Road authority*: As SUNSET partner and host of the Living Lab the City of Enschede itself also is a user of the service.
- *Third parties*: Third parties are individuals or organisations that use the service not for changing their own travel behaviour but for other purposes. These organisations/individuals can either be profit or non-profit and both public and private. There are different sub-groups in this user group:
    - *Incentive providers*: Third parties that use the service to give incentives to individual users of the service.
    - *Service providers*: Third parties that deliver a transport-related service, but that not necessarily provide incentives.
    - *Employers*: Third parties that want their employees to use the SUNSET service. To stimulate this they can also be incentive providers.
- *Early adopters*: Since the first part of the Living Lab is a testing period the service will first be used by a small number of early adopters. Early adopters are individuals or organisations from the above user segments (except the road authority, who, as a SUNSET consortium member, is an early adopter by default) that are also involved in the development of the service and act as ambassadors for it.

4.2.4 Value propositions in Enschede

The different user segments in Enschede all have their own value propositions of the service. All of them are described in this section.

Car commuters

Car commuters can benefit from the service since it can give advice how to reduce travel time and travel costs. The service informs car commuters about the real travel time and costs related to their travel behaviour and compares these to the costs and time of travelling by another mode or route. Informing car commuters in this way can make them aware of possible alternatives and can also encourage them to change their travel behaviour. A particular functionality of the service is that it can offer real-time traffic information on routes that car commuters use regularly. The service informs the commuter when a regular travel route is congested and advices which alternative (route/mode/another departure time) to take. Offering this information will reduce the time in congestion and hence the travel time and costs. It also empowers

people to change to more sustainable modes of transport and contribute to society because their travel results in less emissions and congestion.
Besides the ability to change car commuters' behaviour the service also offers fun and convenience to the users. Using the SUNSET service for instance gives all kinds of nice insights in one's mobility behaviour. It also gives information about how to travel (like bus routes and departure times), which makes travelling more convenient. Giving personalised information to the user is one of the functionalities which also make the service convenient.

Car commuters can share their achievements with their friends or colleagues. They can for instance show how much their CO_2 emissions have decreased or how many calories they burnt by walking and cycling. They can also share rewards they received for (changing) their behaviour. On social networks people can react on and 'like' these achievements which lead to recognition for the (former) car commuters. Sharing their benefits of using the service can also empower or encourage others to change their behaviour which might lead to further recognition for the SUNSET user.

A last value proposition for car commuters is that they can give direct feedback to the road authority. By sharing good and bad experiences of their trips with the road authority they can indicate what is good or should be improved. The road authority can react on this feedback and take action if necessary. In this way SUNSET users have influence on future improvements of the transport network/system.

Congestion busters
Like car commuters, congestion busters can use the service to be well informed about alternatives and the actual status of the network. They can also use this information to optimise their travel behaviour. The same accounts for the fun, convenience and feedback values of the service.

A value proposition that is slightly different for congestion busters is the social aspect. Rather than focussing on the changes of behaviour for car commuters, the congestion busters can share how "good" their mobility pattern already is and inspire others to join them busting congestion and travelling healthy. Small changes of improving your travel pattern even more, incentives that triggered a change in your behaviour and rewards earned can also be shared. Sharing their sustainable behaviour and achievements will increase the recognition of congestion busters. Making others change their behaviour will lead to even more recognition.

Fun app users
The value propositions of the SUNSET service for fun app users are comparable to that of car commuters and congestion busters. However the emphasis for them will be on the social and fun aspects of the service.

Road authority
The road authority can use the service to incentivise travellers and persuade them to change their travel behaviour. In this way they can reduce the congestion and CO_2 emissions on their network, but also encourage people to consider healthier travelling, which can lead to reduced healthcare or social security costs.

Another main value proposition for the road authority is that the SUNSET service offers a lot of monitoring possibilities. The service for instance tracks the (actual) traffic situation on the network. By doing so, it gives the road authority an overview of the traffic state on its network. This can be used to give real-time information on different information panels to people that are not (yet) involved in the project. It also serves as input for an analysis of the performance of the network that can be used for future

development of the network. Besides monitoring the network, also the travellers/users can be monitored. The road authority can for instance see how people reacted on incentives and what the network-wide effects of these reactions are. Other interesting data that can be monitored are: city-wide modal split and CO_2 emissions (to evaluate policy schemes), congestion locations (to determine future measures) and effects of particular events on the network (for future advice/measures). Also the feedback users give to the road authority can be used to make changes to the network/service.

Third party incentive- and service providers
Third party providers can use the service as a marketing tool. A bus company can for instance offer a discount for frequent passengers to attract more travellers and a retailer can offer a discount for customers that came by bicycle to affiliate itself as a sustainable company and attract more customers. Also healthcare insurance companies could use the service to stimulate or reward people with a healthy lifestyle that walk and cycle a lot. Using SUNSET this way might even help to reduce the healthcare costs of their clients.

Another reason for certain parties to provide incentives can be to acquire anonymised insight in the behaviour of their customers. Retailers might for instance be interested to know in which neighbourhoods their customers live to intensify their advertisement efforts based on that information.

Third parties that exclusively act as a service provider might provide information to the service about for instance actual travel information and get anonymised information about their customers in return.

Employers
Employers can also be involved in the SUNSET service. By stimulating their employees to use the system they can for instance reduce parking problems at their locations or they can reduce travel time and costs of their employees. Employers especially benefit from savings of costs and time during business trips. When employees walk and cycle (to their work) more often it might even lead to an increase of the well-being of their employees, healthier people and higher productivity. Employers can also choose to incentivise their own employees to stimulate behavioural change even more.

A possibility is to get aggregated data of employees. However the privacy aspect should be taken into account very cautiously here, since this may pose a risk in smaller companies.

Just like being part of the Twente Mobiel community or incentivising customers, being part of SUNSET can also be a way of affiliating as a sustainable and socially responsible company.

Early adopters
Early adopters have the same value propositions as users that start using the SUNSET service later. One difference is that they can use their role as front-runner for promotion or other purposes. The first experiences of the front-runner can also be used to change the service, which makes that early adopters can have influence on the service itself.

4.2.5 Channels in Enschede

Like in all Living Labs, the SUNSET service itself is the most important channel that is used to deliver value for the user segments in Enschede. The system consists of:

- The mobile application (primary channel)

- A web portal (secondary channel)
- Social network widgets/apps (primary)
- A city dashboard for the road authority/LL coordinator (primary)
- Incentives or the possibility for the LL coordinator to give incentives to individual users (primary)
- Experience sampling questions, to ask questions to individual users and give direct feedback to the road authority (primary)
- A third party control panel (secondary, will most likely not be incorporated in the system during the project)

The presence and values for users of the service should also be marketed and communicated to potential users of the service. Channels that are used in Enschede are:

- The municipal website and newspaper (Huis aan Huis)
- Social networking sites (like Facebook and Twitter)
- Regional newspapers and websites
- Posters
- Twente Mobiel employers group. This is a group of around 40 regional companies that committed to reduce peak hour car kilometres by 5% by using mobility management. Since this objective is similar to the SUNSET project ones, Twente Mobiel may become naturally a partner for SUNSET in Enschede.

4.2.6 Customer relationships in Enschede

When people become users of the SUNSET service, the relationship with them should be maintained. Because of time- and cost constraints the service itself will highly depend on self-service of the user. Communities may also be developed, in which different users can resolve each other's travel problems or questions. For convenience a FAQ should be added that is available on the web portal. Since the privacy aspect is a critical part in SUNSET, a detailed privacy explanation should be present on the web portal. Besides that an understandable description should always be shown when people give consent about the use of the app, the registration on the portal and the participation in the Living Lab.

Third parties (providers and employers) will get more personal assistance of the Living Lab Coordinator. Where possible Twente Mobiel will be used as a linking pin between the third parties and the City.

4.2.7 Revenue streams in Enschede

The SUNSET service is developed and maintained by the SUNSET consortium which means that these parties finance the system. These parties are both public and private. Because SUNSET is an FP7 project, a large proportion of the system is also financed by the European Union. The individual user does not pay to be able to use the service in Enschede, because this would be a barrier and a high volume of users is needed.

When the SUNSET project is finished the revenue model should be redesigned since EU funding will most likely be stopped. There are a number of potential designs:

- Mini payment for advanced services
- Third party users to pay
- Public finance

These are all discussed below.

Glodal figures indicate that over 90% of downloaded apps on Android and iOS platforms are free to download and use[2]. Since the focus on getting things free in the Netherlands is very high, this percentage is not expected to be lower in the Netherlands. Making people pay for the application will therefore most likely lead to a low number of users to reach the critical mass needed to make the service work efficiently. Therefore it is not desirable to let individual users pay for the use of the application. What commonly applies is to let people use the application for free, but demand a small payment in order to be able to use certain (advanced) functionalities. An example is the "Voetbal International" app that allows you to get football news and actual standings for free, but asks users to pay to obtain match details (like line-ups and goal scorers). For the SUNSET service it might be a possibility to give the core functionality for free but to charge a small amount (e.g. €0,99) for being able to obtain real-time information (push messages about your regular route) and the possibility to redeem points for physical/real rewards. Although it is not likely, at least not at a local scale, to cover all costs for the system, it does reduce the amount other parties would have to contribute. Before such a fee is introduced, more research should be done on the potential (negative) effects of such a revenue model.

Third parties are an important user group of the service. These parties can use the service as a marketing and information tool. The added value for these third parties can be quite substantial, which makes charging these parties for the use of the service is acceptable. Third parties can be charged for being able to incentivise users of the service (most likely in the form of a subscription), for the ability to obtain aggregated data and for advertising on the community/portal. However, this requires commuters to give consent to the service owners who may profit by selling aggregated data about their travelling behaviour to third parties.

When SUNSET proves to be a service that coaches people to make smarter choices to more sustainable modes regarding their travel behaviour, it might be that the city of Enschede, as road authority, decides to supply the funds that are needed to keep the SUNSET service up and running (maybe with support of regional subsidies). An advantage for them is that it offers them the possibility to have an overview of how the service is used keeping in mind the system objectives(e.g. the incentives that are provided). Funds could be secured by not increasing expenditure to perform specific research which, without SUNSET, would be essential to monitor policy effectiveness. When people really change their behaviour by using the system there is also less need for new (car) infrastructure. In this way the city could save a lot of money by not building this infrastructure which makes SUNSET a very cost-effective tool to facilitate mobility in Enschede.

Of course other potential revenue models can be designed. However, for now these models are the ones to focus on in Enschede. Alternative models are presented for Leeds and Göteborg as inspiration.

4.2.8 Social and environmental benefits in Enschede

There are both collective and individual social and environmental benefits of the SUNSET-service in Enschede.

Collective benefits

On a city-wide, collective, level the main benefits are the reduction of congestion and emissions and the insight in the traffic state of the network for the road authority. When enough car commuters change their commuting behaviour the total number of peak-hour car kilometres will decrease leading to less congestion. This will also lead

[2] http://www.insidemobileapps.com/2011/01/25/android-paid-downloads/

to lower emissions levels, both because some people would change to sustainable modes and thus others would experience less congestion. A benefit that is not directly linked to changes of individual behaviour is the insight that the data give in the traffic status on the network and about general travel behaviour. With these data, the road authority can analyse where problems occur that need to be solved by physical or non-physical measures. Monitoring the policy can also be done with the data, which saves other, possibly expensive, ways of data collection.

Individual benefits
For individual users of the service (e.g. commuters and fun app users) the main social benefits are less travel time, higher well-being and better health. By using the service it is expected that people reduce their travel time, leaving more time for other activities. Because the service gives the individual user insight in his/her own behaviour and supports him/her to make better travel decisions leading to increased well-being. Also the service makes people able to choose safe routes or increase their security by travelling alongside a buddy. It is expected that people deciding, with the help of the service, to cycle or walk more often will also experience a health improvement. Also the fun and social status aspects can increase well-being of individual users.

4.2.9 Key resources in Enschede

In Enschede there are different key resources that are needed to be able to deliver the value of the service to the different user groups. There are resources concerning users, the transport network and the SUNSET-service itself. The SUNSET-service is already discussed under "Channels in Enschede" (4.2.5), whereas the others are explained below.

In order to be able to use the service an individual should have a smartphone available including a battery with enough capacity to run the mobile application for at least one day and GPS functionality enabled.

To make the service work properly there is a need to know certain user characteristics, for instance its:

- Mode availability, to determine what alternatives the user has and what incentives could (not) be given.
- Vehicle type, to determine emissions and travel costs (if applicable).
- Length and weight, to determine calories burned (or use an average number).
- Working time flexibility, to determine what incentives (not) to give.
- Personal mobility footprint (will be done by the system).
- Actual location (with GPS), to base incentives on.
- Employer, to be able to give employer-specific incentives and compare within and between companies
- Social network activity. It is not required that people are active on social networks, however it is likely that the vast majority of users will already be active on other social networks.

To have a good functioning SUNSET service there is a need to know a lot about the transportation network, such as:

- The road and rail network that is available in and around the living lab, to match the trips on a map and determine the mode used. The modes the network should be available of are (at least): car, bus, train, bicycle and walking.
- The types of buses and trains, to determine e.g. CO_2 emissions of the different modes or the number of seats available.

- Real-time car-network travel information, to determine where congestion occurs or road works are carried out and to be able to determine the best alternative route/mode.
- Bus and train timetables (preferably real-time), to give (actual) and personalised information to users of the service and to determine the best alternative route/mode.
- Weather information, to determine whether bicycle is a convenient alternative as it is widely used in The Netherlands.

4.2.10 Key activities in Enschede

The value proposition of the service requires that a number of key activities are carried out. These activities are about management of the service that is done by human actors and activities which the SUNSET-service should perform itself.

Human actors have to perform the following activities:

- **General Living Lab management**: This includes the recruitment of users and third parties, making/entering incentives, aligning with key partners, providing and managing experience sampling questions and general help to users.
- **System management**: Which is about solving technical problems when they occur, hosting and general maintenance.
- **Run the application for some weeks**: The individual user should run the application for a given number of consequent weeks to let the system determine a mobility pattern where the incentives can be based on. The individual user hence has to have some patience before the service is running optimally.

The system has to perform the following activities:

- **Personal mobility monitoring**: The travel behaviour of an individual should be monitored using the mobile application.
- **Calculate mobility footprint**: The mobility footprint of an individual should be calculated. This footprint includes distance travelled, travel time, travel costs, emissions and calories burned.
- **Traffic monitoring**: The actual traffic situation should be monitored using the application and road-side sensors. Whether the latter is incorporated in the system is unknown at the moment. If it does, then the data has to be integrated in the system.
- **Incentivise users**: The key is to incentivise the right people at the right time using the Incentive Market Place.
- **Data storage and control**: The collected data should be stored in a protected location.

4.2.11 Key partners in Enschede

In order to obtain the key resources and to perform the key activities the Enschede LL needs different key partners. They are:

- The road authority (City of Enschede; http://www.enschede.nl/): For LL management and the real-time road-network information. Since the road authority is a SUNSET-partner and also owns a significant amount of important data this is a very close relation.
- The public transport authority (Regio Twente; http://regiotwente.nl/): Can be the linking point between the bus operator and the actual bus data . The relation with Regio Twente is not necessarily very tight since direct links exist to the bus operator too.
- Peek Traffic (http://www.peektraffic.nl/): This party delivers (real-time) information about traffic lights to the road authority (like throughput,

congestion and queues). Because of the importance of the data the relation should be a close one.

- Connexxion (http://connexxion.nl/, for Twente: http://twents.nl/) and NS (http://www.ns.nl/): These parties deliver (real-time) bus (Connexxion) and train (NS) information. Because of the importance of the data the relation should be a close one.
- Open Street Map (http://www.openstreetmap.nl/): This is the map used in the SUNSET-service to match trips to road segments. Since this is open software, the relation with OSM is a loose one.
- The SUNSET-consortium (http://www.sunset-project.eu/index.html): The consortium builds, hosts and maintains the service and also uses it for research and therefore the relation with the consortium is very close.
- Third party incentive providers: They deliver incentives and, by doing that, make the use of the service more interesting/valuable for potential users, especially when they offer a physical reward. The relationship with the incentive providers should be pretty close, especially when a business model is chosen where the road authority plays a smaller role.
- Employers: Employers can be used to recruit users for the living lab and can also act as incentive provider to its employees. The relationship with the employers is not very close, but also not too loose.
- Twente Mobiel (http://twentemobiel.nl/): The regional organisation for mobility management has a group of employers/companies that want to reduce peak hour car kilometres of their employees. Because of that they are the linking pin to get users (employees) and incentive providers (employers) in the living lab. Because of this important position in the service the relation with TM should be a close one.
- Marketing agency: To recruit users and make the service more attractive (NB: not during the SUNSET project, maybe later). When a marketing agency is used for recruitment and other communication it becomes a close partner.
- Emergency services: To obtain information about blocked routes because of accidents the emergency services could be contacted (NB: unsure whether this can be included). This information is nice to have, but not required. Therefore the partnership is a loose one.

4.2.12 Cost structure in Enschede

Different types of costs are induced for running the SUNSET service in Enschede. These costs are the costs to obtain the key resources and to perform the key activities. These can be categorised as investment costs, operating or running costs and costs for the individual user.

Investment costs

Investment costs are the costs that relate to the building of the SUNSET system itself. The largest proportion of these costs are man hours that are needed to build the software-side of the system. Since Enschede is the first Living Lab these costs are rather high.

Cost category	*Example of cost calculation*	*Key activity (in section 4.2.10)*
Building costs	Costs for building the system (Man hours * cost of man hour)	All system activities
Integration costs	Costs for integration (Man hour * No. of Resources * Resource price) * Number of data sources	Integration of the system with existing sensors

Table 4.1: Investment costs Enschede

Operating costs
Also a lot of costs are related to keeping the service running and operating it. The general management for instance takes quite some man hours and hence financial resources. Also the hosting and management of the system are costs which are induced during the operation of the Living Lab. Acquiring actual traffic information and real-time bus and train information can also cost in monetary terms. However public transport operators might be willing to share this information for free to get anonymised data in return or for the ability to give incentives. Also actual traffic information is already available at the city of Enschede, which means that no additional costs are induced for that information.

Cost category	*Example of cost calculation*	*Key activity (in section 4.2.10)*
General management	Man hours * cost of man hour * incentives given/ES-questions given/number of users/number of third parties * experience factor	General Living Lab Management
System management	General system management costs (Man hours * costs per man hour) + Troubleshooting costs (Man hours * cost of man hour) * number of problems	System Management
System hosting	Fee for internet hosting	Data storage and control
Marketing costs	E.g. Costs for promoting of the service to end users	General Living Lab Management
Data costs	Costs for real time PT information * days/months	Traffic monitoring
Support costs	E.g. Support resource or External service (Man hour * No. of Resources * Resource price) + (indirect costs for support activities)	General Living Lab Management

Table 4.2: Operating costs Enschede

User costs
For the user the main costs are the costs for mobile internet and the costs related to battery usage. Compared to the other costs these costs are considerably lower.

Cost category	*Example of cost calculation*	*Key activity (in section 4.2.10)*
Battery costs	Running hours * Consumption / hour * electricity costs	System activities performed by the mobile application
Mobile data charges	Running hours * used MB * price for MB	System activities performed by the mobile application

Table 4.3: User costs Enschede

4.2.13 Social and environmental costs in Enschede

In addition to real costs, social and environmental costs can be related to running the SUNSET-service is Enschede. Besides that also some potential risks can be identified.

Collective social and environmental costs
Although the objective of the service and its incentives is to reduce congestion and emissions on a system level it might work counterproductively. Giving the wrong incentives might for instance lead to an increase in congestion and emissions rather

than a decrease. When for instance people get a reward or points when they travel outside peak hours and everybody changes their car travel to a time period just after the peak period can lead to a new peak with a lot of congestion and emissions. On an individual level this undesirable use/effects of incentives can lead to higher travel times and costs.

Individual social and environmental costs
The risks are mostly on an individual level. In order to make the service work a lot of information about the individual and its travel behaviour has to be collected and stored. When this is not done in a responsible way data could end up with the wrong parties using it for the wrong purposes. Individual data hence have to be stored in a safe location and by a trusted organisation. In the first place the large need for personal data might keep people from using the service. When many people choose not to use (or stop using) the service it will not reach the system-level objectives of reduced car kilometres.

4.3 Business analysis of the SUNSET service in Leeds

4.3.1 The deployment of SUNSET in Leeds

In the city of Leeds the SUNSET service will be deployed by the SUNSET Consortium as a reference living lab. The University of Leeds will take the lead on the management of the SUNSET service. The objectives with the deployments are the same as the SUNSET goals, however reduced in scope in comparison to the scope of the deployment in Enschede. This is due to the fact that only part of the service is deployed in Leeds and that the time of the deployment is only six months. However as a part of the deployment the conditions for a permanent implementation of the service will be analysed, i.e. amongst other aspects identify potential local main organizations in the Yorkshire Region to run the service in this region.

There will be close co-ordination between Leeds City Council and the University of Leeds to optimise synergies. It should be highlighted at this point that due to the administrative context in the UK. Leeds City Council is not the road authority as in Enschede, which should be considered when contrasting the findings between the three Living Lab cities. It is anticipated that despite the duration of the Leeds Living Lab being six months, system and management improvements will be considered before the start of the LL based on transferable experience from Enschede.

Leeds City Council goals coincide with SUNSET objectives and are along the same lines with the wider regional objectives set out by the Local Transport Plan 2011-2016 issued for West Yorkshire by Metro. For example, the aims include:

- increasing bus journey time reliability from 69% to 73.6%
- improving (local) accessibility
- reducing the risk of injury or death in a traffic related accident
- increasing low carbon trips

In 2014 congestion and emissions reduction appear as key objectives in Leeds, in conjunction with references to safety and overall wellbeing of people living or working in West Yorkshire. The links of Leeds City Council with the local community in Leeds, along with the links with WYTN and the Green Employers group will be useful in the future deployment of SUNSET in this region.

4.3.2 The Business Model Canvas for the SUNSET service in Leeds

The business model canvas in Leeds is completed on the basis of the circumstances of the deployment of the SUNSET services in Leeds, namely that the consortium will run

the service in Leeds with the aim of eventual ownership by a regional stakeholder. That regional stakeholder could be either commercial or not for profit including the local city authority. The business model canvas then looks at the opportunities across the range of different actors within the region.

4.3.3 User segments in Leeds

The user segments in Leeds are comparable with the other Living Labs, but as in Göteborg, the deployment of SUNSET is more limited compared to Enschede due to infrastructure, time and administrative limitations. Since the road authority in Leeds and the UK operates in a non-comparable way with the other Living Labs, it is not directly included in the following user segments. Some of the user segments also coincide with the wider regional objectives, so there is a wider interest in these in addition to the particular SUNSET objectives.

- *Commuters in Leeds city centre*: aiming at reducing peak time kilometres travelled by car, the SUNSET service focuses on travellers who commute to/from Leeds. It is indifferent as to where these travellers reside, as long as they travel within Leeds city centre. Two specific categories of travellers form the focus here:

    - *Car commuters:* Car use is quite high in Leeds despite a range of soft measures taken to date to address congestion. Such measures include 2+ lanes, where cars with two or more passengers (including the driver) may drive on dedicated lanes or the city loop, overall public transport promotion, city centre public transport measures, promotion other travel modes such as walking and cycling. This user segment includes two sub-groups in Leeds: i) any car user driving in/out of Leeds city centre ii) any car user in the wider Leeds area. The first group is of particular interest to SUNSET due to the limited deployment of the service in Leeds, and the considerable congestion on main arterial routes at peak times. Trends in off-peak and dispersed origins and destinations mean it is also important to explore implications for car users who travel in other parts of Leeds even without entering the city centre area.

    - *Congestion busters:* This user segment includes people who have adopted less carbon intensive methods of travel or reduced their travel either because they are concerned about the environmental impacts of travel or for other reasons. This user segment is certainly influenced by its socio-economic status and overall household/employment arrangements. People included are those with the option to work from home, those who already use public transport, walk or cycle to work, those who have used public transport in the past or are keen in trying ride/car sharing. Whilst many of those in this segment will be people travelling to and from work it may also include those travelling regularly to specific locations for other purposes (e.g. social activity, sport activity, leisure).

- *Rail users/commuters:* Based on the wider West Yorkshire 5-year plan it is also useful to focus on the rail user customer segment, as it has been identified that trains in/around Leeds are overcrowded during peak times (both morning and evening).

- *Third party providers:* Another user segment of high interest in Leeds is third party providers, which may be interested in SUNSET for a wide range of reasons. This user segment may include diverse actors such as private firms

which may be local, national or even international, but also charities and other NGOs (Non-Governmental Organisations) who share common objectives with SUNSET. Thus, financial profit may be a driver for commercial organisations (e.g. in the transport, ICT, wellbeing, environmental sectors) to join SUNSET, but there may also be other drivers for non-profit organisations. There is further potential interest from public organisations, such as other local councils and boroughs around Leeds or other regions in the UK, or even the NHS (National Health Service).

- *Tech enthusiasts / Fun app users:* This user segment is considered as a minor one, however it has the potential to create additional interest and promote SUNSET in the wider community. It includes smartphone users who are interested and intrigued by applications used for fun (early adopters who may fall in the same category, are considered as a separate category below). This builds on the social network and incentives dimensions of SUNSET. It is not expected to be a large group of users due to SUNSET not aiming to compete with other fun apps, however it has the potential to develop this additional stream of interest resulting in more SUNSET users in Leeds. This expectation is founded on the fact that smartphone use in the UK and Leeds in particular has been quite high over the recent years.

- *Early adopters:* This is a small group, which forms a sub-group of quite a few of the previous user segments. As such the inclusion of this category highlights that the segments are not mutually exclusive and individuals may belong to more than one group and if identified they could be significant to the success of the SUNSET service implementation. There is a clear need to identify early adopters of technologies as a separate sub-group due to these users' potential influence. This user segment includes users which adopt the SUNSET service early. This offers them a dual opportunity:

i) to act as ambassadors and 'invite' other new users to the service (if they have a positive experience with the SUNSET service) or to create a stream of negative comments and 'discourage' other potential new users
ii) to influence the development of the SUNSET service in the Leeds Living Lab through their early input and feedback, thus contributing in developing research of European interest applied also in Leeds.

- *Employers:* Lastly, a significant user segment in Leeds is that of employers either in the city centre or outside. Again, this may include both commercial and non-profit organisations which are either private or public. The fact that Leeds City Council and University of Leeds have contacts with the Green Employers group (WYTN – West Yorkshire Travel Network) in Leeds means that this option will be certainly explored and is anticipated to yield some interesting findings.

4.3.4 Value propositions in Leeds

The potential of the SUNSET service in a city such as Leeds is highlighted through the value propositions for each user segment.

- ***Commuters***:
    - *Car commuters:* SUNSET can certainly bring additional value to car commuters in Leeds and this will be explored by focusing on a particular corridor (A61) linking the city centre with densely populated suburbs that have high car use or any other similar corridor. By offering more reliable travel time, car users of either of the two sub-groups explored in Leeds will have both time and cost benefits through

information about traffic level on their regular travel route and by providing them with the option to alter their regular travel route/pattern while contributing in their personal and community objectives. In addition the provision of information about individual travel behaviour and incentives to adopt alternative behaviours may result in other benefits particularly if the car commuters try any of the alternatives. For example using the bus and walking may be seen as time also spent exercising or working. Moreover, they may view the SUNSET service as an opportunity to have fun while/after travelling and share their achievements with friends. Additionally, there is an indirect value for car users through the provision of travel data to the road authority, which may improve their own trip or travel pattern too (in the future).

- *Congestion busters:* The value for congestion busters depends on whether they are people who work from home or are actually travelling. Benefits may be similar to those of car commuters since they are also anticipated to face lower travel time and cost in their journeys. SUNSET helps them optimise existing travel behaviour and the opportunity to gain incentives. In addition, they may also experience a better travel experience through improved convenience (e.g. less waiting time, more seats available on public transport), through increases in the number of travellers adopting similar travel behaviour, and a channel for direct feedback to LCC and Metro who are key stakeholders in public transport management in Leeds. Another option to offer value to them is through the SUNSET social network community, which is anticipated to add value for such users while offering more opportunities for collaboration and sharing.

- ***Third party providers:*** A variety of positive implications derive for third party providers. Initially, third party **incentive providers** will view the SUNSET service as a marketing platform to promote their business through direct marketing targeted at the right audience based on their location and time. Of course this will have to be conducted through aggregated data sharing, to avoid any negative implications and negative publicity about the SUNSET service regarding private data sharing. Hence, the service also offers the potential not only to attract new customers and maintain the existing ones, but also to improve the CSR (Corporate Social Responsibility) profile of a third party provider. Moreover, additional value and an emerging market may be created through the sale/rental of data to third party **service providers** who may link their own apps or develop new ones including input from SUNSET, as for example the CommuteGreener app.

- ***Operator:*** The SUNSET service offers additional value to system operators (e.g. LCC in Leeds) since this offers the opportunity:

  - to collect useful data about the transport network at no additional cost
  - to sell/rent these algorithms to interested third parties and benefit the local community through additional revenue or improved transport services.

- ***Tech enthusiasts/Fun app users:*** The value propositions of the SUNSET service for tech enthusiasts are comparable to those of car commuters and congestion busters. However the emphasis for them will be on the social and fun aspects of the service. Through their tech experience and expertise they

are anticipated, along with the early adopters, to contribute in the increased functionality and operational success of the SUNSET service in Leeds which will offer more convenience and higher value to them too.

- ***Early adopters:*** The segment of those adopting the SUNSET service early will benefit through the personalized travel advice which will be based on their individual or household needs. In addition, this opens the window for positive spill-over effects on their (physical or social network) community. Through this, they may attract more users to the SUNSET service and they may be rewarded through personalised incentives by SUNSET for doing so. Similarly to the tech enthusiasts, they are anticipated to contribute to the increased functionality and operational success of the SUNSET service in Leeds which will offer more convenience and higher value to them too. In addition, it will affirm their identity as ambassadors and early adopters of technology, which may have a dual positive impact for them personally as well as the SUNSET service.

- ***Employers****:* As previously described, employers in/around Leeds have the potential to benefit from the SUNSET service. As in Enschede, particular attention has to be paid on the anonymisation of data to avoid this service being used solely to track employees. Employees may benefit themselves through a better travel to work experience, improved safety and increased well-being overall, which may be reflected in the employer's brand (e.g. morale, recruitment) in the longer term. Employers will also be given the opportunity to improve their green and/or sustainable profiles through e.g. monitoring of their organizational/corporate carbon footprint. This may be then shared through their CSR reports, newsletters, websites or social networks. This may result in both monetary and/or sales rewards for certain organisations. Moreover, it may provide a good opportunity to plan workload and internal/external meetings more efficiently while reducing the organisation's travel/parking costs. Working individually or as part of a team while on a business trip e.g. on the train to/from Leeds suburbs is an example of additional value through SUNSET.

Overall, it should be apparent that there is a significant opportunity for value added through the SUNSET system. Nonetheless, it should be highlighted here that among the above there are some cases of double-counting potential benefits through value added, which needs to be considered when evaluating the SUNSET system in aggregate (WP6).

4.3.5 Channels in Leeds

A distinction has been made in Leeds regarding service delivery channels and service marketing channels. The former category includes the direct channels through which the SUNSET service will be deployed and delivered.

Service **delivery channels** may include the following:

- Smartphone app *(primary channel for commuters)*
- SUNSET web-portal *(secondary channel for commuters and third party incentive providers)*
- App Store / Android Market
- Social network widgets, mainly Facebook *(primary channel for commuters)*
- A dashboard for the LL coordinator (*primary for third party incentive providers)*
- Experience sampling / 'Contact City' functionality: providing a direct communication channel between travellers and the road/public transport authority or LCC *(e.g. for travellers to report transport problems and for the transport authority to report resolutions)*

- API for third party service providers to tap into *(primary channel for third party service providers)*

Regarding the service marketing channels, Table 4.4 presents a non-exhaustive list for Leeds, accommodating the fact that LCC is not the road authority in Leeds and will not be in charge of service deployment as in Enschede for example. Table 4.4 corresponds with section 4.3.4.

Channel	Example	User segment	Cost	Impact
SUNSET mobile app	Tripzoom	Car commuters	None	High
Other apps	Vouchercloud	Car commuters, Congestion busters, Tech enthusiasts, Early adopters	High (?)	Moderate/High
SUNSET web-portal	portal.tripzoom.eu	Car commuters, Congestion busters, Early adopters, Third party providers	None	Low
Social networks	Facebook, Twitter (incl. SUNSET and other FB groups with similar objectives)	Car commuters, Congestion busters, Tech enthusiasts, Early adopters, Third party providers	None / High (e.g. paid FB ads)	High
Employers	Green Employers group/WYTN	Employers	None	High
Newspapers/ Banners/Leaflets	LCC, Leeds University Newsletters, Radio channels, Yorkshire Evening Post, Metro Free Newspaper	Car commuters, Congestion busters, Tech enthusiasts, Early adopters, Third party providers, Employers	None	Low
Third parties	First Bus (other interested third parties already offering promotions), Metro/WYPTE	Congestion busters, Tech enthusiasts, Early adopters, Third party providers	None/High	Moderate/High
Miscellaneous	www.leedsletschange.co.uk, Local Councils websites (e.g.	Car commuters,	None	Moderate/High

	Harrogate, Rippon), Major event organisers (e.g. Leeds-Reading Festival, rugby, football or cricket games)	Congestion busters, Tech enthusiasts, Early adopters, Third party providers, Employers		

Table 4.4: Marketing Channels in Leeds

The deployment of the service in Leeds aims to transfer the responsibility of the service from the SUNSET consortium to the city or another stakeholder. One important challenge in transferring the service is to identify which channels can be effectively used by such a stakeholder or have to be developed in order to successfully run the service in Leeds.

4.3.6 Customer relationships in Leeds

All users will be initially supported by the SUNSET consortium to install and successfully run the SUNSET service. It would be useful to incorporate functions such as FAQ to resolve initial user queries, which may deter further system deployment. These are anticipated to be administered centrally by the SUNSET consortium. The situation in Leeds poses some challenges though in terms of language and available infrastructure and resources. The SUNSET web portal is the main way for communication with customers, while the Leeds SUNSET Facebook Group is another promising communication channel.

The SUNSET app offers personalised advice to the user. Because of resource constraints the service itself is anticipated to be highly dependent on user input and interaction. User communities offering live info, tips and travel advice may arise. Third parties (providers and employers) may get assistance from the SUNSET consortium in the first instance. Nonetheless, it would be useful to explore synergies between other stakeholders and service channels to test the viability of the SUNSET service after the LL. Building strong customer relationships during the LL is anticipated to be a key factor in achieving this.

4.3.7 Revenue streams in Leeds

The SUNSET service and app should (at least initially) be free in Leeds to boost interest and downloads. The SUNSET consortium should provide the service based on own funds (i.e. indirect subsidization of service). This means there will not be a revenue stream, at least initially. When the SUNSET project is finished the revenue model should be redesigned since EU funding will most likely be stopped. There are a number of potential designs:

- Mini payment for user collaboration
- Integration with existing digital services

These are all discussed below.

Revenue streams may arise through new SUNSET communities (medium/long term) e.g. micro-payments for providing car parking places (utilising residential parking facilities) to other interested SUNSET users. This would relieve congestion on busy streets and save time for these users, while creating limited additional income for providers. It may be provided through Facebook which would imply no cost for either party, but there are tax/legal implications which should be considered by the SUNSET consortium. SUNSET users may also develop a bike sharing scheme (in the medium term), which may be linked with Velocampus (or other similar schemes existing in

other cities). This could create additional income for bike owners/users. Leeds City Council may develop a small revenue stream by hosting the SUNSET portal and providing advertising space for interested third parties, potentially linking the service with www.leedstravelinfo.com (in the long term). This option may be explored with other existing apps too, since there are high levels of synergies. Moreover, the potential to offer health and exercise advice through the SUNSET community may create additional revenue streams and be of interest to the NHS (National HealthService).

Third party providers may have a small revenue stream based on incentives offered and the SUNSET app operation. This is anticipated to grow with time and future SUNSET success. Links with existing apps e.g. Vouchercloud, Quidco, Glympse, Foursquare, Strava, MapMyRun, MyFitnessPal, YourNextBus, City Car Club, insurance companies need to be explored since they provide good potential for mutual benefit and future revenue streams.

4.3.8 Social and environmental benefits in Leeds

The social and environmental benefits are categorised as both collective and individual.

Collective social and environmental benefits

Collective environmental benefits include lower fossil fuel use, emission and potentially noise levels from reduced kilometres travelled in Leeds which could also have positive financial implications for e.g. the NHS, logistics or insurance companies adopting the SUNSET service. Collective social benefits derive from reduced congestion and the resulting higher well-being for commuters or employees which may be translated in improved work performance. In the longer term, there may be implications for a healthier community, which may result in lower NHS costs.

Individual social and environmental benefits

Individual social benefits include living, travelling and working in a healthier, greener, safer urban environment, where commuters enjoy more efficient and flexible travelling. Minor financial benefits such as through travel cost reduction or micro-payments received may also improve social well-being. Reduced congestion may also result in marginal time benefits which can be used for more leisure activities or increased fun/quality time with significant others. Individuals may have the opportunity to accomplish more tasks due to better planning and reliable travel patterns. Well-being is anticipated to improve through accomplished challenges, third party incentives and rewards and/or social network development. Also the service makes people able to choose safe routes or increase their security by travelling alongside a buddy.

4.3.9 Key resources in Leeds

A range of resources are needed both by the users and the system to be able to deliver the value of the services to the diverse stakeholders. In order to be able to use the service in Leeds users must possess a smartphone (iOS/Android) with sufficient battery capacity to run the mobile application of the service for at least one day having the GPS constantly enabled. To maximize benefits of the SUNSET service in Leeds, it is essential to identify certain required resources. For instance, it is of essence for users to understand and provide:

- Mode availability; to determine what alternatives the user has and what incentives should or should not be offered.

- Vehicle type (e.g. car, bicycle); to determine emissions and travel costs in a detailed way.
- Smartphone features; to determine options and capabilities.
- Height and weight (of user); to determine calories burnt (personalised or as an average).
- Personal mobility footprint (provided through SUNSET); to determine what incentives should or should not be offered.
- Employment information e.g. employer's location, total staff number, working time flexibility.
- Actual location (based on GPS) to use in order to define the incentives suitable for the user.
- Social network activity via Facebook and Twitter.
- Work environment and active communities in this setting.
- Incentive schemes provided by third party incentive providers (e.g. Nectar points, Tesco clubcard, Boots card, BP/Shell reward schemes or MapMyRun, Strava apps incentives and rewards).

Additionally, it would be helpful in promoting the SUNSET service to have information about:

- Existing communities within the region to be utilized in order to promote the service.
- Ambassadors able to promote the SUNSET service; individuals who already have a strong position within existing communities (or 'gatekeepers') who by adopting the service endorse and promote the service e.g. City Car Club, Geocaching, UTravelActive, Velocampus.
- Incentives and rewards corresponding with individual user or broader Leeds City or West Yorkshire system objectives.

Furthermore, it is essential for users to have good understanding of the transport network in Leeds, including:

- The road and rail network that is available in Leeds and West Yorkshire, to be able to understand and match the trips on a map, as well as to determine the mode to be used. Any pedestrian or cycling route maps would be beneficial if they existed. The available mode options should include (at least): car, bus, train, bicycle and walking.
- The types of buses and trains, to determine CO_2 emissions of the different modes. Seat numbers in buses/trains would also be helpful.
- Real-time car-network travel information, to determine where congestion occurs or road works are carried out and to be able to determine the best alternative route/mode e.g. through www.leedstravelinfo.com or Google Traffic.
- Bus and train timetables (preferably real-time), to give (actual) and personalised information to users of the service and to determine the best alternative route/mode e.g. HopStop app. As defined in D3.3, it would be helpful to be able to provide a log of both planned and actual bus/train timetables.
- Weather information, to determine whether cycling or walking are appropriate alternatives.
- Any environmental data collected by sensors in the wider area or specific locations in Leeds.
- Any other relevant open data resources in the region that may support the service.

4.3.10 Key activities in Leeds

Based on the value propositions (section 4.3.4) and the previous section outlining the required resources, this section summarises the key activities needed to run the service in Leeds successfully. The following activities are about operating the application, managing and marketing the SUNSET service as well as recruitment.

Human actors have to perform the following activities:

- **Deployment management:** The SUNSET service has to be launched in Leeds and installed by individual users. A key activity is the detailed and accurate preparation of the deployment of the service to ensure reliable functionality of the service when introduced to end users.
- **Integration of the system with existing sensors**: In general, the SUNSET service has to be integrated with existing data sources providing relevant traffic data to the service. The only such sources available in Leeds are www.leedstravelinfo.com and Google Traffic, both of which provide aggregate information. The SUNSET consortium has to consider this specific context.
- **System management**: This activity refers to the resolution of any arising technical problems and general system maintenance.
- **General Living Lab management**: This includes the recruitment of users and third parties, developing and entering incentives, aligning with key partners in Leeds, developing and managing experience sampling questions and providing generic advice and assistance to users.
- **Usage**: Due to the nature of the SUNSET service, each individual user should run the application for 1-2 weeks to let the system determine one's mobility pattern and allow appropriate incentives to be developed and customised based on this mobility pattern. Hence, individual users need to be fully informed about this process and be patient when seeking outcomes.
- **Design and implementing incentives**: Appropriate individual and group incentives have to be designed and offered through the SUNSET service. One of the key activities is to identify and approach potentially interested third parties who share the SUNSET aspirations (D3.1). The impacts of these incentives have to be evaluated timely and systematically.
- **Promotional activities:** Since the Leeds LL aims at creating a considerable volume of users to allow meaningful comparisons, the service must be promoted accordingly to end user groups. After a critical mass has been created, it would then be more straightforward for the SUNSET service to promote itself using also social networks or word of mouth. Nevertheless, to reach this critical mass during the LL duration, a range of promotional and recruitment activities must be performed.
- **Data storage and identity management**: Since the SUNSET service automatically registers and stores sensitive user data, potential identity and privacy issues arise which should be considered. Appropriate checks and measures should be in place to address this issue, because this is a key activity in safeguarding the brand and reliability of the SUNSET service.

The system has to perform the following activities:

- **Personal mobility monitoring**: The travel behaviour of an individual should be monitored using the mobile application.
- **Calculate mobility footprint**: The mobility footprint of an individual should be calculated. This footprint includes distance travelled, travel time, travel costs, emissions and calories burnt.
- **Traffic monitoring**: The actual traffic situation should be monitored using the application and roadside sensors if available.

- **Challenge users through incentives**: The key requirement for this activity is to challenge the right people at the right time using the Incentive Market Place (D3.3).
- **Data storage and control**: The collected data should be stored in a secure location and access should be password protected.

4.3.11 Key partners in Leeds

A wide variety of partners should contribute in the successful deployment, promotion and operation of the SUNSET service in Leeds (as outlined above). A non-exclusive list of the key partners for this Living Lab is outlined here:

- Leeds City Council: including any support from the transport, planning, technical or IT departments.
- Metro, the West Yorkshire Public Transport Executive, which may facilitate collaboration with bus operators and public transport data use.
- Bus operators e.g. First Bus.
- Road authority: it would be very useful if the road authority would be a partner of the SUNSET service in Leeds.
- Other real time information providers e.g. train operators, traffic management authorities, community transport association, satellite navigation providers.
- Existing relevant app providers e.g. Vouchercloud, Quidco, Glympse, MapMyRun, MyFitnessPal, WalkIt.
- Policy makers who share similar objectives with SUNSET and see the potential future benefits for the wider Leeds area.
- The WYTN/Green Employers group, including Universities and Leeds Teaching Hospitals. Employers may act both as incentive providers, but could also aid in recruitment.
- Local businesses and large employers in Leeds, along with city centre or shopping centre retailers to offer incentives.
- Public and emergency service providers e.g. NHS, ambulance service, to receive information about accidents or road closures.
- Freight logistics companies to improve fuel consumption and potentially reduce their insurance costs or waiting in congestion time.
- Insurance companies to promote safer and more environmentally friendly driving.
- Private car hire operators, acknowledging the financial and environmental repercussions of offering trip sharing options to passengers.
- Car sharing groups e.g. City Car Club to promote more environmentally friendly and safer trips while ensuring safety.
- City centre car parks as incentive providers of real time information to reduce congestion during peak times.
- Bicycle schemes e.g. Velocampus / UTravelActive to promote cycling and exercise, increasing well-being.
- A marketing agency may be also considered as a key partner in the future aiding in promoting and publicising the SUNSET service in Leeds.

4.3.12 Cost structure in Leeds

Costs for transferring the SUNSET service in Leeds are only an estimate. They are divided in transfer costs (for deploying the system on the site), governing costs (for keeping the system running and market the service) and user costs (costs for the user).

Transfer costs

Since Leeds differs compared to Enschede or Göteborg in that there are less data, sensors and infrastructure available, this means that there are lower transfer costs. It also means that there are only installation costs and no integration costs compared to the two other Living Labs.

Cost category	*Example of cost calculation*	*Key activity (in section 4.3.10)*
Installation costs	E.g. Costs for installation support (Man hour * No. of Resources * Resource price) * scale factor of 100	Deployment management

Table 4.5: Transfer costs in Leeds

Operating costs
Total maintenance, management as well as overhead costs are included here. This means all required activities to run the SUNSET service as a business using this particular business model as the prime mechanism for management. It also means costs for hosting the system and facilitating key activities for running the service in Leeds. Furthermore, such costs are generated due to the incentive management and marketing activities that must be performed in order to design and deploy attractive incentives to users. Table 3 provides an estimation of the costs to govern the system in Leeds.

Cost category	*Example of cost calculation*	*Key activity (in section 4.3.10)*
General management (incl. Legal issues)	E.g. Costs for management (Man hour * No. of Resources * Resource price) + (other direct costs for management activities) + (indirect costs for management activities)	General Living Lab Management Identity and data management Legal documentation provision
System hosting	E.g. Fee for internet hosting	System Management Identity and data management
Incentive design and management	E.g. Incentive Manager (Man hour * No. of Resources * Resource price) + (costs for promoting SUNSET service to incentive providers) + (indirect costs for incentive management activities)	Design and Implementing Incentives
Marketing costs	E.g. Costs for promoting of the service to end users	Promotion activities (periodical)
Support/Admin costs	E.g. Support resource or External service (Man hour * No. of Resources * Resource price) + (indirect costs for support activities)	Operations management

Table 4.6: Operating costs in Leeds

User costs
As previously discussed, deploying the SUNSET service in all Living Labs generates user costs in the form of battery usage by the application and possibly additional mobile data charges due to increased smartphone usage. The value and benefits from using the SUNSET service must hence be greater for the individual user than these potential costs to attract and maintain interest.

Cost category	*Example of cost calculation*	*Key activity (in section 4.3.10)*
Battery costs	Running hours * Consumption / hour * electricity costs	Operate management
Downloaded data charges	Running hours * used MB * price for MB	Operate management

Table 4.7: User costs in Leeds

4.3.13 Social and environmental costs in Leeds

Environmental costs in Leeds may arise due to increased smart phone battery charging needs, both at an individual and city wide levels. Certain incentives e.g. alternative routes, treasure hunting or car sharing (D3.3) may result in increased trip volume and emissions for certain individuals or households. Moreover, any wrong incentives issued due to system errors or issued to multiple users may result in higher environmental costs at a system or city level.

Social costs may be faced for individual users at the initial introduction to SUNSET until the mobility pattern is developed due to increased battery charging or due to the time needed to familiarise with the SUNSET service. Any privacy or data storage issues may also be considered as social costs, particularly if/when such data are shared/managed by third parties. Lastly, there are obvious safety issues by potential smartphone loss due to the data stored in the smartphone or by sharing trips with new travel partners.

4.4 Business analysis of the SUNSET service in Göteborg

4.4.1 The deployment of SUNSET in Göteborg

In the city of Göteborg the SUNSET service will be deployed by the SUNSET Consortium as a reference living lab. This means that the consortium is the main organization that runs the service in Göteborg and is responsible for general management of the service during the reference Living Lab. The objectives of the deployment are the same as the SUNSET goals, however reduced in scope compared to the scope of the deployment in Enschede. This is due to the fact that only part of the service is deployed in Göteborg, that the time of the deployment is only six month and that no operating organization is defined for Göteborg beyond the SUNSET Consortium. However as a part of the deployment the conditions for a permanent implementation and transfer of the service will be analyzed, i.e. amongst other aspects identify potential local main organizations in the Göteborg region to run the service in this region.

4.4.2 The Business Model Canvas for the SUNSET service in Göteborg

Since the service is deployed by the consortium in Göteborg the business analysis is done from the perspective that the consortium runs the service within in the region during the project. In order for the service to be properly installed in the region after the living lab another operating organization must take the responsibility for the service in this city. In order to understand the SUNSET service as a business in Göteborg members of the Göteborg Region have been consulted to provide input for the analysis. The analysis hence focuses on the deployment of the service in the reference living lab in spring of 2013, however it also provides insights on other aspects to take into account e.g. if the service should be maintained in the region after the living lab has been concluded.

4.4.3 User segments in Göteborg

In the first deployment wave in Göteborg (the reference living lab) there are three major user segments for the service. These are:

- *Commuters within the Göteborg region*: In D1.1 the target group for Göteborg region is stated. People within households that preferably live outside the City of Göteborg and commute to and from the city centre, or vice versa people within households that live within the city who commute to other locations within the Göteborg Region. This segment of users can in turn be divided into two sub-categories:
    - *Car commuters*: People who commute to and from the occupation primary by using their own car – the aim with the service is to facilitate a change in their travel behaviour. Other characteristics for this initial user group is that they probably have:
        - Households with kids, are
        - Tech enthusiasts, are
        - Early adopters
    - *Congestion busters*: People who use public transportation or environmentally friendly means of transportation in the majority of their commute travels performed during a week – the aim with the service is to ensure that this group maintains and optimizes their use of public transportation and/or other environmental friendly means of transportation. Other characteristics for this first wave user group is that they have:
        - Households with kids, are
        - Tech enthusiasts, are
        - Early adopters
- *LivingLab Coordinator / Operating organization*: As SUNSET partner and host of the reference living lab the Viktoria institute also is a user of the service. After the living lab has ended another operating organization has to take charge of the service if it is to be maintained in the region.
- *Third party providers*: One type of third party providers is individuals or organizations, profit or non-profit, public or private that aim to provide incentives through the SUNSET service in the region. Another type of third party provider is operators of other digital services which can use the SUNSET service, features of the service, and/or data produced from the service as leverage for their own services.

4.4.4 Value propositions in Göteborg

The different user segments in Göteborg have their own value propositions of the service. These propositions are described in this section.

Commuters

Commuters will benefit from the service since they will receive a detail personal reflection of their travelling behaviour. This reflection includes an automatic detection of their travelling routes, means of transportation used as well as traveling time and costs spent (including congestion charges) and emission produced through their actual commuting. This recording can be compared with other means of transportation in order to see how much is saved or not saved by the commuter. Informing car commuters in this way, has the objective to make them aware of their spending as well as promoting alternative means of transportation in order for the commuter to reduce traveling time, money spent on commuting as well as reduce CO_2 emissions. Informing congestion busters has the objective to facilitate this group to even further optimize their commuting behaviour in regard to time travelled, money spent and CO_2 emissions released.

Both groups of commuters will through the service be supported with information about the traffic situation and also receive advice how to best manage obstacles (such as congestion and accidents on the route). In addition they will receive community functionality through the service, which makes it possible for each user to comment their traveling experiences to each of their friends who also is a member in SUNSET.

Based on their mobility patterns both groups of users will receive challenges in order to improve who they travel with. This challenge could be to either reduce the CO_2 emission released, time travelled, or money spent during their travelling. Achievement of these goals will consequently result in awards, which will benefit the user. This creates an opportunity for third party providers to use the SUNSET service as a channel to provide incentives to the users and also receive aggregated information about the travelling behaviour of travellers within the Gothenburg Region

LivingLab Coordinator / Operating organization
The Living Lab Coordinator (LLC)/Operating Organization (OO) can use the service to incentivise travellers and stimulate (coach) them to change their travel behaviour. In this way they can reduce the congestion and CO_2 emissions on their network, but also encourage people to develop healthier travel patterns.

Another main value proposition for the operator is that the SUNSET service offers a lot of monitoring possibilities. The system for instance tracks the (actual) traffic situation of the network. By doing so, it gives the LLC/OO an overview of the traffic state on the network. This can be used to give real-time information on different information panels to people that are not (yet) involved in the project. It can also serve as input for an analysis of the performance of the network. Besides monitoring the network, also the travellers/users can be monitored. The LLC/OO can for instance see how people reacted on incentives and what the network-wide effects of these reactions are. Also the feedback users give to the road authority can be used to make changes to the network/service.

Third party providers
Third party providers will benefit from the service in different ways depending on which type of provider they are. Third party incentive providers will benefit from the service as it will provide a channel for them to offer incentives and rewards to the users of the service, which in turn can be customers to their businesses. The SUNSET service will hence be a reliable way to both provide incentives to users and also to receive aggregated information about travellers behaviour, changes in this behaviour and feedback how the users view their incentives. Third party service providers will as customers benefit from the service as they can tap into the SUNSET service and use the data produced as input in their services. It can for example be the usage of aggregated commute behaviour data created through the SUNSET service or SUNSET user created data about the traffic situation or experiences through the usage of the SUNSET service.

4.4.5 Channels in Göteborg

Like in Enschede and Leeds the SUNSET service itself is the most important channel to deliver value for the user segments in Göteborg. The system consists of:

- The mobile application (primary channel for *commuters*)
- A web portal (secondary channel for *commuters* and *third party incentive providers*)
- Social network widgets/apps (primary channel for *commuters*)

- A dashboard for the LLC/OO (primary for *LLC/OO* and secondary for *third party incentive providers*)
    - Incentives or the possibility for the LL coordinator to give incentives to individual users (primary)
    - Experience sampling questions, to give direct feedback to the road authority (primary)
- API's for the LLC/OO and third party service providers to tap into (primary channel for *LLC/OO and third party service providers*)

The presence and values for users of the service should also be marketed and communicated to potential users of the service. Channels that are used in Göteborg are:

- The LL coordinators website: www.viktoria.se
- The Göteborg Region website: www.grkom.se
- The Lindholmen Science park website: www.lindholmen.se
- Local news papers
- Social networking sites (like Facebook and Twitter)
- Channels managed by third party providers

The deployment of the service in Göteborg in order for the service to be fully operational requires that the system is transferred from the SUNSET consortium to another operating organization. This might be the city or an external stakeholder organization. One important challenge in transferring the service is to identify which channels such an organization immediately can use or has to develop in order to successfully run and market the service in the region.

4.4.6 Customer relationships in Göteborg

Customer relationships in the initial deployment of the service will be catered by the SUNSET consortium. Users will be supported by the consortium in installing the service and during the first stage of service use. The mobile application and the portal will be used here as the primary channels to maintain the relationship with the user and the consortium behind the service. The aim is that the mobile service in itself will instruct the user how to use the service. The web portal will be used as a secondary mechanism to inform the user about the benefits of the service. Through the social network functionality additional support will be provided to different user groups.

One challenge in transferring the service to another organizational setting is to identify which channels that the future owner of the SUNSET service in the Göteborg region has could be co-utilized in order to ensure customer relationships in Göteborg. The service cannot live by its own, but it has to be integrated into an existing ecosystem, provide value to that system and also use the benefits provided in this large system of services.

4.4.7 Revenue streams in Göteborg

It is not a viable revenue model in Göteborg to let the users pay for the SUNSET service through an installation fee. In order to create a critical mass of users the assumption is that the service must be provided free with one or several valuable features to the users in this region. On the other hand revenues must be created in order to make the SUNSET service sustainable over time. When the SUNSET project is finished the revenue model therefore should be redesigned since EU funding will most likely be stopped. There are a number of potential designs in Göteborg, for example:

- Third party subscription
- Advertisements
- Integration of the SUNSET service in an existing third party provided digital service (public or commercial)

These are all discussed below.

Revenues can be created by letting the third party incentive providers subscribe on the possibility to both deliver external incentives through the service to targeted users in order to receive aggregated information about travellers' behaviour, which they can use in order to understand how people commute and travel in the region. In other words the revenue streams of the service in Göteborg build on the idea that the service is viewed by the third party incentive provider as a reliable channel to reach targeted customers (i.e. all or some of the commuters using the SUNSET service). It also builds on the idea that the third party incentive provider views the data which can be provided from the service about their customer behaviour as a commodity that they accept paying for in order to receive. This in turn requires that the commuters accept that the owners of the service may profit on selling aggregated data about their traveling behaviour to third parties.

Another source of revenue is viewing the SUNSET service as a channel for advertising. When using the service the commuters receive advertisements about external products and services that match their profile and their travel behaviour. The providers of such advertisements then receive a reliable and accurate channel for marketing their services and products.

Both of these examples point toward a market financed model of the SUNSET service in the Göteborg region, if the SUNSET service after the LL should stand alone in the region. One key success factor enabling this model is that the number of users rapidly increases in Göteborg, which in turn requires that the consumer in large sees the benefits and potentials of the service. Both of these models build on the assumption that the SUNSET service by the third party provider is viewed as an attractive channel to reach their customers and also a reliable channel to learn more information about their customers. The key here is to create a large group of users.

Another way of thinking about the revenue streams in the Göteborg region is to not create a large user group but instead use the SUNSET service as a basic platform of services on which advanced services for e.g. ride sharing, traffic information and advice, traveling behaviour, commute support is developed or used to further develop existing services (e.g. Västtrafiks Travel Planner, CommuteGreener service for commuting). In doing so the SUNSET service is transferred into an existing ecosystem of services and can tap into the users that these services already have and also use the value that these brands already have. This model is based on the idea that the SUNSET service is injected into an existing revenue stream and an existing group of users.

4.4.8 Social and environmental benefits in Göteborg

What are the social and environmental benefits of the SUNSET service in Göteborg? This question can be addressed both from a collective perspective (hence the city, the region or the users of SUNSET) or from an individual perspective (hence the commuter).

Collective social and environmental benefits

From a collective perspective, the basic use of the SUNSET service in Göteborg will lead to less congestion in the commuter corridors to and from the city centre. Less congestion means that the traffic flow within the city improves which results in a community that has higher well-being both during working hours but also after working-hours.

Individual social and environmental benefits

From the individuals' perspective the SUNSET service will support the individual commuter by providing a mirror to him or her about the commuters' own traveling behaviour. It will also inform the commuter about the traffic situation, which enables the commuter to take better decisions before and during commuting. This will create a more efficient and flexible commuter as the SUNSET service supports the commuter to better succeed in the everyday life puzzle to and from work. Besides that people can also choose safe routes or increase their security by travelling alongside a buddy.

4.4.9 Key resources in Göteborg

In Göteborg different resources are need to be able to deliver the value of the services to different stakeholders. In order to be able to use the service in Göteborg the individual must possess a smartphone with a battery capacity to run the mobile application of the service for at least one day a with the GPS enabled. In order to make the service work properly in this area, there is a need to identify certain characteristics of the user, for instance it is of essence to understand:

- Mode availability; to determine what alternatives the user has and what incentives that should or not should be given to the user.
- Vehicle type (e.g. car); to determine emissions and travel costs in a detail way
- Height and weight; to determine calories burned (or use an average number)
- Personal mobility footprint; to determine what incentives that should or not should be given.
- Actual location (based on GPS) to use in order to define the incentives suitable for the user.
- Social network activity via Facebook and Twitter.
- Existing communities within the region to be utilized in order to promote the service.
- Ambassadors promoting the service. Individuals who have an already strong position within existing communities who by adopting the service endorse and promote the service.
- Work environment and communities which are active in this environment.
- Incentive schemes provided by third party incentive providers.

To have a good viable SUNSET service also requires to understand and connect the transport network in the region, such as:

- The road and public transportation network that exists in the Göteborg region as well as the city of Göteborg
- The types of vehicle that the public transport agencies use in the region; to determine CO_2 emissions of the different modes available and the number of seats available
- Real-time car-network travel information, to determine where congestion occurs or road works are carried out and to be able to determine the best alternative route/mode
- Bus and train timetables to give actual and personalized information to users of the service and to determine the best alternative route/mode
- Environmental data collected by sensors in the network
- Other open data resources in the region that may support the service.

4.4.10 Key activities in Göteborg

The value proposition of the service in Göteborg consequently means that a number of key activities must be carried out in order to run the service. These activities include the operation of the application, the management of the service, as well as recruitment and marketing of the service.

Humans have to perform the following activities:

- **Deployment management:** The SUNSET service has to be launched and installed in the area. A key activity is preparing the deployment of the service and deployment in itself in order to secure reliable usage of the service when introduced to the end users.
- **Customization management:** The SUNSET service might have to be customized in regard to the application, API's, and portal to the local environment in the region. Key activity is preparing the application for the region (i.e. develop suitable features and/or widgets) in order to secure extended usage of the service when introduced to the end users.
- **Integration of the system with existing sensors**: The SUNSET service has to be integrated with existing data sources providing relevant traffic data to the service.
- **System management**: Which is about solving technical problems when they occur and general maintenance.
- **General Living Lab management**: This includes the recruitment of users and third parties, making/entering incentives, aligning with key partners, providing and managing experience sampling questions and general help to users.
- **Operational management**: The individual user should run the application for some weeks to let the system determine a mobility pattern where the incentives can be based on. The individual user hence has to have some patience before the service is running optimally.
- **Design and implementing incentives**: Incentives must be designed and implemented in the service. The impact of the incentives must be evaluated
- **Promotion activities:** In order to create a critical mass of users the service must be promoted to the end user groups. When a critical mass is created then the idea is that the service promotes itself and that word of mouth markets the service. However in order to reach this critical mass, different promotion activities must be performed.
- **Integrity and privacy management**: As the service automatically registers and stores sensitive data about the user, potential integrity and privacy issues must be managed and prevented. This is a key activity in order to safeguard the reliability of the service.

The system has to perform the following activities:

- **Personal mobility monitoring**: The travel behaviour of an individual should be monitored using the mobile application.
- **Calculate mobility footprint**: The mobility footprint of an individual should be calculated. This footprint includes distance travelled, travel time, travel costs, emissions and calories burnt.
- **Traffic monitoring**: The actual traffic situation should be monitored using the application and road side sensors.
- **Incentivize users**: The key is to incentivize the right people at the right time using the Incentive Market Place.
- **Data storage and control**: The collected data should be stored in a protected location.

4.4.11 Key partners in Göteborg

In order to obtain key resources, perform key activities and deliver the value of the service to the intended user groups the SUNSET Consortium needs different key partners in Göteborg. They are:

- The Göteborg Region (http://www.grkom.se) which already is a companion to the project.
- On-going research and innovation programs in the region (such as ISET): This research project has made traffic relevant data available in Sweden and it is a resource for the service (http://web.viktoria.se/iset/)

- Trafiklab.se: This hub of traffic data provides traffic relevant data to the SUNSET service (http://www.trafiklab.se/)
- The city of Göteborg and Trafikkontoret Göteborg (http://www.goteborg.se)
- Trafikverket Väst (http://www.trafikverket.se)
- Västtrafik: Public Transit Authority in the Göteborg region (http://www.vasttrafik.se/)
- Operators of public transportation in the region: For example nettbuss (http://www.nettbuss.no/)
- The SUNSET-consortium: The consortium builds, hosts and maintains the service and also uses it for research. (http://www.sunset-project.eu/)
- Third party incentive providers: They deliver incentives and, by doing that, make the use of the service more interesting/valuable for potential users, especially when they offer a physical reward.
- Third party service providers: By tapping into the SUNSET service, utilizing data that this service provider needs, the value of SUNSET could be elevated and also the service could be diffused to new user groups. Trafiklab.se is a potential channel to use in order to market SUNSET to third party service providers. One example of potential third party service provider to create an alliance with is CommuteGreener (http://www.commutegreener.com/)
- Lindholmen Science Park (http://www.lindholmen.se/)
- Västsvenska paketet. The West Swedish Package includes a number of projects in the Göteborg region aiming to improve the transport infrastructure. The objective is to significantly increase the use of public transport, create an effective railway network, promote new road projects and develop better conditions for cyclists. The West Swedish Package costs SEK 34 billion, and the financing consists of 50 per cent State funding and 50 per cent local and regional funding. Regional co-financing, which includes measures such as a congestion charging, is a precondition for it being possible to finance the package. Without the congestion charge it would not be possible to implement the initiatives during the same period of time. The congestion charge, which will be introduced on 1 January 2013, will reduce congestion and produce a better environment. (http://vastsvenskapaketet.se/)

4.4.12 Cost structure in Göteborg

Costs for deploying the SUNSET service in the Göteborg Region is only an estimation. These costs are divided into transfer costs (for deploying and customizing the system for the site), operating costs (for keeping the system running and market the service to stakeholders) and user costs (costs for the user).

Transfer costs

The deployment of the SUNSET service in the Göteborg Region means costs for integrating the system and the service into the data sources provided in Göteborg. For example costs for integrating the service in the real time data sources provided by Trafikverket, Västtrafik, Trafikkontoret Göteborg and Trafiklab. It also means costs for deploying the service and create a reliable release of the service for the users in the region. Table 4.8 provides an estimation of the costs to initially transfer the system in the Göteborg Region

Cost category	*Example of cost calculation*	*Key activity (in section 4.4.10)*
Integration costs	E.g. Costs for integration (Man hour * No. of Resources * Resource price) * Number of data sources	Integration of the system with existing sensors
Customization costs	E.g. Costs for customization (Man hour * No. of Resources	Customization management

	* Resource price) * scale factor of 100	
Installation costs	E.g. Costs for installation support (Man hour * No. of Resources * Resource price) * scale factor of 100	Deployment management

Table 4.8: Transfer costs in Göteborg

Operating costs

Deploying the SUNSET service in the Göteborg Region also generates costs for the general management of the service in the region. This means the activities to run the service as a business using this business model as the prime mechanism for management. It also means costs for hosting the system and facilitate the key activities for running the service in the Göteborg region. In addition costs are generated from the incentive management and marketing activities that must be performed in order to design and deploy attractive incentives to the users. Table 4.9 provides an estimation of the costs to govern the system in Göteborg region.

Cost category	*Example of cost calculation*	*Key activity (in section 4.4.10)*
General management	E.g. Costs for management (Man hour * No. of Resources * Resource price) + (other direct costs for management activities) + (indirect costs for management activities)	General Living Lab Management Integrity and privacy management
System hosting	E.g. Fee for internet hosting	System Management Integrity and privacy management
Incentive design and management	E.g. Incentive Manager (Man hour * No. of Resources * Resource price) + (costs for promoting SUNSET service to incentive providers) + (indirect costs for incentive management activities)	Design and Implementing Incentives
Marketing costs	E.g. Costs for promoting of the service to end users	Promotion activities
Support costs	E.g. Support resource or External service (Man hour * No. of Resources * Resource price) + (indirect costs for support activities)	Operate management

Table 4.9: Operating costs in Göteborg

User costs

Deploying the SUNSET service in the Göteborg Region generates costs for battery usage of the application and possibly extra mobile data charges from using the smartphone. The value from using the service must hence be greater for the individual user than these potential costs might generate.

Cost category	*Example of cost calculation*	*Key activity (in section 4.4.10)*
Battery costs	Running hours * Consumption / hour * electricity costs	Operate management System activities as presented in 4.4.10
Mobile data charges	Running hours * used MB * price for MB	Operate management System activities as presented

		in 4.4.10

Table 4.10: User costs in Göteborg

4.4.13 Social and environmental costs in Göteborg

During the analysis, it has not been possible to specify any environmental costs connected to the deployment of the SUNSET service in the Göteborg Region. However possible social costs from using the service in Göteborg has been revealed by the analysis. As SUNSET automatically traces and records the mobility pattern of the individual user this might results in privacy and integrity issues, i.e. costs, for the user in question. In a pre living lab survey in Göteborg 35% of the pilot test respondents indicated that they to some extent see risks with the service as it automatically records the traveling behaviour. Additional research must be performed in order to fully understand these risks and how they can be countered in order make the service reliable for the user and to reaffirm its business potential.

5 Comparison and Living Lab Business Models

In this chapter the results from the site-by-site analysis (presented in ch 4) are compared. This in turn provides a basis for transforming the results of the business analysis into one aggregated comprehensive business model for each LL, creating a baseline for a generic SUNSET business model (presented in ch 6). After the comparison of the business analysis, a business model for each LL, is included to get a better and more graphical overview of the models and their mutual differences.

5.1 Comparison

Table 5.1 presents a comparison of the analysis. The comparison is organized based on the building blocks used to perform the site-by-site analysis. An in-depth examination of the comparison points towards a number of similarities between the three living labs. This is for example evident in regard to block 4 Relationships as all three cities rely on a model in which customer relationship is a product of user self service. The distribution channels (block 5) are also similar. The core of the business in all three sites is the SUNSET service with the mobile application (in iPhone and Android OS) as primary channel for the commuter. Additionally, the core in all three sites is also widgets, the portal and the dashboard.
Differences in the results of the analysis are however evident in blocks 1 and 2 value proposition and users, block 9 revenue models and in block 5 key activities, as the transfer of the service in a higher degree than in Enschede requires integration and customization as well as marketing and promotion in the other LLs. The intended user segments (block 2) and value propositions (block 1) differ amongst the three cities. In the analysis of Enschede the highest number of targeted user segments is identified which coincides with the fact that this site is the main Living Lab, with a committed operating organization (the City of Enschede) also after the Lab. The number of targeted users in Göteborg in contrast is only three. The primary user group is commuters, which is the main targeted user segment in all three labs. Targeted users are also here the operating organisations and in addition any third party providers of both incentives and external services at this location. The motive for viewing a lower number of user types in this region is that no strong future operating organization has been defined for this region. Hence, the future scope of the SUNSET service in Göteborg and Leeds is not as clearly defined as in Enschede, and consequently not as many potential user types with value propositions as in Enschede may be defined with certainty yet.

The unclear scope also affects which revenue models (block 9) are proposed in the analysis for the three cities. In Enschede a model with three pillars is suggested, with public finance as one important pillar, micro and third party payment as two additional. In Leeds and Göteborg more market-based models are suggested, as the two cities are not intended to operate the system in these regions. In Göteborg, third party incentive providers could be offered to subscribe to the service in order to receive a reliable channel to reach targeted user groups based on the users travel behaviour. The incentive providers will in exchange for the fee receive the possibility to incentivise the user and also receive aggregated information about the commute habits of the targeted users. Offering the service as a channel for advertisements from the provider to a specific user group based on their commute profile could, in addition, create a second revenue stream. To this stream, a third market oriented revenue model could both in Leeds and Göteborg be to integrate the whole SUNSET service or parts of it in existing external digital services. Third party service providers (public or commercial) could consequently rent SUNSET features on licence and integrate them into their own digital services tapping into the values that the SUNSET service provides.

Pillar	Block	Enschede (Main Living Lab)	Leeds (Reference Living Lab)	Göteborg (Reference Living Lab)
Product	1 Value Proposition (ch. 4.2.4, 4.3.4, 4.4.4)	Multiple value propositions for different target user groups: in total 8 propositions identified	Multiple value propositions for different target user groups: in total 7 propositions identified	Multiple value propositions for different target users; in total 3 propositions identified
User interface	2 Target Users (ch. 4.2.3, 4.3.3, 4.4.3)	Number of target user groups: 8 Commuters (Car commuters & Congestion Busters); Fun app users; Road authority; Third parties (Incentive providers, Service Providers & Employers); Early adopters	Number of target user groups: 7 Commuters (Car commuters & Congestion Busters); Rail users/commuters; Fun app users / tech enthusiasts; Third party providers; Early adopters; Employers	Number of target user groups: 3 Commuters (Car commuters & Congestion Busters); Living Lab Coordinator / Operating organization; Third party providers
	3 Distribution Channel (ch. 4.2.5, 4.3.5, 4.4.5)	Channels for service distribution: 5 primary, 2 secondary. Channels for marketing: 5	Channels for service distribution: 4 primary, 3 secondary. Channels for marketing: 8	Channels for service distribution: 5 primary, 1 secondary. Channels for marketing: 6
	4 Relationship (ch. 4.2.6, 4.3.6, 4.4.6)	Main CRM: self service relationship management. Alternative CRM: Third parties need personal relationship management	Main CRM: self service relationship management. Alternative CRM: Third party user communities and CRM	Main CRM: self service relationship management. Alternative CRM: Social network functionality
Infrastructure management	5 Value Configuration; i.e. key activities (ch. 4.2.10, 4.3.10, 4.4.10)	Human: General LL Management, System Management, Usage. System: Monitoring, Calculation, Incentive provision, Storage and Control	Human: Deployment mgmt, Integration, System mgmt, General LL mgmt, Design and implementing incentives, Promotional activities, Data storage & mgmt. System: Monitoring, Calculation, Incentive provision, Storage and Control	Human: Deployment mgmt, Integration and customization, System mgmt, General LL mgmt, Design and implementing incentives, Promotion activities, Integrity and privacy mgmt. System: Monitoring, Calculation, Incentive provision, Storage and Control
	6 Capability; i.e. key resources (ch. 4.2.9, 4.3.9, 4.4.9)	User provided resources: Mode availability, Vehicle type, Length and weight, Working time flexibility, Personal mobility footprint, Actual location, Social network activity, Employer. System provided resources: transport network data	User provided resources: Mode availability, Vehicle type, Length and weight, Working time flexibility, Personal mobility footprint, Actual location, Social network activity, incentive schemes, Employer. System provided resources: transport network data, weather information, open data relevant for SUNSET. Other resources: existing communities, ambassadors, broader incentive schemes	User provided resources: Mode availability, Vehicle type, Length and weight, Working time flexibility, Personal mobility footprint, Actual location, Social network activity, incentive schemes, Employer. System provided resources: transport network data, open data relevant for SUNSET. Other resources: existing communities, ambassadors, broader incentive schemes

	7 Partnership; i.e. key partners (ch. 4.2.11, 4.3.11, 4.4.11)	The road authority in Enschede, Public transport authority, Peek Traffic (third party), Connexxion, NS, Open Street Map, SUNSET-consortium, Incentive providers, Employers, Twente Mobiel, Marketing agency, Emergency services	Leeds City Council, Metro, Bus operators, Road authority, Real time information providers, Third party service providers, Policy makers, Employers, Emergency services, Car sharing groups, SUNSET-consortium, Bicycle schemes, Marketing agency	The Göteborg Region, The City of Göteborg, Trafiklab.se (provider of open data), Ongoing research innovation and projects, The national traffic authority, Operators of public transportation, SUNSET-consortium, Third party incentives and service providers, Lindholmen Science Park,
Financial aspects	8 Cost Structure (ch. 4.2.12, 4.3.12, 4.4.12)	Number of cost categories: 3; Investment costs (building, integration, installation), Operating costs (general mgmt., system mgmt., marketing, data costs, support), User costs (battery and mobile data charges)	Number of cost categories: 3; Transfer costs (installation), Operating costs (general mgmt, system hosting, incentive design and mgmt., marketing, support/admin costs), User costs (battery and mobile data charges)	Number of cost categories: 3; Transfer costs (integration, customization, installation), Operating costs (general mgmt, system hosting, incentive design and mgmt., marketing, support costs), User costs (battery and mobile data charges)
	9 Revenue Model (ch. 4.2.7, 4.3.7, 4.4.7)	Number of suggested models: 3; Mini payment for advanced services, Third party users to pay, Public finance	Number of suggested models: 2, Mini payment for user collaboration, Integration with other external (commercial or public) digital service,	Number of suggested models: 3; Third party subscription, Advertisements, Integration with other external (commercial or public) digital service
Sustainability	10 Social and environmental costs (ch. 4.2.13, 4.3.13, 4.4.13)	Collective: wrong incentives might lead to increase in congestion and emissions. Individual: risks connected to personal integrity	Collective: wrong incentives might lead to increase in congestion and emissions. Individual: risks connected to personal integrity	Collective: wrong incentives might lead to increase in congestion and emissions. Individual: risks connected to personal integrity
	11 Social and environmental benefits (ch. 4.2.8, 4.3.8, 4.4.8)	Collective: reduction of congestion and emissions and insights in the traffic state of the network, improved work performance, healthier community. Individual: less travel time, increased health, more fun, higher well-being	Collective: reduction of congestion and emissions and insights in the traffic state of the network, improved work performance, healthier community. Individual: less travel time, increased health, more fun, higher well-being	Collective: reduction of congestion and emissions and insights in the traffic state of the network, improved work performance, healthier community. Individual: less travel time, increased awareness of costs, higher well-being

Table 5.1: Comparison of the site-by-site Business Analysis

5.2 Business Model Enschede

In figure 5.1 the business model for the Living Lab Enschede is presented. The main stakeholders in Enschede are the commuters and fun app users in Enschede. The TripZoom mobile application (the SUNSET mobile application) provides a personal mirror of their travel behaviour to these targeted users of the SUNSET service. As described in section 4.2.4 the commuters are divided into car commuters (which should be coached to change travel behaviour) and congestion busters (already sustainable users which are supported by the service to optimize their behaviour). The fun app users use the service mainly because they like to track their travel behaviour and share it with their friends, but can also optimise their behaviour. These groups receive a personal mirror of their behaviour through the app. They will also receive incentives (challenges) and rewards based on their behaviour. A possibility to get some revenue is to charge users for advanced functionality of the service (e.g. actual alerts and information and the ability to redeem points) (marked with a small **+€** in the model). In addition they will be able to provide input through responses regarding their experiences from travelling in the city and also to generate and use travel advice that is integrated in the app and the data platform.
Users can also connect the service to their Social Network accounts and share their mobility pattern and achievements there. Also comparing with friends or colleagues is done using social networks, which makes them an integral part of the service that is delivered to the individual users.

Through the Tripzoom Portal the value of the service will be marketed to new potential users. With support of this portal they will be able to register to the service and become members of the SUNSET service.

The Dashboard provides value to the Living Lab Coordinator of the service in Enschede (City of Enschede). The LLC will use the portal to monitor the behaviour of users in Enschede. This can replace other monitoring efforts or infrastructure investments and hence lead to an indirect revenue (marked **(+€)** in the model). Using the Dashboard the LLC will also be able to incentivise the commuters to change or enhance their travel behaviour by providing incentives and by giving rewards. They will also be supported in asking the users experience questions that will give the LLC feedback from the users regarding the service and also the travel experience in the Living Lab.

The LLC will also be able to provide aggregated information about targeted user groups to third party incentive providers and employers. They might be able to subscribe on the opportunity (described in 4.4.7) to use the SUNSET system as a reliable channel to reach individual users (e.g. incentivising them) and also receive aggregated information about their behaviour and their views of the incentives provided by the third party incentive provider. Employers (e.g. from the Twente Mobiel employers group) can get aggregated info about the travel behaviour of their employees and can also incentivise them. In this use case the LLC acts as a broker between the Third Party Incentive Provider and the individual users. These subscriptions could be a major revenue stream when the SUNSET project will have ended and other revenue models have to be determined, in particular when the Enschede Business Model will be intended to stand alone without governmental funding (marked **+€** in the model).

Data generated from the SUNSET system provides also value to other stakeholders. For third party service providers aggregated data from the SUNSET service can be useful in enhancing their existing services (e.g. Connexxion, Dutch Railways and Regio Twente). One complementing revenue stream is identified here. The use of the

aggregated data by Third Party Service provider can be charged (also marked **+€** in the model). This revenue stream can in turn be used to finance the deployment of the SUNSET System in the city of Enschede.

The cost structure of SUNSET (marked as **-€**) is described in section 4.2.12 and is initially related to the investment costs to build the system and the costs to operate it in the Living Lab environment including user related costs.

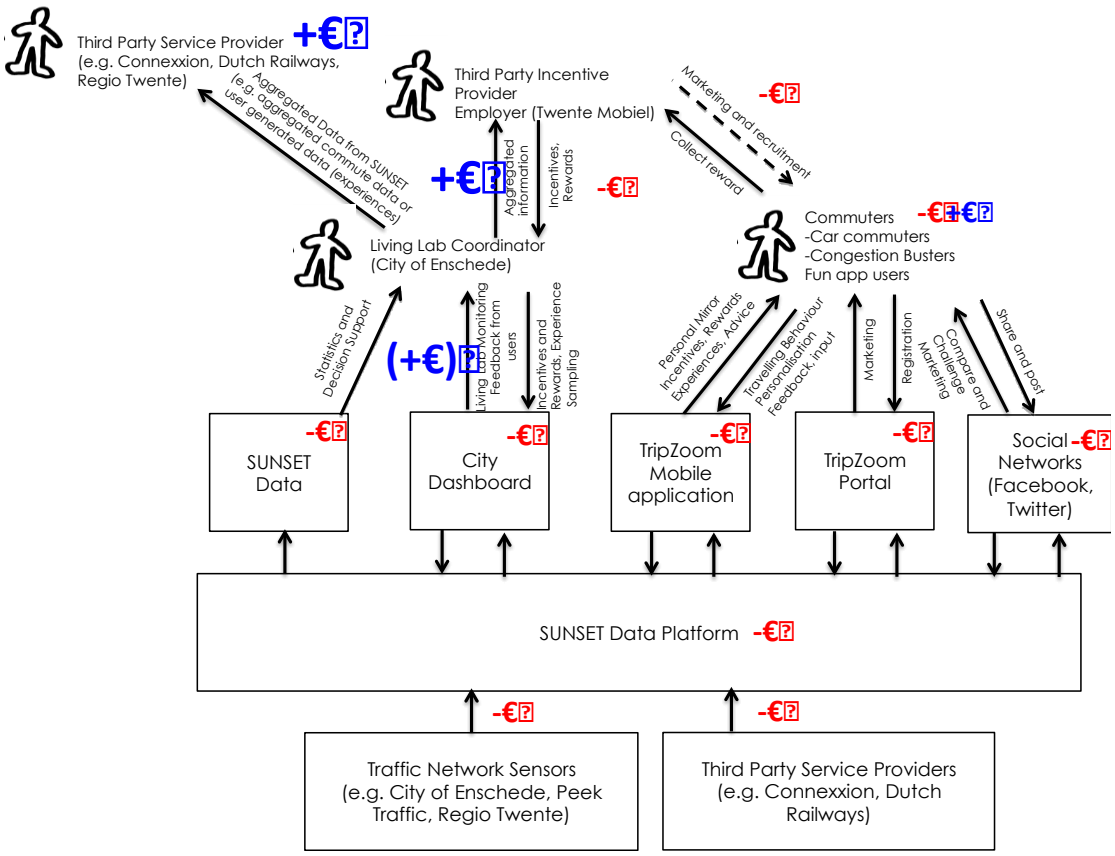

Figure 5.1: SUNSET Business Model Enschede

5.3 Business Model Leeds

In figure 5.2 the business model for the Living Lab Leeds is presented. The main stakeholders in Leeds are commuters in Leeds and fun app users. The TripZoom mobile application provides a personal mirror of their travel behaviour to these targeted consumers of the SUNSET service. As described in section 4.3.4 this target group is divided into car commuters, both within Leeds city centre and in the wider Leeds and W.Yorkshire areas, (which should get information about the corridor they usually travel to change their usual car driving behaviour), congestion busters (already changed consumers which are supported by the service to optimize their behaviour and convenience). These groups receive a personal mirror of their behaviour including links to actual information on the corridor through the app. They will also receive incentives (challenges) and rewards based on their behaviour. In addition they will also be able to provide input through questions and responses regarding their travel experience in the region. Furthermore, they will be able to generate and use travel advice through the social network functionality which is integrated with the Tripzoom app and the data platform.

Users may also connect the service to their Social Network accounts and share their mobility pattern and achievements there. Comparing with friends or colleagues is

achieved using social networks, which makes them an integral part of the service that is delivered to the individual users. A further possibility to generate revenue is to allow users to offer certain paid services to each other (e.g. a parking place or a rented bike) receiving mini payments, with a small proportion of this payments ending up to the organisation facilitating this option (marked with a small **+€** in the model).

Through the TripZoom Portal the value of the service will be marketed to new potential users. With support of this portal they will be able to register to the service and become members of the SUNSET ecosystem. The Dashboard provides value to the LivingLab Coordinator / Operating organization (LLC/OO) of the system in Leeds. Through this, the LLC/OO will be able to monitor the behaviour of users in Leeds. Using the Dashboard the LLC/OO will also be able to coach the individual users to change or enhance their travel behaviour by providing incentives and by giving rewards. They will also be supported in asking the users experience questions that will give the LLC/OO feedback from the users point of view regarding the service provided and also their travel experience in the Living Lab.

The LLC/OO will also be able to provide specific user groups which may be targeted directly to third party incentive providers. They might subscribe anticipating (described in 4.3.4) to utilise the SUNSET system as a reliable channel to reach targeted consumers within the user group (marked **+€** in the model).

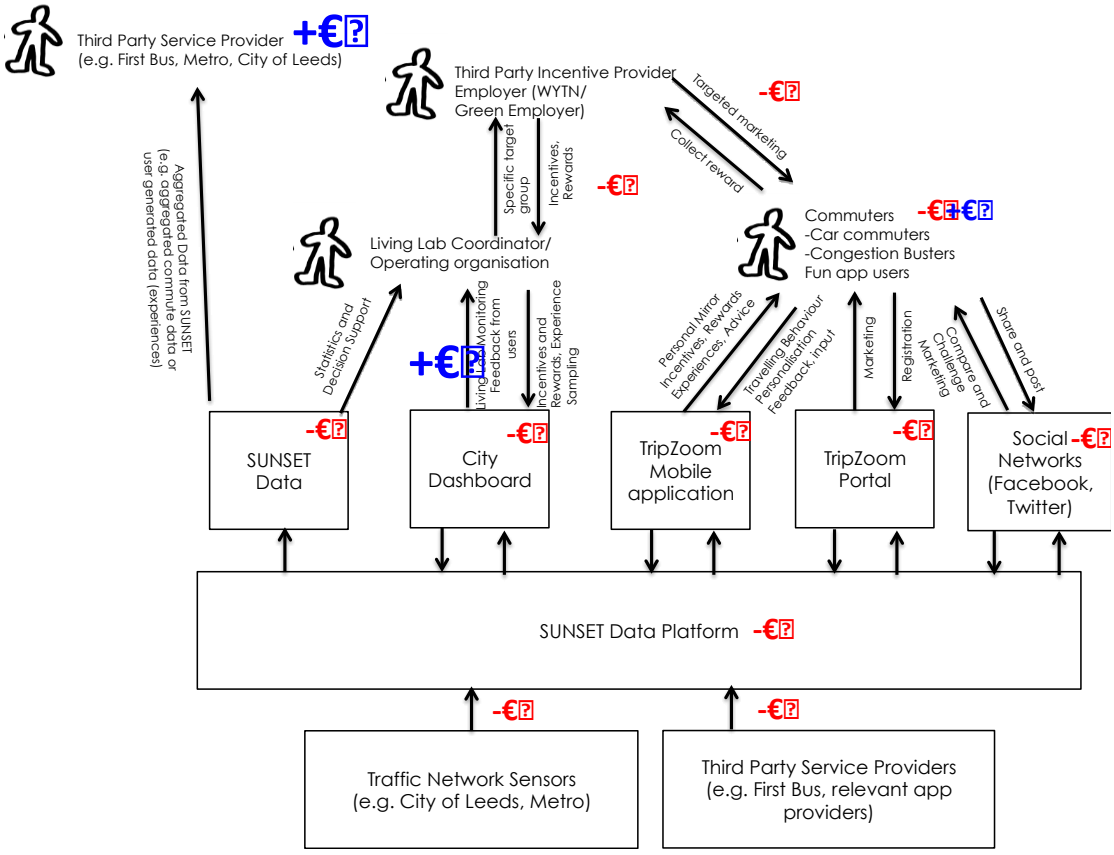

Figure 5.2: SUNSET Business Model Leeds

Data generated from the SUNSET system provides also value for stakeholders. For third party service providers aggregated data from the SUNSET service can be useful in enhancing their existing services (e.g. Leeds travel info). A complementary revenue stream is identified here. The engine of SUNSET or the key features in this system might be licensed or rented by the Third Party Service provider and integrated in this

external service (also marked **+€** in the model). This revenue stream can in turn be used to finance the deployment of the SUNSET System in the city of Leeds.

The cost structure of SUNSET (marked as **-€**) is described in section 4.3.12 and is initially related to the transfer of the service from Enschede to Leeds. On a longer term pont of view, additional costs might arise in connection to customization of the service to users' needs in the region, as well as governing costs (e.g. management, marketing, incentives design) and user related costs.

5.4 Business Model Göteborg

In figure 5.3 the business model for the Living Lab Göteborg is presented. The main stakeholder in Göteborg is the Commuter who lives in the Göteborg Region. The TripZoom mobile application provides a personal mirror of their travel behaviour to these targeted consumers of the SUNSET service. As described in section 4.4.4 this target group is divided into car commuters (which should be coached to change travel behaviour) and congestion busters (already changed consumers which are supported by the service to optimize their behaviour). These groups receive through the app a personal mirror of their behaviour including a virtual bill of congestion taxes which creates immediate value for them as congestion taxes are implemented in Göteborg on January 1st 2013. They will also receive incentives (challenges) and rewards based on their behaviour. In addition they will be able to provide input to questions regarding their experiences from travelling in the region and also be able to generate (and use travel advice) through the social network (i.e. Facebook) that is integrated with the app and the data platform.

Through the TripZoom Portal the value with the service will be marketed to new potential Commuters. With support of this portal they will be able to register to the service and become members of the SUNSET ecosystem. The Dashboard provides value to the Living Lab Coordinator / Operating organization (LLC/OO) of the system in Göteborg. Through it the LLC/OO will be able to monitor the behaviour of users in Göteborg Region. Using the Dashboard the LLC/OO will also be able to coach the Commuters to change or enhance their travel behaviour by providing incentives and by giving rewards. They will also be supported in asking the users experience questions that will give the LLC/OO feedback from the users regarding the service and also their travel experience in the Living Lab.

The LLC/OO will also be able to provide aggregated information about targeted user groups to third party incentive providers. They might be able to subscribe anticipating (described in 4.4.7) to use the SUNSET system as a reliable channel to reach targeted consumers within the commuter group and also receive aggregated information about their behaviour and their views of the incentives provided by the third party incentive provider. In this use case the LLC/OO acts as a broker between the Third Party Incentive Provider and the targeted Commuter group. It might also be possible to provide the functionality in the service to send advertisements from the Third Party Incentive Provider to the Commuters via the service. Subscriptions and revenues generated from advertisements are hence the two major market based revenue streams identified in the Göteborg Business Model if the service is intended to stand alone, without governmental funding (marked **+€** in the model).

Data generated from the SUNSET system provides also value for stakeholders. For third party service providers open data from the SUNSET system can be useful in enhancing their existing services (e.g. CommuteGreener and Västtrafik Travel Planner). One complementing revenue stream is identified here. The engine of SUNSET or key features in this system might be licensed or rented by the Third Party Service provider and integrated in this external service (also marked **+€** in the model). This revenue

stream can in turn be used to finance the deployment of the SUNSET System in the Göteborg region, or be used to finance the deployment of the system in other regions and further enhance the features of SUNSET. This latter alternative consequently means that the features of SUNSET are solely distributed by other third party services in the area of Göteborg and packed as their service.

The cost structure of SUNSET (marked as **-€**) is described in section 4.4.12 and is initially related to the transfer of the service from Enschede to Göteborg . On a longer term view, additional costs might arise in connection to customization of the service to users' needs in the region, as well as governing costs (e.g. management, marketing, incentive design) and user related costs.

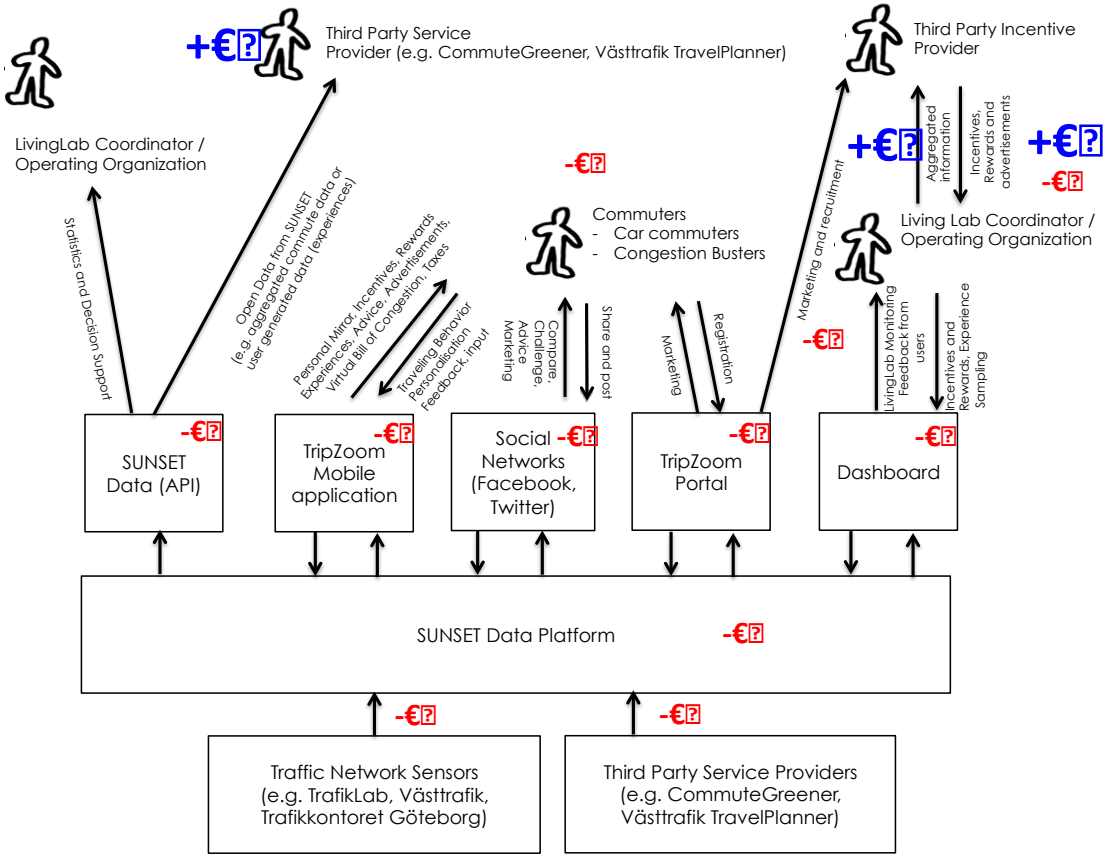

Figure 5.3: SUNSET Business Model Göteborg

6 Extended Business Cases

In this chapter initial ideas for extended business cases for the SUNSET services are presented. The extended business cases leverage the SUNSET data platform towards different deployment domains and extended user groups. The chapter is not intended to give a full business model analysis, but merely explores the broader deployment possibilities of the SUNSET service in terms of high-level stakeholder and domain analysis and added value of the application. As such this chapter creates a starting point for future work on exploitation models.

6.1 An extended Business Model for SUNSET

Extended business models build on a broader definition of the user groups using the SUNSET data platform beyond the business models presented in the preceding chapters. This line of thinking builds on the broader potential of the SUNSET data platform as a 'marketplace' for mobility data strengthened on the one hand by social processes, which introduce new models for co-production and sharing of content, and on the other hand open development of apps in a broad range of deployment domains. It includes the notion that open innovation ecosystems around mobility data can be more fluid for new entrepreneurship and enterprise creation based on societal innovation and can also involve new entrepreneurs, academics, students and 'geeks', NGOs and volunteers, and citizens themselves.

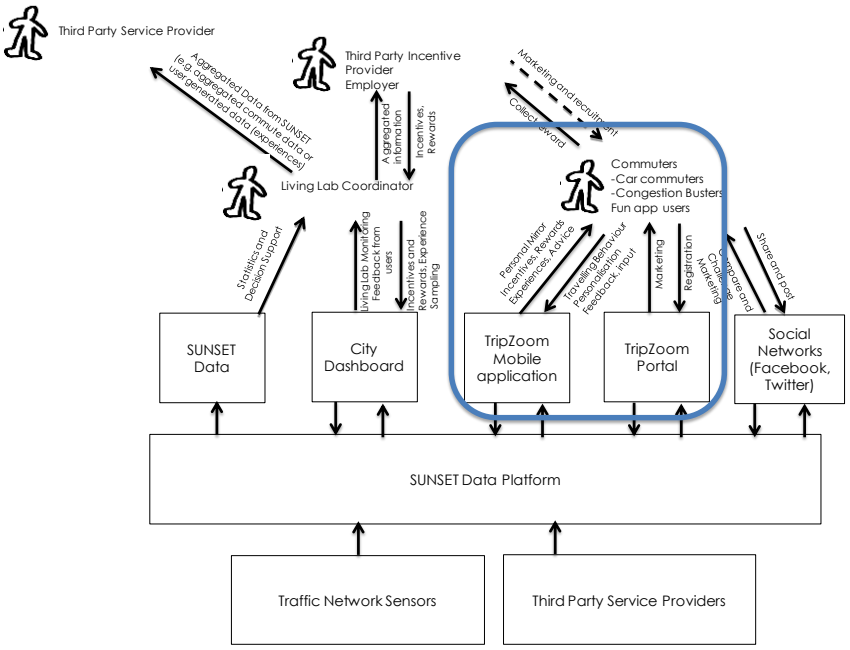

Figure 6.1: Focus area for extended Business Models for SUNSET

As elucidated in figure 6.2 an extended business model means first of all that a broader segmentation of user groups is introduced. This also implies that the concept of the Tripzoom service (a combination of the Tripzoom mobile application and the Tripzoom portal in the figure above) is expanded to a range of services and apps servicing these different user groups with corresponding added value propositions.

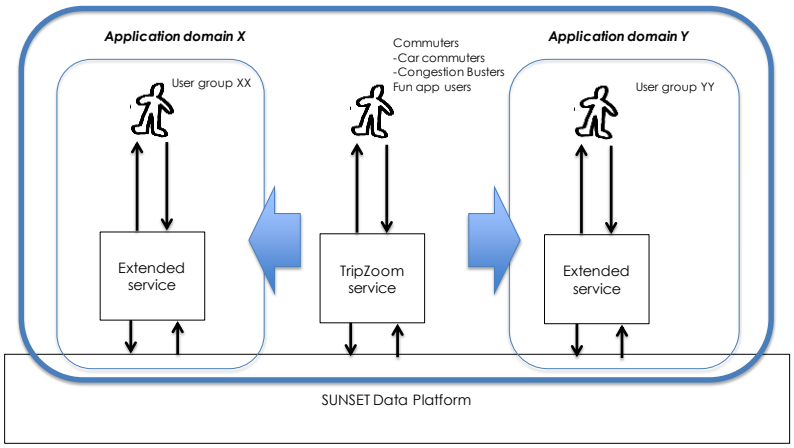

Figure 6.2: Extended Business Model for SUNSET

The following long list of extended deployment domains could benefit from the SUNSET personal mobility and incentive services:

- Tourism and city promotion. Create services to guide tourists and visitors in unknown city environments on the most sustainable, safe, convenient, interesting or fast way to travel and park;
- Event management. Create services to guide visitors of large events like concerts, commemorations or celebrations on safe, fast and convenient ways of travel to and from events;
- Transport. Create services to professional drivers in city center retail distribution and supply to optimise in-bound and out-bound traffic and/or stimulate effective driving styles;
- Education. Create services for school youth to promote a sustainable lifestyle;
- Healthcare. Create services to guide and advice hospital visitors. Create special services for disabled people or in case of emergencies;
- Retail. Create services for (potential) customers that leverage on new or existing loyalty programs. For example create the possibility to earn points when a store is visited in a 'green' way, a certain route (e.g. along a certain set of retail stores) has been taken or a certain parking option is chosen;
- Insurance. Create services to stimulate careful driving and/or safe driving styles;
- Leasing and mobility management. Create business services to analyse actual and historic travel patterns on a department and company level in relation to travel budgets and mobility policies and develop consultancy services on optimizing mobility management measures and improve cost saving possibilities for companies;
- Automotive. Create services to stimulate effective driving styles or to provide users with added value data on car performance.

In each deployment domain multiple more or less specific apps for multiple more or less specific target groups or purposes could be developed or adapted and introduced by third parties utilizing the SUNSET data platform demonstrating a promising context. For two deployment domains we now introduce a first glimpse of how a business case could look like.

6.1.1 Example case 1: 'Serious Request' app

Serious Request (www.seriousrequest.3fm.nl) is a yearly campaign of the Dutch national radio broadcasting organisation to raise money for the Red Cross. Central in the campaign is a 'house of glass' where involved disc jockeys will be locked up during the campaign without eating, while making 24hour radio programs in shifts.

This year, the house of glass will be situated in the centre of Enschede in the period 18-24 December 2012. The house of glass attracts a massive audience throughout day and night who can enjoy music, interact with the disc jockeys and can offer the results of all kinds of smaller or bigger local money collection activities. Also social media and additional television broadcasts will be heavily used to raise awareness and support money collecting activities.

Based on the SUNSET data platform a 'Serious Request travel app' could be developed to

- help to automatically locate friends or buddies around the house of glass;
- guide visitors with the best and safe options and moments to travel and provide incentives for use of public transport or bicycle modalities. E.g. a common challenge for all app users which results in Serious Request prices or a financial municipality contribution to the campaign;
- share experiences integrated with the Serious Request social media.

Local security authorities could use the aggregated personal mobility patterns of the app users to analyse what walking routes are taken by the masses around the house of glass. This information could be input for decision making on security and safety measures around the house of glass.

As the event runs for a week, the app will typically have a temporary objective.

6.1.2 Example case 2: Westermaat experience app

The Westermaat is a large scale retail area (42.000 m2 store area, to be extended with 22.000 m2) in the Dutch Twente region. The area suffers from severe inbound, parking and outbound traffic problems especially in the weekends as the number of parking spaces are limited and local congestion spreads easily towards the national highway A1, which is adjacent to the area. There is public transport (bus line) available, but many visitors (also from Germany) prefer car.

Based on the SUNSET data platform a 'Westermaat travel app' could be developed for (frequent) visitors to

- guide visitors with the best moments to travel and best place to park;
- provide incentives for use of public transport modalities, e.g. with vouchers that can be spent at the Westermaat;
- provide incentives for use of remote parking places and use of the bus or shuttle services for the last mile.

6.2 Towards a trusted marketplace for mobility data

When one considers the broader deployment perspective on the SUNSET data platform, the SUNSET data platform has the potential to evolve into an open service platform ('marketplace') that can mediate supply and demand of a range of mobility data for a variety of public and private stakeholders and diverse end-user groups. In such a service constellation, suppliers and users of mobility data can be either public or private organisations, individuals or social groups.

6.2.1 Supply side services

Data supply services from public road authority organisations or bodies then include local, regional or national viewpoints on historic, real-time or predicted traffic, infrastructure and environmental conditions under service level agreements that guarantee certain levels of data quality. Data supply services from public or private transport organisations could include data feeds on actual and upcoming departures and arrivals and actual incidents (like the TFL London Datastore). Mobility

service providers could provide data services about historic, actual or predicted traffic and travel information measured from their own sensor networks or deduced, combined and enriched from other sources in a chained model. This also includes specific location-based information of buildings, stores, organisations, parking information or points of interests. Moreover, weather service providers could feed actual or predicted localised weather information to the marketplace.
With the SUNSET innovations, individuals and social groups can also provide their own personal mobility data and make that data either directly available to the marketplace or mediated by a mobility or ICT service provider, that bundles data streams for groups of users. The major difference here is that these new data services consist of personal or semi-anonymous data (e.g. an individual could provide his/her mobility profile data under a shielded, but in the end traceable identity). For a marketplace to work, this requires that the service platform must make very clear commitments to personal data suppliers. For example about data processing, which third parties have access to the data, under what conditions and how data is managed. Even more importantly it requires a solid trust establishment and relation between the service platform provider and personal data suppliers. As a result, the service platform provider needs to have a neutral position in the field of supply and demand and preferably fall into a legislation regime which is trusted by both the supply and demand sides of the platform.

6.2.2 Demand side services

On the demand side, trust is less a primary issue than it is on the supply side. Whether we consider organisations or end users that want to use mobility data for their own decision making or organisations that build incentives or value adding services on top of the data platform (e.g. via applications or apps for professional or consumer end-users), in both cases service provisioning and terms of use can be governed well by an appropriate contractual service level agreement covering the demand needs in terms of availability, quality and usage of data.

6.2.3 In-platform services

In a marketplace perspective the core functionality of the service platform would be to:

- Match & merge. Match demand with (combinations of) available data streams;
- Event and incentive management. Design and provide triggers for data exchange or incentive distribution when certain conditions become true;
- Book keeping and contract management. Provide services that deduct and settle incoming and outgoing data;
- Data management services;
- Authorisation and authentication services.

Note that in a true marketplace perspective there will, almost per definition, be a core emphasis on match & merge functionality of data as the core objective of a marketplace is to bring demand and supply together. In the end, this is a little different perspective than the SUNSET vision, where incentive management is the core functionality of the service platform. Incentive management is important to align system-level goals with personal-level goals. Moreover, to effectively seduce people to other behaviour SUNSET not only leverages on data as an incentive, but also utilises different incentive types such as point earning/rewarding systems or intrinsic incentives such as the availability of data as an objective in its own. As such the service platform also has value for the traveller that wants to be aware of his actual travel behaviour and constitutes a data supplier (of his/her own mobility profile) as well as an end-user of the platform at the same time. In such a situation no real market mechanism is apparent.

6.2.4 Public, private or mixed exploitation model options

The essence of the service platform is that traffic and personal data is brought together in one place. Local and regional road authorities, external data providers (private parties) and individuals provide the service platform with traffic, travel and status information. The service platform collects this data, processes and enriches it and makes it available to the needs of different deployment domains.

In the extended model the exploitation of the service platform could be done by a public or a privately owned venture in a single organisation or collaborative (consortium) exploitation mode, all with pros and cons of their own. Without yet choosing for the best model, some already prominent pros and cons are summarised in the table below. These pros and cons will be further examined and revisited in the course of the SUNSET project.

Exploitation model		Pros	cons
Public	Municipal authorities	- Secure city-level objectives - Promote open data access model - Local scope	- Disturb commercial market - Big brother is watching sentiments - Local scope
Public	Regional collaborative body	- Secure city-level objectives - Promote open data access model - Share operational costs	- Disturb commercial market - Big brother is watching sentiments - Lack of collaboration efficiency
Private	SME	- Innovative power - Local scope - Flexibility to market change	- Ability to execute
Private	Large	- Ability to reach economies of scale and scope (internationally)	- Difficult to adjust to local situation
Private	Collaborative	- Ability to reach economies of scale and scope (internationally) - Focus on partner strengths	- Lack of collaboration efficiency

Table 6.1: Prominent pros and cons on a public versus private exploitation model

In the course of the project we will also further investigate the possibilities for mixed mode public/private constructions where exploitation and business development is done by a profit organisation, with public city level objectives ensured via a governance model, where investing public stakeholders can take part in a board of supervisors.

6.2.5 The Enschede i-Zone roadmap

Before the SUNSET project started, the Dutch City of Enschede already had created a vision and ambition in line with the SUNSET philosophy to seduce travellers with positive incentives to make smart travel choices that align personal with city-level goals: the incentive zone (i-Zone). The i-Zone project, which is supported by the

Twente region and Twente Mobiel[3], creates an innovation chain together with the SUNSET project. While SUNSET is devoted to research and development activities with a Living Lab, the i-Zone project has a two year ambition to create an operational, exploitable version of the SUNSET platform compliant with the extended business model and respecting or compensating the IPR of the SUNSET partners on the SUNSET results and innovations.
The i-Zone operational service platform will be developed by selected partners in a number of stages building on the learning experiences of SUNSET (see figure 6.3). Starting from a core sensing platform, the service platform will be extended with incentive and social functionality to reach a full service platform concept in Dec 2013. On top of the service platform a number of specific apps will be created by third parties for specific user groups in Enschede and in the broader Twente region. These apps include the case examples given in section 6.1.1 and 6.1.2.

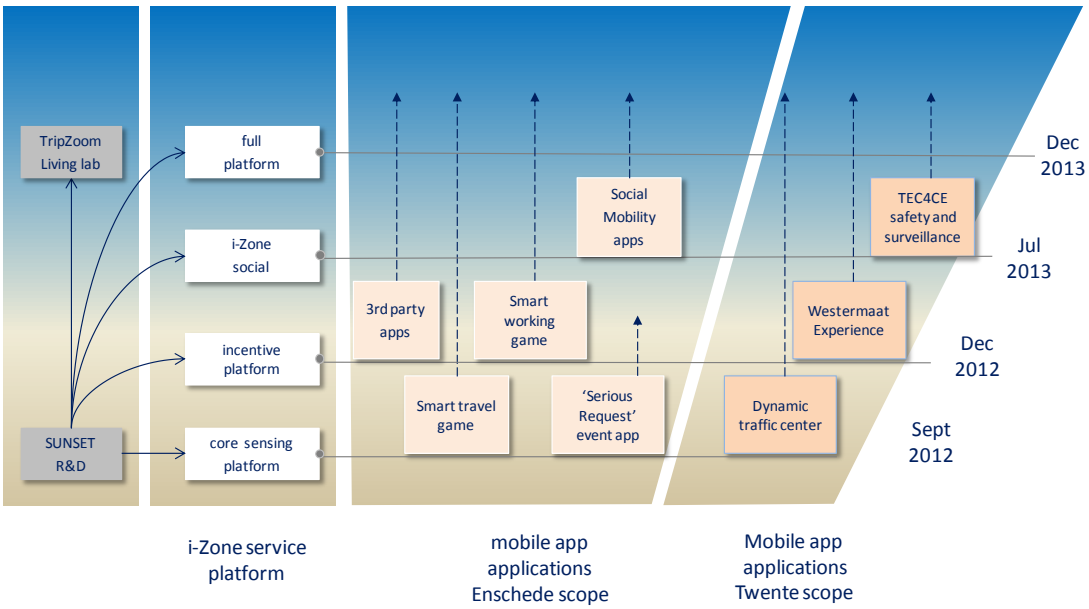

Figure 6.3: City of Enschede i-Zone roadmap

6.3 Future work

The work on extended business cases, the marketplace and the i-Zone roadmap is an iterative and ongoing process. In the coming months we will keep on working on these issues which means that the current content of this chapter may be subject to changes.

[3] Twente Mobiel: an action-oriented pact of public and private companies in Twente to reduce congestion

7 Conclusions

The goals of this deliverable have been to:

- Select and adapt a work model for analysing the SUNSET service from a business perspective.
- Present the business analysis performed of the service if it is deployed in the Living Lab (LL) sites Enschede, Göteborg and Leeds.
- Offer an overview of similarities and differences in regard to business aspects between the three LL sites.
- Propose tentative and generic business cases for a future deployment and semi-commercialization of SUNSET (chapter 6).

The work model selected and adopted was the business model canvas (chapter 2) proposed by Osterwalder & Pigneur (2010). In its original form it did not match all of the conditions that the SUNSET project retained, so in order to be utilized its structure, representation and process were adapted (chapter 3). Two additional building blocks were added to the work model, in addition the block customer segment was re-named to user segment to fit the unit of analysis better; hence a digital service. For each building block a set of modelling questions were defined to facilitate the analysis of the SUNSET service in the three living labs, in order to capture both similarities and differences with the SUNSET service as a business in the three regions.

The three business analyses performed are presented in chapter four. In the following chapter a comparison is performed and aggregated business models with a focus on channels, revenues and costs are presented for each living lab city. Major similarities between the three LL sites are:

- Similar social and environmental benefits and costs (risks) with the service between the Living Lab Cities.
- Similar overall user segments: commuters, Living Lab Coordinators/Operating organizations, Third party service and incentives providers.
- Similar value propositions between the LL cities, however a larger set in Enschede as the operating organization (the City of Enschede) have a clear scope how to use the SUNSET service after the living lab. This is not clear in Göteborg or Leeds as the potential future operating organizations in these cities are not defined.

The uncertainty in regard to operating organizations in Leeds and Göteborg affects the revenue models proposed for the three cities. The main differences between the LL cities are therefore about how income is generated from the service in the cities. In Enschede a model with three pillars is suggested, with public finance as one important pillar, micro payment and third party payment as two additional. In Leeds and especially Göteborg more market based models are suggested, as the two cities are not intended to operate the system in these regions (the Göteborg Region and the Leeds city Council are only companions to the project). In Göteborg, third party incentive providers could be offered to subscribe to the service in order to receive a reliable channel to reach targeted user groups with incentives based on the users travel behaviour. It is the subscription that creates the revenue flow, which could be used to operate the system in that city. The incentive providers will in exchange for the fee receive the possibility to incentivise the user and also receive aggregated information about the commute habits of the targeted users. Offering the service as a channel for advertising from the provider to a specific user group based on their commute profile could, in addition, create a second revenue stream. To this stream, a third market-oriented revenue model could both in Leeds and Göteborg be to integrate the whole SUNSET service or parts of the service in existing external digital services. Third party service providers (public or commercial) could consequently rent

SUNSET features on license and integrate them into their own digital services tapping into the values that the SUNSET service provides.

In chapter 6 an extended business model for the SUNSET service is presented. This model builds on the business analyses performed and the business models derived for the living lab cities. It provides a more generic framework to be utilized in order to understand the SUNSET service as a business if it is extended into other areas of deployment beyond the contexts provided by the three living labs. Its usefulness is illustrated through two alternative business cases, which also provide practical insights in the potential of the SUNSET service if applied in other areas of deployment, beyond the living lab sites. Finally, chapter 6 also elaborates on the opportunity for SUNSET to evolve into an open service marketplace that can mediate supply and demand of a range of mobility data for a variety of public and private stakeholders and diverse end-user groups.

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Appendix

The Business Model Canvas

Designed for: **SUNSET Service in Enschede** (from the City of Enschedes viewpoint)

Key Partners

Road authority (general management); Road authority subcontractors (e.g. real time traffic data); PT authority (data and linking pin); Bus & Train operators (bus and train (real-time) information); SUNSET-consortium (system building, hosting and maintenance); Open Street Maps (network); Third party provider (e.g. Public health provider); Employers (recruiting users); Twente Mobiel; Marketing agency; Emergency services (real-time information)

Key Activities

Management/Human: General management (as LL coordinator, so: designing/entering incentives, recruiting users, find third party providers, align with key partners, provide and manage experience sampling, general help), System management (solve technical problems when they arise), Run the app with patience (to determine mobility footprint).
Technical/System: Personal mobility monitoring, Traffic monitoring (car, bus, train), Incentivise the right user at the right time (IMP), Calculate mobility footprint (distance, time, costs, emissions, calories burned), Data storage & control.

Key Resources

User (characteristics): Smartphone (+battery) available, Mode availability, Type of car (CO_2 emissions), Length and weight (Calories burned), Personal mobility footprint, Actual location, Working time flexibility, Employer; Social network activity.
Network/service information: Road/Rail network/map (car, bicycle, walk, bus, train), Type of bus and train, Real time car-network travel information (road works/congestion), (Real time) bus and train timetables. Weather information.
System: The SUNSET system as described under "Service Delivery Channels".

Value Propositions

Car commuters: Less travel time/costs, fun/convience, actual traffic information on regular route, empowerment to change travel behaviour and contribute to the society, share achievements with friends, recognition, possibility to give direct feedback to the road authority.
Congestion busters: Less travel time/costs, fun/convience, share green/healthy mobilty profile with friends, recognition, possibility to give direct feedback to the road authority.
Fun app users: As car commuters/congestion busters, but with emphasis on the fun factor.
Road authority: Monitoring (actual) traffic situation on the network, monitoring mode choice and CO_2 emission (trends), possibility to incentivise travellers, recieve direct feedback from travellers.
Third party provider: Marketing, attract customers, affiliate as sustainable company, get anonymised insight into customers.
Employers: Affiliate as sustainable company, get anonymised insight into own employees, reduce travel costs/parking problems, increased well-being of employees.
Early adopters: As car commuters, congestion busters and third parties, but in addition also being a front runner and have influence on the development of the service/system.

Customer Relationships

The system offers personal assistance to the user of the SUNSET service. Because of time- and cost constraints the system itself will highly depend on self service of the user. Also communities can be developed in which different users answer each others questions. For convenience a FAQ can be added. Also a detailed privacy explanation should be included. Third parties (providers and employers) will get more personal assistance of the owner of the system (City of Enschede).

Channels

Service Delivery Channels: Mobile app; Web portal; Social network widgets; Incentives; "Contact city" functionality (Experience sampling); City dashboard; Third party control panel
Service Marketing Channels: City website (free, small reach); Twente Mobiel (employers); Newspapers (costs money, wide reach); "Enschede" Facebook group (free, wide reach); Municipal Twitter; Municipal paper (free, wide reach); Posters; Employers

User Segments

Car commuters: People working in the city center commuting by car at least three times a week.
Congestion busters: People who utilize public transportation, bicycle, walking etc to commute to and from the work place.
Road authority: City of Enschede.
Fun app users: People that like to use apps and social networks.
Third party provider: Can either be a party that provides a service in Enschede or that is willing to provide incentives. This can be an individual, a group or an organization, either non-profit or profit, private or public
Employers: Organization that wants their employees to use the service, either non-profit or profit, private or public
Early adopters: Car commuters, congestion busters, fun app users or third parties (providers or employers) that are the first to use the system and act as ambassadors of the SUNSET service.

Cost Structure

Investment costs: System building, integration, installation.
Operating costs: General management (money and time), system hosting, system management, actual traffic information, marketing. Actual bus and train info might be free (maybe more likely when operators become third party providers). Actual road information is already available to the city.
User costs: battery usage of the application, mobile data charges.

Revenue Streams

System could be financed either by the municipality, a third party or a combination of both (as in i-Zone). In principle users do not pay for the system, however a mini payment for advanced services can be considered. Third parties (providers/employers) might contribute. For the municipality a regional subsidy might be available. Monitoring budgets might be used since less other research is needed.

Social and environmental costs and risks

Collective: Incentives might also be wrongly given/used leading to more congestion/emissions etc
Individual: Incentives might also be wrongly given/used leading to higher travel time/costs etc, Privacy and integrity issues.

Social and environmental benefits

Collective: Less emissions, Less congestion (might even be a real revenue), Better insight for the road authority (leading to better planning and policy).
Individual: Less travel time, Higher well-being, Higher safety (at the moment not really in the model, include?), Healthier people (inderectly less healthcare costs?).

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The Business Model Canvas

Designed for: **SUNSET Service in Leeds** (operated by the SUNSET Consortium)

Key Partners

City of Leeds (council officers and traffic control technicians: planning: urban, city centre and transport), West Yorkshire Passenger Transport Executive (METRO). Public transport (bus) operators, Taxi operators (individuals, companies and associations). Leeds-Bradfor Airport. Politicians. Other real-time information providers. Users: individuals and businesses. Community Transport Association. Emergency services coordinators. Freight logistics companies. Breakdown services. Employers. City centre retailers. Public health providers. Existing car share organisations. West Yorkshire green plan employers (e.g. City Council, Universities). Velocampus (bicycle schemes). Student groups. Local businesses offering discounts (VoucherCloud). Residents' Groups. Sports Clubs. System Users. Facebook Groups (Existing/New). System Hosting / IT maintenance. Car park owners and operators.

Key Activities

Management/Human: Reliable service/system operation (e.g. real time info, incentives). Integration with existing services (e.g. www.leedstravelinfo.com or other existing apps/FBgroups). General management (as LL coordinator: develop/offer incentives, recruit users, find third party providers, align with key partners). System management (resolve any technical issues). Usage. Marketing. Data storage and identity management.
Technical/system: Personal mobility monitoring. Traffic monitoring (car, bus). Incentivise the right user at the right time (IMP). Calculate mobility footprint (distance, time, costs, emissions, calories burned). Challenge users through incentives. Data storage and control.

Key Resources

User (characteristics): Smartphone available, Mode availability, Type of car (CO2 emissions), Smartphone features, Height and weight (Calories burned), Personal mobility data/footprint, Actual location, Working time flexibility, Employer (name/total staff number), Social network activity (e.g. Facebook/Twitter account and basic data about SUNSET related interaction), Incentive schemes.
Network/service information: Road/Rail network (car, bicycle, walk, bus, train), Type of bus and train, Real time car-network travel information (road works/congestion e.g. www.leedstravelinfo.com OR Google Traffic), (Real time) bus and train timetables (e.g. HopStop app), Weather info, Environmental data, Other relevant data.
System: The SUNSET app/system as described under "Channels".
Incentives and rewards corresponding with Users'/System objectives. Third party providers of incentives or (on-line) communities providing such incentives/rewards.
Existing communities: e.g. Geocaching Leeds, Velocampus, Car Club.

Value Propositions

Car commuters: reduced travel time/costs, fun/convenience, actual traffic information on regular route, empowerment to change travel behaviour and contribute to society/community, car sharing, share achievements with friends, possibility to give direct feedback to the road authority.
Congestion busters: Reduced travel time/costs, fun/convience, share green/healthy mobilty profile with friends, possibility to give direct feedback to Leeds City Council.
Early adopters: Get rewarded for attracting others to the SUNSET service; Gain increased personal/community benefits.
Fun app users: Like commuters but with emphasis on fun and social networking aspects.
Third party providers: Marketing (direct/timely advertising), attract customers, affiliate as green/sustainable company/CSR profile, get anonymised insight into consumer behaviour.
Employers: Improve green/sustainable/CSR profile (e.g. carbon footprint), get anonymised insight into own employees behaviour, plan workload/meetings more efficiently, reduce travel/parking/safety costs, increased well-being of employees.

Customer Relationships

The SUNSET portal is the main way for communication with/between customers. The Leeds SUNSET Facebook Group is another promising communication channel. The SUNSET app offers personalised advice to the user. Because of time- and cost constraints the system itself will highly depend on user input and interaction. User communities offering live info, tips and travel advice may arise. Third parties (providers and employers) may get assistance from Leeds City Council.

Channels

Service Delivery Channels: Mobile app (Android/iPhone). SUNSET Web portal; Social network widgets; "Contact city" functionality/ Experience sampling. Leeds City Council dashboard. Third party control panel.
Service Marketing Channels: Leeds CIty Council website, Word of mouth, ITS personal contacts (free, small reach). Green Employers scheme (free, employer dependent). Newspapers/Banners/Leaflets (costly, wider reach). Leeds SUNSET Facebook group (free/costly, wide reach). Municipal/University newspaper/letter (free, limited reach). VoucherCloud/ Local Newspapers/Radio channels (costly/wide reach). Third party existing promotions (free, limited reach).

User/customer Segments

Car commuters: Car users (general user group), Car users traveling to Leeds city centre (specific user group).
Congestion busters: Ride sharers, working at home, bicyclers, walkers, public transport users to/from workplace or regular activity locations.
Third party providers: Parties that provide services or incentives. This can either be an individual, a group or an organization, either non-profit or profit, private or public.
Employers: Employers within Leeds either non- or for-profit and private or public
Fun app users: People that like to use apps and social networks.
Early adopters: Individuals or third parties that start using the service early.

Cost Structure

Transfer costs: Installing and integrating the SUNSET system with existing databases. Incentives design/adjustment. Overcoming any language issues.
Operation costs: General admin/management, system hosting, system management, actual traffic information, incentives provision, SUNSET helpdesk/feedback provision, system marketing/promotion. WY Metro has information about bus services, but relies on private bus operators. Leeds City Council has limited live camera info about traffic and car park availability.
User costs: Battery usage of SUNSET app and downloaded data charges.

Revenue Streams

SUNSET service and app should (initially) be free. Other revenues can be mini payments for advanced services and public finance.

Social and environmental costs

Collective: Privacy as well as community trust are significant social costs. Along with personal safety issues, this is a potential risk/threat for SUNSET (e.g. if smartphone gets lost/stolen). Environmental costs may rise due to wrong incentives issued on an individual level or due to the same incentive issued multiple times to different users, creating an increased environmental cost for the system/city overall.
Individual: Time needed to familiarise with SUNSET app/portal is a social cost since it will take time/attention from other activities. Increased battery usage results in higher environmental costs (smartphone charging).

Social and environmental benefits

System benefits: Less congestion, Lower emission levels, Less fossil fuels used (particularly if logistics/insurance companies adopt SUNSET), Healthier community (lower NHS costs / long term), Higher well-being for commuters, better work performance.
Individual benefits: Healthier users, Better informed and safe commuting, efficient and flexible commuting/travelling, more fun/quality time with significant others, Less time wasted, more tasks accomplished. Travel cost reduction. Well-being increase through third party incentives/rewards (or micro-payments) or new social networks creation.

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The Business Model Canvas

Designed for: **SUNSET Service in Göteborg** (operated by the SUNSET consortium)

Key Partners

• The SUNSET-consortium: The consortium builds, hosts and maintains the service and also uses it for research. (http://www.sunset-project.eu/) • The Göteborg Region (http://www.grkom.se) which already is a companion to the project.
• On-going research and innovation programs in the region (such as ISET): (http://web.viktoria.se/iset/)
• Trafiklab.se: This hub of traffic data provides traffic relevant data to the SUNSET service (http://www.trafiklab.se/)
• The city of Göteborg (http://www.goteborg.se)
• Trafikverket: national traffic authority (http://www.trafikverket.se)
• Västtrafik: Public Transit Authority in the Göteborg region (http://www.vasttrafik.se/)
• Operators of public transportation: e.g. nettbuss (http://www.nettbuss.no/)
• Third party incentive and service providers
• Lindholmen Science Park (http://www.lindholmen.se/)
• Västsvenska paketet. The West Swedish Package includes a number of projects in the Göteborg region aiming to improve the transport infrastructure. The objective is to significantly increase the use of public transportation, create an effective railway network, promote new road projects and develop better conditions for cyclists. The West Swedish Package costs SEK 34 billion, and the financing consists of 50 per cent State funding and 50 per cent local and regional funding. Regional co-financing, which includes measures such as a congestion charge, is a precondition for it being possible to finance the package. Without the congestion charge it would not been possible to implement the initiatives during the same period of time. The congestion charge, which will be introduced on 1 January 2013, will reduce congestion and produce a better environment. (http://vastsvenskapaketet.se/)

Key Activities

The value proposition of the service in Göteborg means that a number of key activities must be carried out in order to run the service: Deployment mgmt; Customization of the service; Integration with external sensors; System mgmt; Living Lab mgmt; Operate mgmt; Design and implementation of incentives; Promotion; Integrity and privacy management. In addition the system must be able to perfom activities such personal mobility monitoring, cost calculations etc.

Key Resources

In Göteborg different resources are need to be able to deliver the value of the services. In order to be able to use the service in Göteborg the individual commuter must possess a smartphone with a battery capacity to run the mobile application of the service for at least one day a with the GPS enabled. In order to make the service work properly, there is a need to identify certain characteristics of the user, for instance is it of essence to understand: Mode availability, Vehicle type (e.g. car); Length and weight; Personal mobility footprint; Actual location (based on GPS) to use in order to define the incentives suitable for the user; Social network activity via Facebook and Twitter; Existing communities within the region to be utilized in order to promote the service; Ambassadors promoting the service; Work environment and communities active in this environment; Incentive schemes provided by third party incentive providers. To have a good viable SUNSET service also requires to understand and connect the transportation network in the region.

Value Propositions

Commuters: Using the sunset service makes it possible for the user to track his/hers travel behavior. He/she will receive a mirror of the behavior (trips, frequent trips, frequent use of means of transport, costs, info about enviromental behavior), govermental provided incentives, corporate provided incentives, information incentives. The SUNSET service will provide the means to be part of a community in order to change the travel behavior of the user as well as the community Third party providers: Stimulate people to change travel behavior (incentive providers) Attract users to offers and ord become users of alternative services (service providers), affiliate as sustainable company, get anonymised insight into the users travel behaviors LivingLab Coordinator / Operating organization can use the system to incentivise travellers and stimulate (coach) them to change their travel behaviour. In this way they can reduce the congestion and CO2 emissions on their network, but also encourage people to travel healthier.

Customer Relationships

The primary channel for customer relationsship is the SUNSET portal; the seconadry channel for customer relationsship is the systems' web portal

Channels

Service delivery: Mobile applications (Android, iPhone), Portal (webbased), widgets, Dashboard, APIs', Service marketing Word of mouth, website of region, channels managed by third party providers, Local news papers

User Segments

Commuters from the Region to City Centre The general user segment is commuters to and from the city centre of Göteborg. Households living in region municipalities commuting to the city centre The specific user segment for the sunset service is housholds with children living in the municipalities outside the city centre of Göteborg. Car commuters and Congestion busters. Tech enthusiasts and early adopters in the first wave. Living Lab Coordinator / Operating Organization. In addition Third Party Providers; i.e. third party incentive providers and third party service providers

Cost Structure

Costs for deploying the SUNSET service in the Göteborg Region is only an estimation. These costs are divided in transfer costs (for deploying and customizing the system for the site), operating costs (for keeping the system running and market the system/service to stakeholders) and user costs (costs for the user).

Revenue Streams

The SUNSET service should be mainly financed by the market in Göteborg; three revenue models are identified. Third party incentive subscription of using the service as a reliable channel to reach specific target groups with incentives. Third party advertisments, the service is financed by advertisments from organizations to specific user groups depending on their travel behavior. The third model is an integation of the sunset service in a third party service providers service. The SUNSET service or features within the SUNSET service is used under licences by other service providers who pays rent or a licences fee for using the SUNSET technology.

Social and environmental costs

During the analysis, it has not been possible to specify any environmental costs connected to the deployment of the SUNSET service in the Göteborg Region. However possible social costs from using the service in Göteborg has been revealed by the analysis. As SUNSET automatically trace and record the mobility pattern of the individual user this might results in privacy and integrity issues, i.e. costs, for the user in question. In an pre living lab survey in Göteborg 35% of the test pilots indicates that they to some extent sees risks with the service as it automatically records the traveling behavior.

Social and environmental benefits

From a collective perspective, the basic use of the SUNSET service in Göteborg will lead to less congestion in the commuter corridors to and from the city centre. Lesser congestion means that the traffic flow within the city improves which results in a community that has higher well-being both during working hours but also after working-hours. From the individuals perspective the SUNSET service will support the individual commuter by providing a mirror to him or her about the commuters' own traveling behaviour. It will also inform the commuter about the traffic situation, which enables the commuter to make better decision before and during the commuting. This will create a more efficient and flexible commuter as the SUNSET service supports the commuter to better succeed in the everyday life puzzle to and from work

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