EMPOWER

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International review of business models and best practice

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Executive Summary

This deliverable is the first deliverable in Work Package 3 (WP3) and the second deliverable in the EMPOWER Project. WP3 covers a variety of aspects in producing the business model component for the EMPOWER toolbox, i.e. the main deliverable of EMPOWER project. The deliverable is a public report that presents the preparation work performed in Task 3.1 (T3.1) and includes an international review of business models and best practice. The goals of T3.1 has been to:

- identify potential directions for design choices for the EMPOWER business models based on current business model trends and literature on business models.
- cover example cases of intended positive incentive services in transportation, like public transportation customer loyalty programs (e.g. such as in Montreal and Singapore), peak reward programs from the Netherlands.
- identify challenges and key success factors for incentive-scheme based business models that have been applied around the world as well as documented in literature on business models from different fields.

The first objective is covered in chapter 2 and 3. In chapter 2 key concepts regarding business models are described and summarized. This description will act as an important input to other tasks within the EMPOWER project, especially T3.2 which has as objective to define the methodology that should be used to develop incentive-scheme based business models for the four lead cities/regions involved in the project. In addition to definition of key concepts, chapter 2 also address business model innovation and in section 2.2.1 presents important trends in business modelling, for example the trend to move from ownership to access (sharing economy), omnichannel, utilization of big data, scarcity and sustainability and social innovation in business models. Social business models are also covered (section 2.2.2) and the chapter is concluded by exploring business model trends through the lens of a case which uses an incentive-scheme based business model to organize the business setup.

In chapter 3 an in-depth literature review of key sources is presented with the objective to identify key take-away from business model literature to be used in EMPOWER. In all, 20 literature sources are covered by the systematic review from the field of strategic marketing, information systems, transportation, innovation and management (section 3.2 to 3.21), displaying the value that these sources have on business model design, implementation and evaluation. Key take-away's from each source is also presented for each case, see the table below (ES:1).

Reference	Key take-away
Kotler & Zaltman (1971)	Driving social change requires a strategic marketing approach (e.g. four "P's": price, product, promotion, and place, see section 3.2) and is more than promotion alone.
Osterwalder (2004)	Solid business models are made up of the nine building blocks Value proposition; Customer Segments; Customer Relationships; Channels; Key resource; Key activities; Key partnerships; Revenue streams; and Cost structure.
Osterwalder et al. (2005)	Business models can be positioned on different levels in relation to an organization and the development of business models should be interlinked with the development of the information system that should support the business.
Enquist & Juell-Skielse (2010)	In Business model development a choice should be made for a niche or holistic service approach.
Demil & Lecocq (2010)	A business model is not a static entity. It should be viewed as an evolutionary process that involves continual changes in the business model setup and also the organizational design.
Zott et al. (2011)	The EMPOWER project will test services that distribute incentives that enable people to make smart travel choices. The value that the EMPOWER services provide for stakeholders lies in the new value that is created through the provision of positive incentives. The value in EMPOWER is that its services should create new value connected to smart travel choices.
Limonard et al. (2011)	The business model canvas can be used for the design of "fuzzy" innovative concepts by going from the Key resources, to the Value proposition, Customer Relationships, Distribution Channels and Customer segments, and then back to Key activities.
Burkhart et al. (2011)	A set of assessment indicators to support the evaluation of business model impact. The main assessment indicators are: Application field, Knowledge gaining, Delimitation, Level of aggregation, State of

	business models, Purpose, Underlying type of business, Support during company lifecycle, Support during product/service lifecycle, Point of view, Addressee of business models, Scope, Components, Relation between components, Notation, Process of representation, Evaluation and metrics.
Zolnowski & Böhmann (2011)	Provides insights to what white spots core business modelling approaches has which enables the project to complement the models selected to enhance the business model creation within EMPOWER. Provides 19 evaluation criteria which can be used as base for developing indicators within EMPOWER
Bie et al. (2012)	Make sure to do develop a value proposition that does not only address one stakeholder group. The EMPOWER service will have several stakeholder groups and should thus provide different value for these groups.
Ferro & Osella (2013)	Eight business model archetypes that act as inspiration in the development of EMPOWER service business models: e.g. Premium Product / Service, Freemium Product / Service, Open Source Link, Infrastructural "Razor and Blades", Demand-Oriented Platform, Supply-Oriented Platform, Free as Branded Advertising, White-Label Development.
Berkers & Roelands (2013)	When multiple stakeholders are involved, a common vocabulary regarding the EMPOWER tool/service should be established in the beginning and all the perspectives on "value" should be taken into account.
Klang et al. (2014)	In the design of the business models, the business modellers in T3.3 must be sensitive to that business models are understood differently by different stakeholders and adopt the language depending on target audience.
Bocken et al. (2014)	Business model archetypes that will inspire the design of business models for the EMPOWER services: Maximise material and energy efficiency; Create value from 'waste'; Substitute with renewables and natural processes; Deliver functionality rather than ownership; Adopt a stewardship role; Encourage sufficiency; Re-purpose the business for society/ environment; and Develop scale-up solutions.
Janssen & Zuiderwijk (2014)	In order to achieve social change EMPOWER envisions that social media and networking can be used as incentive for supporting people to make smart travel choices.
Kranenburg et al. (2014)	The article provides key recommendations when developing viable business models for sustainable transport solutions: business modelling should begin early on in the innovation project; customers and their needs should be the basis for the business setup design.
Butzin et al. (2014)	Respect the fact that in the "right" side of the Business Model Canvas (regarding the Customers), multiple dynamics can be at play and made use of such as (social) networks, active and passive citizens, capacity building among citizens for empowerment, etc.
Peters et al. (2015)	The article provides a framework to analyse and assess the implementation of business models in complex service settings. The framework can be used to structure the business model evaluation in EMPOWER.
Rauter et al. (2015)	Each building block in Osterwalder's Business Model Canvas can be considered from a sustainability perspective, e.g. in the choice of partners, combining distribution channels, consider re-use or cradle-to-cradle in the value proposition, etc.
Herrador et al. (2015)	State-of-the art case examples is provided, including Commute Greener, that will inspire and influence the design of business models for the EMPOWER services.

ES:1: A summary of contributions from the literature review

Chapter 3 is concluded by a outline of the impact that the literature review will have on different work packages and tasks in EMPOWER, acting as a guideline how to use the knowledge base developed in T3.1 not only for the business model design in the project, but also incentive design (WP1), systems development (WP2, 4 and 5) and evaluation (WP6).

Task 3.1 also included a state-of-art review of solutions that have implemented incentive-scheme based business models. Six cases have been reviewed based on categories derived from business model literature: key stakeholders, customers, value proposition, elementary offerings provided and an analysis of the basic revenue streams for each solution. The cases addressed in the review are (1) Mobidot (the Netherlands), (2) SMART (the Netherlands), (3) Commute Greener (International), (4) Travel Smart Reward (Singapore, US), (5) Merci (Canada) and (6) SUDS (the Netherlands). The review is presented in chapter 4 with a case-by-case presentation (4.2-4.7) as well as a case comparison (4.8) with a concluding elaboration on the lessons relevant for the EMPOWER project. The comparison is displayed in Table ES:2.

#	Description of solution	Key stakeholders	Target customers	Value proposition	Elementary offerings	Basic revenue model
1 Mobidot	Platform-based service enabling personalizing and incentivising end-user mobile services	Multiple, e.g. cities, transit operators, employers, travellers, service providers	Organizations: e.g. city mobility and traffic management authorities, transit authorises	B2B solutions where low cost personal level travel data or capabilities to influence travellers behaviour are the main value drivers	Multiple: analysis of travel behaviour, incentive provision, behavioural change mechanisms	From operators (e.g. cities): Licensing, Pay-per-user service provision, and support fees from customers
2 SMART	End-user mobile service that enables traveller to understand travel behaviour, organize traveling and be stimulated to make smart travel choices	Multiple, e.g. city government, service providers, incentive partners and systems developers	Individuals: car commuters and commuters in general	B2C solution for travellers to understand and organize travel behaviour. The city or transit operator can stimulate travellers to make smart travel choices	Multiple end user features (e.g. mobility profile, multi-modal route planner) delivered through a mobile application, a website and a web shop	From operators (e.g. cities): less investments in infrastructure, monitoring multi-modal traffic flows and surveys on travel behaviour
3 Commute Greener	End-user service providing ways to measure and reward improved everyday travel behaviours as well as enable smart ride-sharing including social network features.	Multiple: e.g. city authorities, employers and equivalent organisations that enable contacts with end-users who mainly is driving CFVs	Organizations: corporations, city authorities concerned with congestion and environmental impact from CFV use	The solution offer expertise and a scalable system set-up enabling cities, corporations and citizens to gain measurable results and improve everyday travel.	Multiple: e.g. campaign tool, measurement tool for travel behaviour, reward tool to stimulate smart travel change, ride-sharing support and social network features	From operators: the solution is sold to the operator as a campaign tool or as pay-per-use service
4 TSR	End-user service wherein public transit users receive transferable points, based on CEPAS card transactions, for using public transit weekdays with a boost on time slots where the demand on the system is lower	Multiple: city authorities, transit operators, service providers	Individuals: public transit users	B2C solution that enables customers to earn monetary rewards for using public transit. Tier levels and lottery system is added to increase attractiveness. The value for the operator of the solution is to spread demand of public transit from peak hours.	Website for registration, social media application for lottery and game and information. Solution connected to CEPAS public transit card.	From operators: the solution reduces transit operation costs through peak spreading
5 Merci	End-user service wherein public transit users get personalised location based offers from engaged external partners	Multiple: city authorities, transit operators, third party providers of offers (in Montreal 340 merchants and 1000 event partners), service providers	Individuals: Public transit users	B2C solution that enables customers to get personalised and location based offers where higher tier levels, i.e. more transit use, results in better offers. B2B solution: a cost efficient channel for merchants to reach consumers	Multiple: Website of link to social media for registration. public transit card number is coupled to account and transaction data is retrieved from the transit operator back-end system.	From operators: reduction in transit operation costs through peak spreading and increased revenues from ticket sales From engaged external partners (future): minor fee
6 SUDS	Slim uit de Spits (Smart away from peak hours) is an end-user service aimed towards car travellers in the regional network to avoid peak hours and be rewarded for that change in behaviour	Multiple: city of regional authorities, commercial service provider and project management	Individuals: car travellers using the road network on a regular or incidental basis	B2C solution: initially a monetary reward, which was later converted to a point based system to promote changes in travel behaviour. Next to this, an app provide a fun factor and feedback on the travellers' behaviour.	Multiple: app with features for tracking trips and provide pre-trip traffic information. Website that provides overview information and registration.	Main flow from operators: publicly funded scheme. Secondary flow: involvement of private partners

ES:2: Comparison of state-of-art solutions using incentive-scheme based business models

The final objective with T3.1 to identify key success factors for incentive-scheme based business model implementation. Using the investigations performed in T3.1 the report ends with four challenges that acts as barriers for developing incentive-based solutions that aim to reduce CFV usage:

- Challenge 1: How create customer relationships between a city or road authority and CFV users when no accessible relationships are in place that can be used as base to add new value on?
- Challenge 2: Offering value so that travellers will choose other travel options than the car. Where is the value for the CFV user to shift modality? Why would they chance on a perceived second best travel option? How do the incentives provided solve the life puzzle in a way so that the CDV is needed less?
- Challenge 3: How is a large user base generated without continuous expensive marketing campaigns using for example social networking?

- Challenge 4: How can societal benefits be monetized in order to build and operate the system if there are no clear and direct monetary benefits for operators such as road authorities or cities?

Ten key success factors concludes the report providing support in the design and implementation of incentive-scheme based business models within EMPOWER promoting reduction of CFV use:

1. Incentive-scheme business models require a **strategic marketing approach** to attract both users and incentive providers to the scheme, utilizing not only traditional expensive marketing campaigns but also mindfully designed social media utilization to create impact.
2. An Incentive-scheme business model is **not a static entity**. It should be viewed as an evolutionary process that involves continually changes in the business model setup and also the organizational design.
3. Incentive-scheme business models should **evolve in terms of the value proposition.** The model should not be over-engineered to suit only one ideal situation, rather should the design meet conditions connected to different phases: e.g. a value proposition when the service is introduced, a value proposition to build user base and user engagement and a value proposition when extensive user base is reached.
4. An incentive-scheme **business model should be developed intertwined with the technical solution**; i.e. the design of the technical system and the incentives that operationalize the value propositions in the model
5. An incentive-scheme business model should be **designed for a multi-sided market** that goes beyond the dyadic relationship between one buyer and one seller, and might require the design of new relationships between customers and suppliers or the utilization of proxy organisations that provide such relationships to the market.
6. An incentive-scheme business model should be a **win+win+win enabler** providing value to several different stakeholders and customers (service operator, incentive partners, travellers). The value that the EMPOWER services provide for stakeholders lies in the new value that is created through the provision of positive incentives that in turn should be connected to smart travel choices. The perspective of different stakeholders should be included when the business model is designed.
7. Incentive-scheme business models promoting the reduction of CFV use **rely in early stages on operator funding**, but alternative and complementing **commercial revenue streams can be created and should be identified** for a situation when the system reaches a large user base.
8. An incentive-scheme business model should be developed based on **available techniques and best practice**. EMPOWER will use state-of-art modelling techniques and existing business model archetypes to speed-up the development process and enable easy communication of results.
9. An incentive-scheme business model should provide **a comprehensive and attractive model** for the business setup. When multiple stakeholders are involved, a common vocabulary regarding the EMPOWER tool/service should be established in the beginning and all the perspectives on "value" should be taken into account.
10. Incentive-based business models should be **designed mindfully in respect to sustainability**. E.g. in the choice of partners, combining distribution channels, consider re-use or cradle-to-cradle in the value proposition, etc.

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Deliverable

Work Package	3
WP Name	Business models and organisational embedding
Deliverable	D3.1
Name	International review of business models and best practice

History

Version	Date	Changes
V0.1	2015-05-20	Table of content created and plan for Task 3.1 designed
V0.3	2015-06-04	Chapter 1 and 2 created
V0.5	2015-06-10	Chapter 3 created
V0.7	2015-07-15	Chapter 1, 2 and 3 revised, chapter 4 and 5 completed
V.9	2015-07-20	Summary completed and draft report distributed for internal review
V1	2015-07-31	Report finalized and submitted to EC

Distribution

Date	Recipients	Action
2015-07-20	EMPOWER internal reviewers	Draft for comment
2015-07-27	EMPOWER partners	Draft for comment
2015-07-31	EC	Submission of finalized report

Short abstract

Through a literature and case study review ten key success factors to support the design and implementation of incentive-scheme based business models within EMPOWER promoting reduction of CFV use were identified, which will provide input to both other tasks within WP 3 as wells as tasks in other Work Packages.

Relation to other WPs

	Relation to other WPs (also consider section 1.1)
WP 1	The (review) work in WP 1 is relevant to WP 3 as the value proposition and incentives are partly defined there. T3.1 is relevant to WP 1 as it provides inputs from several cases where incentives have been or are being used to influence behaviour.
WP 2	No strong links with WP 2 although the social networks as a tool for user uptake which is used in some of the cases described in T3.1 may be relevant for WP 2.
WP 4	The business models consists of different parts, like value propositions and communication channels to users, which are all relevant for the work in WP 4. T3.1 provides insights to WP 4 on important components of successful business models.
WP 5	This deliverable will develop key success factors for implementing business models in urban environments. WP5 will use these success factors in the design of the Living Lab (LL) operations and further on in the scheme design within WP5**.**
WP 6	This deliverable will identify indicators for evaluating business models in urban environments. WP6 will use these indicators in the design of the evaluation protocol for evaluating the business impact in the lead cities.
WP 7	No strong direct links of T 3.1 with WP 7

	Challenges and Risks
1	Deliverable deadline shortly after project start and during holiday season.

	Deviations from the proposal (positive and negative)
1	No deviations from the proposal

	Dissemination Activities - proposed or actual		
	Activity eg conference presentation, workshop, publication	Target Audience	Feedback from testing (if applicable)
1			
2			
3			

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Figures

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1 Introduction

This deliverable is the first deliverable in Work Package 3 (WP3) of the EMPOWER Project. The Work Package covers a variety of aspects in producing the business model component for the EMPOWER toolbox, i.e. the main deliverable of EMPOWER project. In its core, WP3 involves the analysis of the four within EMPOWER developed services from a business perspective (T3.3). Task 3.1 and T3.2 provide important conditions to develop the lead city business models in T3.3. Using the experiences from T3.1-T3.3 as base along with the outcomes from the living lab operations (WP5) and the evaluation work performed (WP6), task 3.4 will produce generic business cases and templates to be included in the EMPOWER toolbox. This first chapter in D3.1 introduces the deliverable and discusses its goals, main results and innovations, as well as the approach applied and concludes with a brief overview of the document structure.

1.1 Goals and contribution to other tasks and deliverables in EMPOWER

The goals of this task 3.1 is to:

- identify potential directions for design choices for the EMPOWER business models based on current business model trends and literature on business models.
- cover example cases of intended positive incentive services in transportation, like public transportation customer loyalty programs (e.g. such as in Montreal and Singapore), peak reward programs from the Netherlands.
- identify challenges and key success factors for incentive-scheme based business models that have been applied around the world as well as documented in literature on business models from different fields.

The review of key literature sources and the review of state-of-art cases are documented in this deliverable. The results presented in this deliverable are related to the following other parts of the project:

- T1.1 (Systematic review of the behaviour change models)– State-of-art solutions are analysed in T3.1. The behaviour change models implemented in these solutions are important input to the review of behavioural change that is performed in T1.1.
- T2.1 (Cross-sectoral Review of social innovation impact) – Business model implementation is a part of social innovation. T3.1 involves an in-depth analysis of business model innovation. These findings, as well as the theoretical sources that are reviewed in T3.1, are input to T2.1.
- T3.2 (Methodology and process for business model design) – The business model methodology developed in T3.2 will be based on the best practices presented in this deliverable.
- T3.3 (Business model development for lead cities) – The methodology presented in D3.2 will together with this deliverable act as preparation for the collaborative business modelling process performed in T3.3.
- T3.4 (Generic business case and toolkit development) – In this deliverable 20 theoretical sources are reviewed. In a selection of these business model archetypes examples are presented that will act as input for how to create generic business cases, which is the main objective in T3.4 (to be included in the EMPOWER toolbox)
- WP 4 (Mobility Services Infrastructure) – This deliverable will contribute to the development of EMPOWER services and specifically components that will improve the business success of future implementations
- WP5 (Experimentation and show casing) – This deliverable will develop key success factors for implementing business models in urban environments. WP5 will use these success factors in the design of the Living Lab (LL) operations and further on in the scheme design within WP5.

- WP6 (Whole-societal assessment of EMPOWER interventions) – T3.1 will yield a number of assessment criteria that act as basis for designing appropriate components in the evaluation method developed in WP6.
- Task 7.4 (Roll out in take-up cities) – The key success factors for implementing business models in urban environments will act as input for the roll out of results in take-up cities.

1.2 Main Results and Innovations

The main results of this deliverable are 1) an international review of the existing body of knowledge regarding business models from design, implementation and assessment perspectives, 2) a review of state-of-art case examples on business models for incentive scheme based services and platforms. Derived from the literature as well as the case review 3) key factors for successfully implementing incentive scheme business models are presented and discussed. The target group for the deliverable is primarily the project itself as it, together with D3.2, prepares other tasks (see section 1.1) in the project to develop, implement and assess business models for the envisioned EMPOWER services. In Table 1.1 we connect this deliverable with the stated EMPOWER innovation outputs and discuss how this deliverable directly and/or indirectly will contribute to the fulfilment of these five overall outputs.

EMPOWER innovation output	Contribution of this deliverable
New EMPOWER mobility services to provide innovative positive policy measures	The deliverable provides an overview of existing services with similar purposes as the envisioned EMPOWER services. This result can act as direct input in the design of the services that should be tested in the living labs operated in the project. The deliverable also provides useful experiences from deploying digital services for smart mobility in urban areas that is expected to have an indirect contribution to the service design in the project.
The EMPOWER toolkit that aims to support different stakeholders to choose and implement positive policy interventions in urban areas	The deliverable introduces existing guidelines, strategies, perspectives, business model archetypes and indicators for business model design, implementation and assessment. This collective set of knowledge resources will be used to develop the business model aspects of the EMPOWER toolkit.
Evidence of the impact of new positive incentives on behaviours	The deliverable illustrates existing state-of-art solutions that use different forms of positive incentives that will be input in the design of appropriate incentives in EMPOWER. The state-of-art solution review can be used to compare results from EMPOWER in order perform cross-case comparison and analysis.
New and improved organisational models for successful implementation of positive policy measures	The deliverable introduces existing guidelines, strategies, perspectives, business model archetypes and indicators for business model design, implementation and assessment. This collective set of knowledge resources will influence the new and improved organisational models that will be a part of the EMPOWER toolkit.
Innovation in the evaluation method for new mobility services	The deliverable includes a literature review that has discovered several sets of criteria that can directly impact the development of indicators for assessing the effects of business model implementation in relation to EMPOWER services

Table 1.1: Contributions of this deliverable to EMPOWER innovation outputs

1.3 Approach applied in Task 3.1

The main objective of Task 3.1 is to empirically and theoretically ground a set of key success factors for successful implementation of incentive-based businesses. In order to generate grounded and sound business recommendations, a structured approach was designed for task 3.1 (see Figure 1.1). The task was initiated with definition of key concepts regarding business models and an elaboration into business model trends. In order to visualize trends in business models and also give an example of business model innovation, Commute Greener was used as an illustrating case at this stage. The

initial definition of key concepts was followed by an extended literature review based on a sample from the existing body of knowledge regarding business models within the fields of Innovation, Information systems, Management and Transportation. This in turn, created a basis for the development of a systematic case review model, which was applied on six state-of-art solutions now in operation. Both primary and secondary data sources were used to perform this review. The review of literature as well as the structured review of state-of-art solutions created the basis for designing key factors for incentive-scheme based business models, which completes the deliverable.

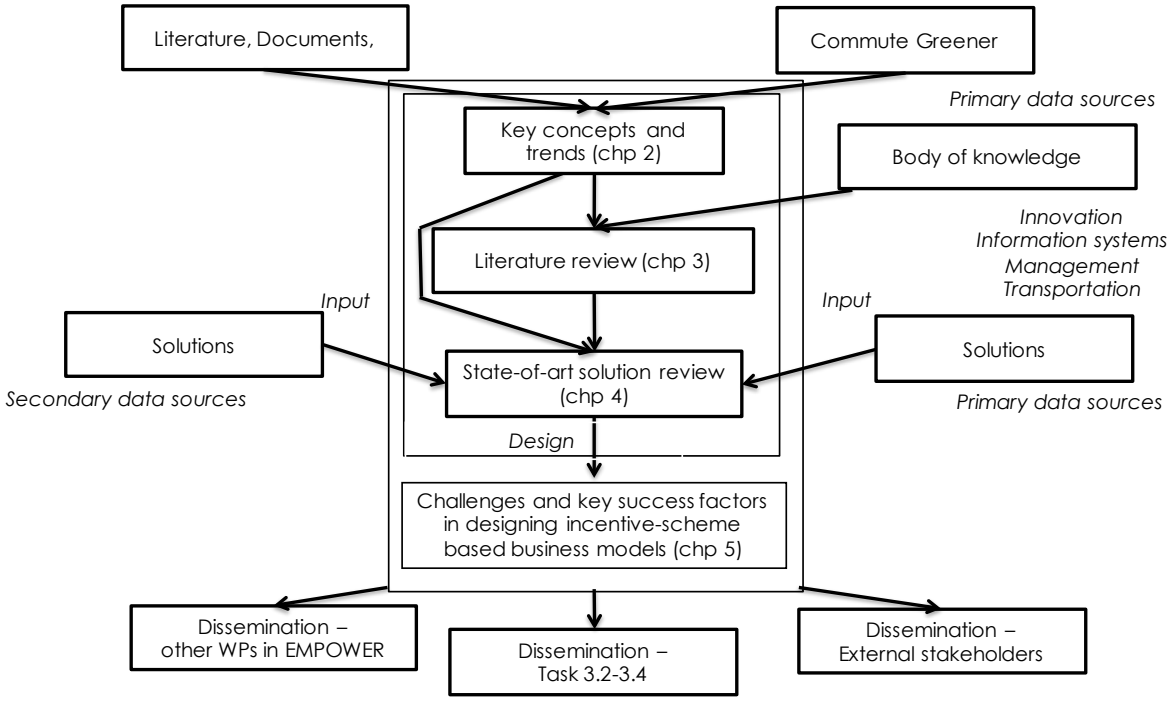


Figure 1.1: Approach applied for Task 3.1

The task was performed in M1-M3 in the project. After the project kick-off meeting a systematic process was defined for M1-M3 to perform activities in task 3.1. The systematic process is presented in Figure 1.2.

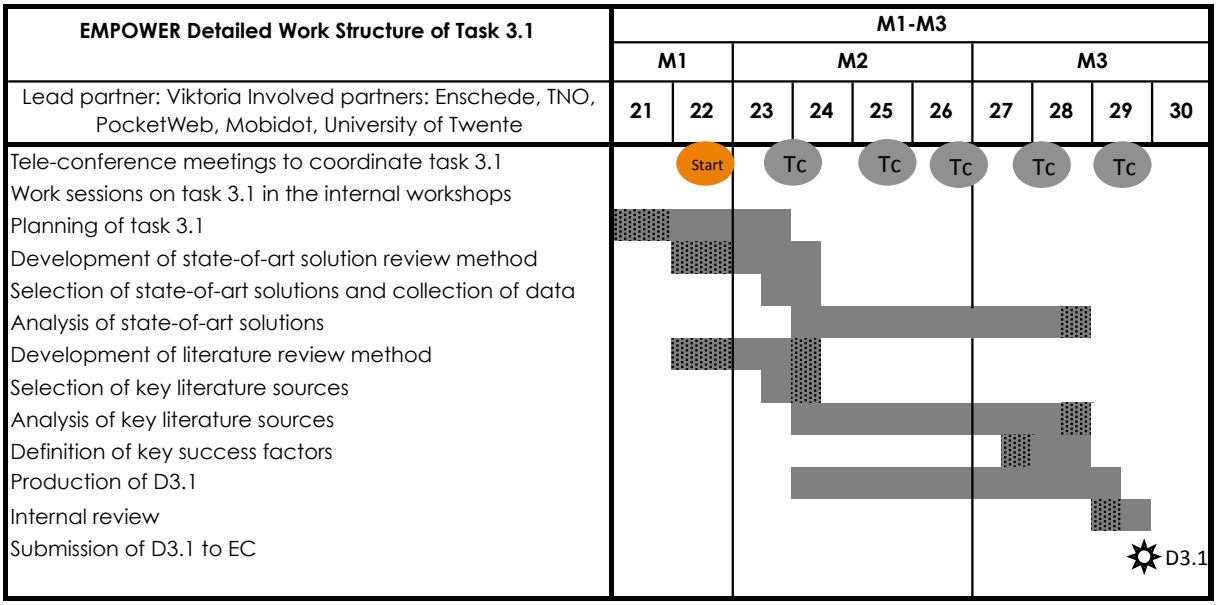


Figure 1.2: Time planning of Task 3.1

1.4 Document Structure

Task 3.1 is documented in the report D3.1 The report starts with an introduction into key concepts and trends connected to business models (chapter 2). In chapter 3 the in-depth literature review of key theoretical sources connected to several different fields is presented. Based on insights from the literature review, a structured model for case review is presented in chapter 4 and then used to describe the state-of-art solutions that have been identified and analysed. The report is concluded with chapter 5, wherein key factors for implementing incentive scheme business models are presented.

2 Key concepts and trends

A useful starting point before analysing existing business models is to have a common understanding of what business models actually are and how they are positioned within the domain of business strategy and impacted by trends in business. This chapter aims to do just that.

2.1 What is a business model?

2.1.1 A theoretical introduction

The driving force behind sustainable transport innovations is to improve upon a current situation, whether it is by improving products and services or reaching a new group of people. Successful innovations thus are destined to create value, both for the supplying and the receiving end of the innovation; the supplier gains revenue and the receiver has his or her situation changed for the better. This does not necessarily entail a monetary exchange; a revenue can also be the compliance with the sustainability goals of a city, which are in turn created to improve the well-being of its inhabitants (Rauter, Jonker, & Baumgartner, 2015)

A common way, in which the potential value of an innovation can be assessed, is by looking at the underlying business model. This includes both, the individual and the societal perspective. Considered one of the founders of business model thinking – although he does not even refer to the concept specifically – Peter Drucker in 1994 posited "business theory" as making assumptions about society and its structure, the market, the customer, and technology (Drucker, 1994). He posits that it is crucial to make these assumptions about "what to do" instead of only evaluating "what has been done" in order to maintain viability and prevent fruitless ventures. He also claims that making these assumptions is just as much worthwhile for ventures with societal goals (e.g. labour unions) as it is for businesses. Thus, in spite of what the term "business model" may suggest, it is also useful for innovations of which the value is a social goal, such as CO2 reduction.

A while onward, Weill and Vitale (Weill & Vitale, 2001:40) outline a business model as "the description of the roles and relationships among a firm's consumers, customers, allies and suppliers that identifies the major flows of products, information and money, and the major benefits to participants". It was also in that time that business models were often connected to technological innovations and their potential reciprocal value. For instance, one study (Bouwman, 2003) suggests that business modelling is about the process of linking new technological environments to business strategies and how new customer value in this context can be created. Put differently, business models as a concept are typically used to explicate how companies create and capture value from technological innovation (Chesbrough & Rosenbloom, 2002).

2.1.2 A practical approach

Osterwalder 2004 and Osterwalder & Pigneur, (2001) propelled the domain of business model generation (or business modelling as a verb) when they took the theoretical approaches and assumptions as described above and turned these into a comprehensive framework, initially based on four pillars that, according to Osterwalder, should be addressed in a business model: the Product (what is offered to the market); the Customer Interface (who the customers are and how they are reached and related to); the Infrastructure Management (the processes, networks and logistics needed for fulfilment of the product); and lastly the Financial Aspects (referring to revenue model, cost structure and the business model's sustainability). Furthermore, besides these four larger categories, Osterwalder added so-called "building blocks" to deal with these pillars in further detail. The pillars and building blocks of the Business Model Canvas can be explained as depicted in Table 2.1.

Pillar	Building blocks	Description
Product	Value Proposition	This central and focal part of the business model describes the value that is delivered to the customer segments. The value proposition should respond to their needs, and/or alleviate their pains.
Customer Interface	Customer Segments	This field describes who the main customers are that an organization creates value for.
	Customer Relationships	This field describes how the relation with the customer is established and maintained. This may vary from dedicated personal assistance to an automated service.
	Channels	Which channels are used to reach the customer segments? These channels may differ for the different phases (potential) customers go through: awareness, evaluation, purchase, delivery and after sales.
Infrastructure Management	Key resources	What resources are required for the value propositions, the distribution channels, etc.? Examples are FTEs, knowledge and intellectual property, machinery, etc.
	Key activities	This field denominates the activities that are required to create the value proposition and run the business model. Think of production, management of IT systems, etc.
	Key partnerships	What partners are needed to offer the value proposition to the envisaged customer segments? Reasons for partnering may be acquisition of particular resources and activities, access to customer segments, risk reduction, etc.
Financial aspects	Revenue streams	This field describes the revenue streams that are generated. One can think of subscription fees, sales revenues, revenues from advertisers, etc.
	Cost structure	The most important costs are denominated. They are mainly based on the key resources and key activities. Some costs will be fixed (like initial investments) and other variable.

Table 2.1: Blocks in the Business Model Canvas (Osterwalder, 2004; Kranenburg, et al, 2014)

Osterwalder's work has also been turned into a useful template for the building blocks, which is widely used today, called the Business Model Canvas. The upper left part of the Business Model Canvas (Key resources, Key activities and Key partnerships) is sometimes summed up as the "business ecosystem", whereas the upper right part (Customer Segments, Customer Relationships, and Channels) can be summed up as the "service or product concept" (Limonard et al, 2011) and also often serves as inspiration for the marketing strategy for an innovation. The bottom part (Cost structure and Revenue streams) can in turn be regarded as the business case (which is often mistakenly mixed up with the business model as a whole). An example of a business model in the mobility sector is provided by van Kranenburg et al (2014), see Figure 2.1[1].

The example illustrates how the segments of a Business Model Canvas can be filled in, based on the real-life example of a Dutch company implementing a 'mobility budget' for their employees to promote green(er) commuting. The yellow items describe what the current business model looks like; the purple items are possible additions to the business model. In chapter four of this deliverable, a number of state-of-art examples of business models in the mobility domain will be dealt with in further depth using a sample of the building blocks that Osterwalder (2004) propose.

[1] In deliverable D3.2 (T3.2) the Business Model Canvas is used as core in developing the methodology for business model design in EMPOWER. D3.3 (T3.3) will include a series of these canvases for the four lead cities participating in the project.

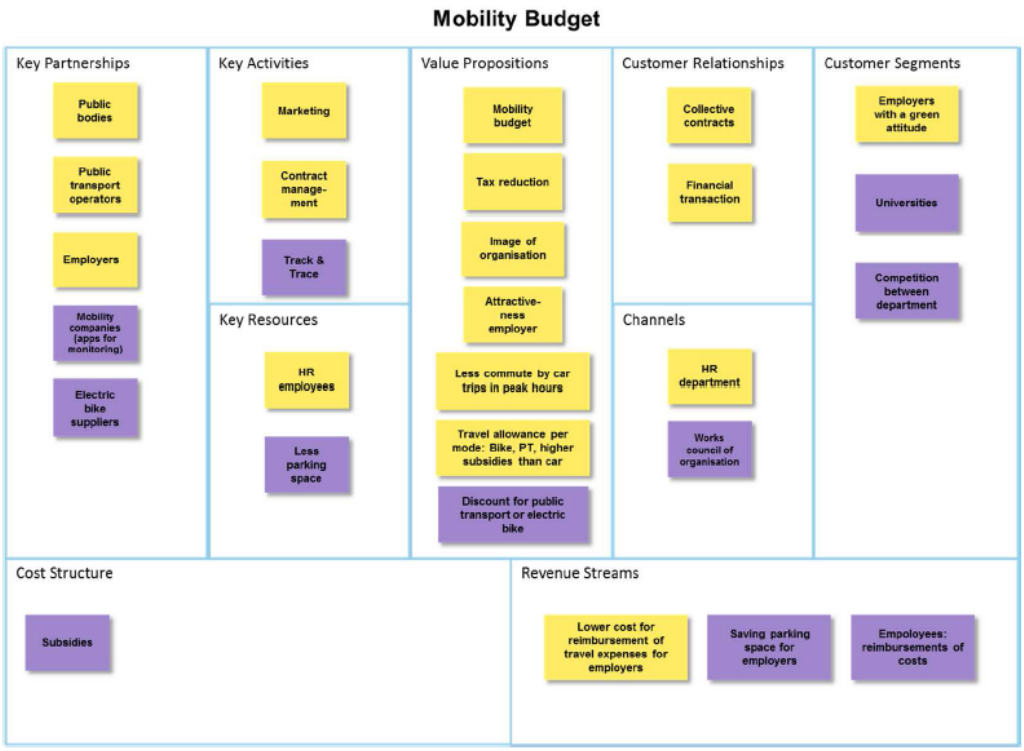


Figure 2.1: Example of Mobility Budget Business Model Canvas (Kranenburg et al 2014)

2.1.3 The Value Proposition Canvas within the business model

A part so vital to the business model that it is worth describing separately is the value proposition (Osterwalder and Pigneur 2014[2]): that is, what is actually on offer, what does it promise, or rather, what value does it deliver? And, maybe most importantly, why? Separate templates are available to conduct a value proposition exercise before exploring the rest of the business model. An example is given below in Figure 2.2

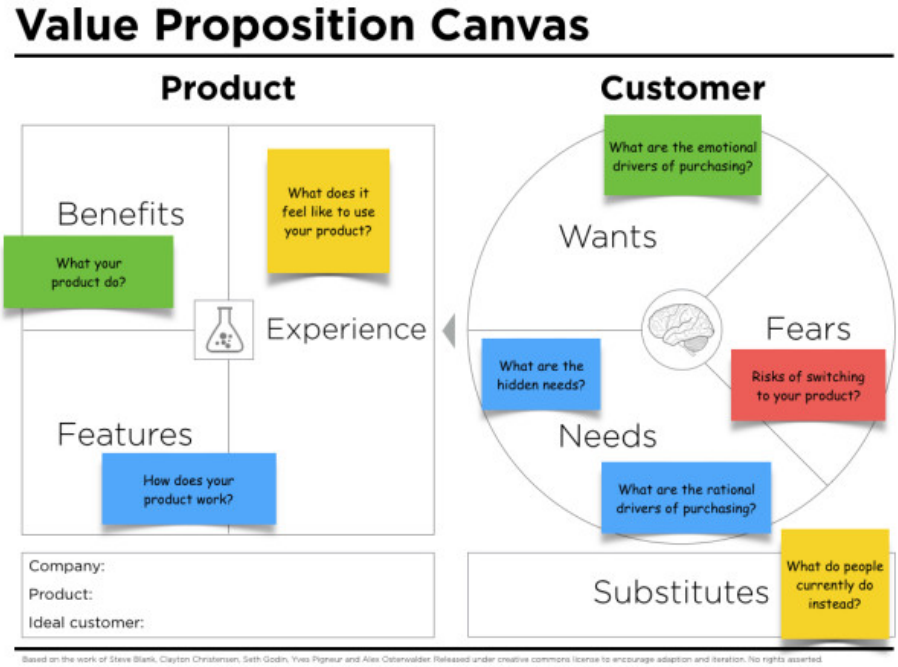


Figure 2.2: Value Proposition Canvas (Thomson, 2013)

[2] Osterwalder & Pigneur, Value Proposition Design, How to Create Products and Services Customers Want, 2014, Wiley

The items in the Value Proposition Canvas are very much based on what seems to drive consumers the most: their feelings, emotions, thoughts, beliefs, and so on regarding the intended product or service at hand (the more psychological aspects of a proposition). Also, what they currently use that serves as a substitute of what you will have on offer. Thus, first of all, one has to gather insights about the intended customer, on both functional and emotional drivers of people's (purchasing) behaviour that the value propositions should make sure to properly address. How this should be addressed, is explored in the part of the Value Proposition Canvas that deals with the product or service itself; the features it has, the experience it delivers to consumers and what benefits it has for them.

In line with the fact that business models are not limited to commercial products, the value proposition offered can also entail motivators to induce behaviour change, for instance. To take an example in the context of the EMPOWER project, for a business model focused on changing commuter behaviour, the value offered is for instance positive incentives for the commuters when switching from the car to public transport, such as rewards. A consequent remark concerning the value proposition, and also very much relevant for business models with a social goal, is that the value from such an initiative does not only benefit a specific target group (e.g. the commuters), but other stakeholders at the same time, such as incentive providers that has to be engaged in the business setup for a model based on external rewards to succeed, or other commuters that are less bothered by congestion, and city inhabitants that become surrounded by more fresh air. Having clarified the concept of the business model, the next paragraph deals with trends in the domain of business modelling and consequent innovation of the business model, as 'business modelling' is by no means a static, one-off exercise.

2.2 Business model innovation

2.2.1 Trends in business modelling

Many trends, stemming from changes and advances in technology, society, politics, and so on, influence business model generation and challenge existing business models, motivating the innovation of the current practice. An overview of these trends, however non-exhaustive, is given below based on the following sources: Bachet (2014); Butzin & et al (2014); Scheppingen & Berkers (2012); Berkers & Roelands (2013); Sprout (2013); Kotler & Zaltman (1971) and Kranenburg et al (2014).

From ownership to access

More and more consumers prefer having access to products and services to actually owning them. Examples of this are plentiful; platforms such as iTunes offer access to music; car-sharing propositions pop-up of which Uber is a well-known example, but also washing machines 'as a service' for student residencies are an example of a product-turned-into-service for which no investment is needed (rather a monthly fee). Consequently, pay-per-use is an example of a model for revenue following from this trend.

Omnichannel

Consumers inform themselves more and more online and therefore have become much more knowledgeable on for instance product specifications and prices than before, often regardless the product type; user reviews and comparisons are just a click away. This not only means that the need for a 'man in the middle' disappears and organisations have to operate far more customer-centric by taking their customers and the information they serve them throughout their distribution channels much more seriously; also the mere existence of certain offline services is challenged, from small retailers to solicitors whose basic services such as contracts can be found and copied online. This trend requires, but also enables much more agility of organisations to respond to customer needs, for instance by introducing new concepts quickly in basic versions and modifying them along the way

based on (digital) input from customers. Revenue streams in this case are for instance split up into basic freemiums (free products), complemented by premiums for new and/or more elaborate versions.

Growth of data sources
Connected to the former trend, the growing amount of data and data sources, from social media to videos and sensors on traffic at shopping locations, makes it possible to communicate and interact with customers more. With these new data sources, better analyses can be conducted for instance, on the actual needs and behaviours of intended customers, but also quality control can be real-time thus improving customer experiences and lessening the amount of complaints. New business models are not only based on product innovations and new product developments, but also on optimising processes. Furthermore, the collection and analysis of data can even result in new revenue streams purely based on this knowledge; there is always someone out there who can come up with a new ideas based on that data. It is important to be aware that this brings along new cost structures, as well, concerning data maintenance, storage, and so on.

Multi-sided business models
Also interconnected with the trends above, but worth mentioning separately, is the growing number of so-called 'multi-sided business models'. This type of business model respects the fact that an innovation not always stems from one organisation alone, but is rather an outcome of several ideas and concepts coming from different parties, either brought together in the beginning (through co-creation for instance) or after deployment (e.g. new apps on a platform), all with goal of benefitting from each other's strengths, such as access to new markets. For all parties therefore, a viable business model should be in place.

Scarcity and sustainability
In many countries consumers are becoming more and more aware of limits to (natural) resources and capital, requiring more sustainable business models from their suppliers. Of course this points to products and services that either in their production, delivery or usage reduce the demand on resources; but it also means that consumers require more and more that their products and/or services are not compromising well-being, for instance of the people working for the manufacturers or the producers at the beginning of the value chain. The growing popularity of fair trade goods is an example of this trend.

Social innovation in business models
As has been pointed out a few times before in this chapter, a goal of an innovation need not necessarily be of a monetary nature. For organisations such as NGO's, their (innovative) products or services mostly serve a societal goal and/or are directed toward some sort of social change. The necessity for them to think in a strategic "business" way about their innovations, too, has long been recognised. Although in this case, the value proposition is often a behaviour change that improves a social situation (e.g. improving health by getting a vaccination or having safe sex, and better quality of life in cities through swapping the car for public transport), it nevertheless should be deployed in a way that is somehow economically viable or even profitable, otherwise the initiative will surely not last or not even get started in the first place.

2.2.2 Social business models
The social innovation in business models as discussed in the previous sections deserves more detailed analyses given the societal objectives of the EMPOWER project. Many current studies on this specific topic (e.g Butzin & et al, 2014; Rauter, Jonker, & Baumgartner, 2015; Yunus, Moingeon, & Lehmann-Ortega, 2010) focus mainly on innovating current business models towards more sustainable models, such as producing in a more environmentally friendly way. One aspect that stands out

from these studies is that the potential revenue streams are also considered in the light of their social and environmental profit (e.g. a healthier workforce or less pollution). An example of business model innovation into a more sustainable model is provided in Table 2.2.

Pillar	Building blocks	Examples from case studies on building sustainable business models
Product	Value proposition	Product-service-system with a strong focus on re-use; sustainable products which for example help to lower CO2 emissions; products which are produced fairly; locally produced products; consulting which considers ethical standards products with fewer environmentally harmful ingredients; products (partly) consisting of recyclable materials; system solutions
Customer Interface	Customer Segments	Mainly customers aware of sustainability-related issues; customers who are willing to pay not only for the product/service itself but also for the underlying philosophy
	Customer Relationships	Importance of having direct contact to the customers; transparent information and communication; importance of awareness raising and informing the public that is not directly linked to specific customer segments
	Channels	Different ways of distributing products and services, e.g., direct distribution, online, shops, distribution partners
Infrastructure Management	Key resources	Importance of partnerships with suppliers and partners, this allows for concentration on core competencies, ensures sustainable products based on fair value chains and/or helps communicate the sustainable features of a product to customers by using own distribution channels as well as specialized distributors
	Key activities	Concentrating on core competencies and organizing all other relevant processes together with partners
	Key partnerships	Expressing appreciation for partners, e.g., by changing relevant wording or by talking about partners instead of competitors; actors see themselves as system suppliers, thus making co-operation with partners even more necessary
Financial aspects	Revenue streams	Besides generating revenue, the companies create additional value, e.g. by being active in the region or by offering further education for customers buying a new product
	Cost structure	Cost structure is adapted in such a way that suppliers (for example) are able to both fulfil their requirements and make profit

Table 2.2: Business Model Building Blocks for sustainability (Rauter et al. 2015)

Other studies (e.g. Kotler & Zaltman, 1971; Gordon, 2012) also look at the marketing strategy for social ventures. Whereas a business model is used for defining the business strategy, the marketing mix is a frequently used approach towards a marketing strategy for reaching, interesting, motivating and persuading potential customers. The most common items in the marketing mix are the "four P's" (McCarthy, 1960): *Product* (what is on offer, either tangible or intangible); *Price* (the price of a product or service; may also be the amount of effort to require it); *Place* (where the product van be acquired, also referred to as distribution channel); *Promotion* (the means of communications for marketers, such as advertisement or PR). The overlap between these P's and especially the right-hand side of the Business Model Canvas is noteworthy, though, as has also been mentioned earlier, not surprising: both deal with the market and the market approach and related business activities. In social marketing, where again the product to be "sold" is mostly a behaviour change, these P's can be applied, too. In this case, the Product is often intangible (e.g. choose another modality); the Price is more related to effort or barriers such as comfort and image; the Place refers to the places where the target groups can best be reached, e.g. at schools, and lastly Promotion is often a similar set of advertisements, but also incentive programs.

It is however being argued that in such a social setting, the four P's are a bit too transactional and short-term: "a new social marketing model that includes the other strategies employed in social marketing beyond product, price, place and promotion, and is also able to incorporate a more consumer oriented approach in which relational thinking, and a strategic and holistic approach to behaviour change, would be beneficial to the field" (Gordon, 2012). This suggests that adding certain assumptions to the business model might be worthwhile, such as the aforementioned expected social

and environmental gains; new types of resources such as local communities and co-creation with target groups; non-monetary barriers such as effort or comfort loss that can be added to the cost structure; and working more in co-creation with the target groups instead of a one-way approach.

A final point that requires some elaboration in this context, is the fact that social business models often tend to rely on incentives (or disincentives) in the value proposition. In other words, especially when the desired behaviour requires some form of altruistic action (for a greater good rather than your own good), positive or negative reinforcements are frequently used to motivate people and to have them "value" what is being offered. These incentives can range from monetary rewards, to gifts, or appraisals, but they can also be fines, fees, taxes or punishments. (In EMPOWER, the focus is on "positive" incentives). In a study on business models in mobility (Kranenburg, van, Sluijsmans, Kruijff, de, & Vonk Noordegraaf, 2014), the different types of incentives were categorised into services that either offered pleasure (e.g. fun through gaming and competition), comfort (e.g. tips that better fit into a daily schedule), efficiency (e.g. less costly) or a combination of these. One should be aware however that also positive incentives may have a "perverse" effect. This is especially common with financial incentives, as they can take away a genuine feeling of responsibility, because it is geared towards an external motivation for money, resulting in the disappearance of this motivation when the incentive is taken away (e.g. Gowdy, 2008).

2.2.3 Business model evolution as a continuous journey

"Business Model Innovation does not come from creatives only. It comes from understanding other business models and learning from them"
(a quote from Patrick van der Pijl, Producer Business Model Generation, CEO Business Models Inc.)

Establishing a viable business model is only a first step. "Always challenge your current business model" is what many strategic and visionary thinkers will posit is necessary for organisations to endure, as changes are constant in people and societies as the trends described earlier clearly point out. In fact, innovating the business model is sometimes even referred to as a matter of discipline and should be a constant matter (Girotra & Netessine, 2014), which just as well is true for business models with a social goal. The authors argue: "innovating the business model means making changes to the set of basic decisions that have been made earlier: what your offerings will be, when decisions are made, who makes them, and why. Successful changes along these dimensions improve the company's combination of revenue, costs, and risks." The same source also points out that innovating the business model should not necessarily stem from novelties such as new markets or technologies. More often in fact, profits are generated by modifying the most trivial of things, such as finding commonalities (e.g. selling more products through one channel) or focusing on one market rather than many, thereby having more return for the effort due to more focus. And, linking back to the social business models, the innovation can also stem from the motivation to make a current model more sustainable.

As the case study below, see Table 2.3, clearly demonstrates, business model innovation is actually an evolutionary journey, fed by external changes, organisational changes and developments that force a new way of thinking. In chapter 4 we further investigate the current business model used by Commute Greener.

Commute Greener is a solution (app-based) for reducing the environmental impact of commuting. Users of the app can redesign their commutes to select a more eco-friendly and efficient way to get to and from work and consequently track the environmental impact of their choices. The app also contains social network features to, for instance, set (common) goals and take on challenges together with co-workers.

In this case description, key aspects of business model innovation of Commute Greener are described. The actual features and current business model of Commute Greener, will be described in further depth in chapter 4 of this deliverable.

The first phase
The concept Commute Greener arises during 2009, when two prototypes coincide at the Volvo IT Innovation Centre: first, how to keep bus- and truck drivers connected and have them share information; and secondly the need for measuring CO2 emissions out of environmental concern. Experienced with open innovation initiatives gave a good possibility to nurture what is now a spin-off from Volvo. The City of Gothenburg showed an interest at a very early stage and actually helped forming the solution into a commercial path. While the Volvo Group was a valuable setting it also became clear, along the path, that the potentials would be larger within a stand-alone organisation than as part of an organisation dominated by manufacturing. Business decisions needed independence of the decision-making process of Volvo.

Innovating the business model of Commute Greener
Commute Greener finds itself in a continuous evolutionary journey of the business model; which mostly means trying out various value propositions, for new customer groups. In the beginning, it was founded on a Business-to-Consumer model (i.e. the app was sold to consumers) but there was not enough revenue to be sustainable. Motivated by getting the City of Gothenburg as a customer, Commute Greener thus explored further the model of 'Business to Government' (B-to-G), which became a much more successful venture than B-to-C as also Mexico City and San Francisco acquired the app to reduce emissions in their cities. The B-to-G model then evolved into Business-to-Business (B-to-B), motivating the creation of a white-label solution with which the app could be specifically branded for commercial customers. The strategy of selling campaigns is not that it should be a one-off event. It is a solution, not just a product and the desire is to retain business customers for a long period of time, continuously supporting them with achieving sustainability goals. It often starts with a pilot campaign for employees of a business or engagement with Commute Greener into a strategic project. One way to retain customers is to certify emission savings.

Whereas the “direct” B-to-B market for Commute Greener means the app is used by citizens or employees directly, an indirect form of B-to-B sales is the customer segment of third parties, such as urban mobility agents and public transport organisations. They can make use of Commute Greener in their own toolbox, and for this purpose they acquire the license and set-up. Another indirect B-to-B customer segment are so-called sponsors; companies that fund the usage of Commute Greener, in order to reach a new market segment themselves.

Currently also a new model is thought about at Commute Greener, based on the data streams resulting from the usage of the app. Several models are considered here, such as API’s targeted to specific customer segments. Considering the business model pillar of 'Infrastructure Management', Commute Greener focuses on being digital and scalable.

Market opportunities and assumptions have been identified by making use of the Business Model Canvas to find the white spots for innovation. The Canvas is seen as helpful for gaining a rich understanding of all stakeholders with different perspectives. The good thing about the Canvas is that it helps to overcome misunderstandings, as it takes into account different perspectives. It is not about networking or stakeholder management, but about actual work and value for all parties involved.

Take-away for business model innovation
The road to new business models is also paved by road bumps and challenges. It is often not until after some years that one may be able to fully re-assess a situation. For example if there would have been inquiries about the viability of a B-to-C model during the early days of Commute Greener there would have been many supporters for that business model, but obviously not anymore. A key take-away is that one need to dare to choose the appropriate organisational model for a venture, which also means daring to say goodbye to non-viable approaches.

Table 2.3: Business model innovation illustrated through Commute Greener

3 Literature review and impact on EMPOWER

A core objective within WP3 is to develop and evaluate business models for the EMPOWER services that should be tested and assessed in the four Living Labs that will be established in the project. Key activities in task 3.3 are the design, implementation and assessment of these four business models. As introduced in chapter 2, numerous modelling approaches have been designed and researched by scholars from different fields, as well as the related trends, which has created a vast body of knowledge with the common topic of business models. Together they lay a foundation for novel development incentive-scheme based business models. In order to prepare the activities that should be performed in the parallel tasks performed within the project, and to underpin these with the current knowledge base on business modelling, a structured review has been performed on the primary sources introduced in chapter 2. The main purpose with the literature review is an in-depth analysis of the value that these sources bring to the EMPOWER project.

3.1 Literature review process

To organize the literature review, a systematic framework of analysis was developed to streamline the review of the literature sources. The structure is based on a model consisting of four categories acting as analytic lens, consider Table 3.1.

Category	Description
Summary of literature source	This category summarizes the literature source analysed in terms of article scope, method used, business model focus and contributions.
Lessons learnt about business model design [how to design]	This category targets the input that the theoretical source brings to how business models are/should be developed in EMPOWER
Lessons learnt about business model implementation [how to implement]	This category targets the input that the theoretical source brings to how business models are/should be implemented in EMPOWER
Lessons learnt about business model evaluation [how to assess]	This category targets the input that the theoretical source brings to how business models are/should be assessed in EMPOWER.

Table 3.1: Categories structuring the literature review on business model literature

The literature review include 20 key sources that address business models from diverse viewpoints, such as marketing, strategic management, information systems (IS) and innovation, with relevance to the EMPOWER project. Table 3.2 provides an overview of the literature sources analysed in terms of reference, type[3], field and motive for selection. The motive of selection is based on Gerring (2007) analysis into how cases are selected providing different case-selection techniques.

		Type						
#	*Authors, year*	*Theoretical survey*	*Single case study*	*Multiple case study*	*Concept investigation*	*Other*	*Field(s)*	*Motive for selection*
1	Kotler & Zaltman (1971)				X		Marketing	Influential
2	Osterwalder (2004)					X	IS	Influential
3	Osterwalder et al. (2005)	X			X		IS	Influential
4	Enquist & Juell-Skielse (2010)			X			IS	Pathway
5	Demil & Lecocq (2010)		X				Management	Influential
6	Zott et al. (2011)	X					Management	Influential
7	Limonard et al. (2011)		X		X		Innovation	Influential

[3] The *theoretical survey* denotes an investigation into how different theoretical stances view a specific concept, e.g. business modelling. *Single case study* denotes an investigation based on one case, e.g. organization. *Multiple case study* denotes an investigation involving several cases, e.g. organizations. A *concept investigation* focus the presentation and/or development of a specific concept, e.g. business model canvas. *Other* denotes e.g. dissertation, public report or other type of report.

8	Burkhart et al. (2011)	X					IS	Typical
9	Zolnowski & Böhmann (2011)	X					IS	Typical
10	Bie et al. (2012)		X				Multiple	Crucial
11	Ferro & Osella (2013)			X			IS	Pathway
12	Berkers & Roelands (2013)		X				Innovation	Influential
13	Klang et al. (2014)	X					Management	Typical
14	Bocken et al. (2014)				X		Multiple	Pathway
15	Janssen & Zuiderwijk (2014)			X			IS	Pathway
16	Van Kranenburg et al. (2014)			X	X		Innovation	Crucial
17	Butzin et al. (2014)					X	Multiple	Influential
18	Peters et al. (2015)		X				IS	Pathway
19	Rauter et al. (2015)			X	X		Innovation	Typical
20	Herrador et al. (2015)		X				Innovation	Crucial

Table 3.2: Literature sources included in the review

3.2 Kotler & Zaltman (1971): Social marketing as approach to planned social change

In Kotler & Zaltman (1971) the authors investigate the applicability of marketing concepts and techniques to promote social objectives such as increased use of public transit and smart mobility. In the article, the authors demonstrate how social causes can be advanced through applying principles for marketing, planning and control. Particularly they address and explain different types of markets, channels how to reach these markets and variables to tackle when planning for social change, i.e. product, promotion, place and price (Kotler & Zaltman, 1971). As a basis of their work, they asked the question: "Can marketing concepts and techniques be effectively applied to the promotion of social objectives such as brotherhood, safe driving and family planning?" Clearly they argue yes, as long as the approach is not limited to social advertising, which is only part of the marketing strategy, and instead a strategic marketing perspective is used. The value that this source brings to EMPOWER is that it primarily provides support to systematically design and assess business models for lead cities and stresses the need for a broad strategic marketing approach. The support that the article provides is summarized in Table 3.3.

Category	Input to activities within EMPOWER
Business model design	• Provides a set of planning variables to design the value proposition for the EMPOWER service. • Provides examples on channels to use in order to promote social change. • Splits a potential market into four general types (primary, secondary, tertiary, and miscellaneous, representing the array of stakeholders involved in social change) • Exemplifies drivers for social change
Business model implementation	• Provides examples on barriers to succeed with social change
Business model evaluation	• Through its sets of planning variables, channel design principles and market segments the paper provides basis for designing assessment indicators to evaluate the effects of business model implementation.
Key take-away	• Driving social change requires a strategic marketing approach (e.g. four "P's", see section 2.2.2) and is more than Promotion alone.

Table 3.3: Lessons learnt from Kotler & Zaltman (1971)

3.3 Osterwalder (2004): Business model ontology

In Osterwalder (2004) the author reviews the current body of knowledge regarding business models and through a consolidation of the research domain proposes a business model ontology that comprises nine core elements or building blocks grouped in four pillars (see chapter 2). The author also discusses the value of business models to drive change and information systems implementation (e.g. an IT based platform providing incentives for smart travel choice), arguing a strong connection between developing business models parallel to the design and implementation of information systems (Osterwalder 2004). As described in chapter 2, the value from Osterwalder (2004) is that it will

provide the project with a comprehensive tool, the nine core elements of business modelling, to develop, in collaboration, with key stakeholders in each lead city, tentative business models for the EMPOWER services that will tested in these urban environments. The specific value that Osterwalder (2004) brings to the project is summarized in Table 3.4.

Category	Input to activities within EMPOWER
Business model design	• Provides a set of nine elements to develop viable business models for the EMPOWER services. The elements clarify the planning variables that Kotler & Zaltman (1971) suggest and broaden the scope by providing additional elements.
Business model implementation	• Provides insights into how the application of business models drive change and information systems design and implementation.
Business model evaluation	• Nine core elements that can be used as base for assessment indicators • Numerous projects have before utilized Osterwalders (2004) concepts for business model design (e.g. van Kranenburg 2014) which enables easy comparison and cross-case evaluation
Key take-away	• Solid business models are made up of the nine building blocks Value proposition; Customer Segments; Customer Relationships; Channels; Key resource; Key activities; Key partnerships; Revenue streams; and Cost structure

Table 3.4: Lessons learnt from Osterwalder (2004)

3.4 Osterwalder et al. (2005): Business model conceptualization

Based on Osterwalder (2004), the authors of Osterwalder et al. (2005) further clarify the concept of business models, its usages, and its roles in the information systems domain. A review of the body of knowledge shows a broad diversity of understandings, usages, and places of business models within a firm. The article also elaborates upon the ontology introduced in Osterwalder (2004) to describe a business model. Besides further clarifying the nine core elements in Osterwalders methodology, Osterwalder et al. (2005) also provides the project with a language to explain the aim of business modelling for key stakeholders and provides the analytic tools to define generic business cases from the business model instances developed in each lead city. The contribution that the article has for the EMPOWER project is summarized in Table 3.5.

Category	Input to activities within EMPOWER
Business model design	• Provides a comprehensive definition what a business model is, that supports the involvement of key persons in each lead city. • Provides a level structure which makes it possible to structure the transformation of lead city business models (T3.3) into generic business cases (T3.4)
Business model implementation	• Provides insights about the business models place in an organizational setting vis-à-vis e.g. the organizational setup, IT-infrastructure and strategy. • Provides insights into the alignment of the strategy of a business and the information system that should support the business
Business model evaluation	• Relates the nine core elements to a balanced scorecard setup that may stimulate the design of appropriate indicators to study the effect of business model implementation.
Key take-away	• Business models can be positioned on different levels in relation to an organization and the development of business models should be interlinked with the development of the information system that should support the business.

Table 3.5: Lessons learnt from Osterwalder et al. (2005)

3.5 Enquist & Juell-Skielse (2010): Value propositions in service oriented business models

In Enquist & Juell-Skielse (2010), six case studies are analysed to identify attributes and patterns of service oriented business models. The business models are analysed with a focus on value proposition, one of the key elements in business model design (Osterwalder 2004). Two patterns of service oriented business models are identified: holistic and niche models. In addition to analysing business

model patterns, the authors also identified and applied categorizations of elementary offering types, layers and generic value proposition types to understand service oriented business models (Enquist & Juell-Skielse 2010). The articles value to the EMPOWER project is summarized in Table 3.6.

Category	Input to activities within EMPOWER
Business model design	• Deepens the elaboration into how to perform value proposition design. • Holistic service oriented business models: explains the business for a service that addresses the needs of multiple customers providing full support. • Niche service oriented business models: explains the business for a service that addresses the need from a niche customer group providing specific support to this segment.
Business model implementation	• Clarifies the value proposition in terms of elementary offerings provided to customers • Exemplifies patterns for business models based on the holistic or the niche approach.
Business model evaluation	• Provides a structure for how assessments of business models can be presented (see chp 4).
Key take-away	• Business model development involves a choice should be made for a niche or holistic service approach

Table 3.6: Lessons learnt from Enquist & Juell-Skielse (2010)

3.6 Demil & Lecocq (2010): Business model evolution

Demil & Lecocq (2010) discuss that the use of the term business model can be two-folded. The first is the static approach - as a blueprint for the coherence between core business components. The second refers to a transformational approach, using the concept as a tool to address change and innovation in an organization, network or in the model itself. In the article the authors strive to reconcile these two approaches to consider business model evolution, looking particularly at the dynamic created by interactions between its business model's components. They view business model evolution as a fine tuning process involving voluntary and emergent changes in and between permanently linked core components, and find that sustainability in the business case depends on anticipating and reacting to sequences of voluntary and emerging change events (Demil & Lecocq 2010). The articles contribution to the EMPOWER project is summarized in Table 3.7.

Category	Input to activities within EMPOWER
Business model design	• Illustrates how the choices of e.g. key resources, organizational setup and value definition are interlinked.
Business model implementation	• Provides insights that a business model is not a static entity. • Business model implementation should be viewed as an evolutionary process • Implementation of a business model should be viewed as a change process that involves different versions of the model that in turn are appropriate for the evolutionary stage that the service has reached. • Explains that changes in the business model could be either voluntary or reactions to changes that originates/emerges from the business environment.
Business model evaluation	• Assessment of business implementation shall take into account what evolutionary stage the business model has reached.
Key take-away	• A business model is not a static entity. It should be viewed as an evolutionary process that involves continually changes in the business model setup and also the organizational design.

Table 3.7: Lessons learnt from Demil & Lcocq (2010)

3.7 Zott et al. (2011): The business model

Zott et al. (2011) provides a broad and multifaceted review of the body of knowledge in regard to business models in which the authors examine the business model concept through multiple subject matter lenses. The review reveals the business model is a multi-faceted concept and that the literature regarding this notion is developing largely in silos, according to the phenomena of interest of the respective researchers. However, they also found emerging common themes in the literature such as

(1) that the business model is emerging as a novel unit of analysis that multiple researchers address; (2) business models emphasize a system-level, holistic approach to explaining how firms "do business"; (3) firm activities play an important role in the various conceptualizations of business models that have been proposed by different scholars; and (4) business models seek to explain how value is *created*, not just how it is captured (Zott et al 2011). This change in perspective, that is that business models should seek to explain how value is created and not only how value is captured is a core input that the article brings to the EMPOWER project, see Table 3.8.

Category	Input to activities within EMPOWER
Business model design	• Value creation goes beyond an organizations border and occurs in a value network—which can include suppliers, partners, distribution channels, and coalitions that extend the organisation's resources.
Business model implementation	• Provides insights that the business model can be seen as part of a comprehensive framework for enabling systemic change and innovation, together with products, infrastructure and other enablers.
Business model evaluation	• Provides a set of criteria to be used to assess and compare business model implementation effects, such as "what mechanisms enable the business model to influence outcomes?"
Key take-away	• The EMPOWER project will test services that distribute incentives that enables people to make smart travel choices. The value that the EMPOWER services provide for stakeholders lies in the new value that is created through the provision of positive incentives. The value in EMPOWER is that its services should create new value connected to smart travel choices.

Table 3.8: Lessons learnt from Zott et al. (2011)

3.8 Limonard et al. (2011): Business modelling in innovation consortia

In this article Limonard et al. (2011) targets the complex task in the "fuzzy" milieu of innovation consortia to bridge the gap between the lack of knowledge on future demand for a technology (e.g. a service) and the need to make design decisions, e.g. to develop a proper business model and design the technology. The authors acknowledge that the problem in these types of collaborations is that the business interests to develop novel technology differs per consortium member, and the technology developed consists of a heterogeneous set of components that need to be integrated. Limonard et al. (2011) propose a business modelling methodology to deal with such issues. The value that this methodology brings to EMPOWER is summarized in Table 3.9

Category	Input to activities within EMPOWER
Business model design	• Provision of method based on the core elements introduced by Osterwalder (2004) • The method allows EMPOWER to map and scope of the business ecosystem in each lead city • Enables EMPOWER to demonstrate how technical design has an impact on networked business environments • Supports the fuzzy, creative process of (service) idea generation • Facilitates the dialogue between different disciplines
Business model implementation	• Provides a case study that illustrates how the methodology can be applied by the innovation consortia
Business model evaluation	• Supports the evaluation of design choices and structures a feedback loop between the evaluation efforts and techno-economic design work in the project
Key take-away	• The business model canvas can be used for the design of "fuzzy" innovative concepts by going from the Key resources, to the Value proposition, Customer Relationships, Distribution Channels and Customer segments, and then back to Key activities

Table 3.9: Lessons learnt from Limonard et al. (2011)

3.9 Burkhart et al. (2011): Analysing the business model concept

Burkhart et al. (2011) conduct a comprehensive literature analysis examining 30 relevant literature sources focusing mainly on business model research. The analysis was based on a classification framework containing 17 evaluation criteria with corresponding attributes. This evaluation frame-

work is used to perform a systematic and objective investigation into different business model concepts. The main contribution that the article brings to EMPOWER is the criteria for evaluation presented which can support the project to define appropriate indicators to assess the impact that the lead city business models will create during the living labs, see Table 3.10.

Category	Input to activities within EMPOWER
Business model design	• Provides a summary of different business model concepts • Review 30 business model concepts based on the 17 criteria derived from literature, enabling an overview how different business modelling techniques can support the development of viable business models.
Business model implementation	• Provides some experiences in relation to business model implementation, however already covered by Demil & Lecocq (2010).
Business model evaluation	• Provides based on a literature review 17 criteria with corresponding attributes that can be used to develop assessment indicators for the evaluation of business models.
Key take-away	• The main assessment indicators are: Application field, Knowledge gaining, Delimitation, Level of aggregation, State of business models, Purpose, Underlying type of business, Support during company lifecycle, Support during product/service lifecycle, Point of view, Addressee of business models, Scope, Components, Relation between components, Notation, Process of representation, Evaluation and metrics.

Table 3.10: Lessons learnt from Burkhart et al. (2011)

3.10 Zolnowski & Böhmann (2011): Business modelling for services

Zolnowski & Böhmann (2011) review 15 business model literature sources from the perspective of modelling approaches in order to discover and explain gaps between these. Due to the growing importance of e-services the article also focuses on the link between business models, e-services and service design. Zolonwski & Böhmann (2011) identify how the business model construct can provide support for the analysis and design of service business models. The support that the article brings to EMPOWER is summarized in Table 3.11.

Category	Input to activities within EMPOWER
Business model design	• Analyses what 15 modelling approaches bring to development of business models, in terms of objective, structure, modelling process and representation. The Osterwalder (2004) methodology needs for example to be complemented with additional support in order to model the value flow, social benefits and address legal aspects connected to the business. This is, according to Zolnowski & Böhmann, not covered by Osterwalder (2004)
Business model implementation	• Clarify that most business modelling techniques are general and do not specific provide support when business models are created for businesses that should operate e-services.
Business model evaluation	• Provides 19 criteria for evaluation of business models
Key take-away	• Provides insights to what white spots core business modelling approaches has which enables the project to complement the models selected to enhance the business model creation within EMPOWER. Provides 19 evaluation criteria which can be used as base for developing indicators within EMPOWER

Table 3.11: Lessons learnt from Zolnowski & Böhmann (2011)

3.11 Bie et al. (2012): Move better with tripzoom

Bie et al. (2012) describes the SUNSET (Sustainable Social Network Services for Transport) project and its ambition to improve urban traffic situations on a city-wide level by motivating users on a personal level to change their mobility behaviour. To make personal mobility more sustainable, flexible, and rewarding for users, the project combines mobility data and patterns from mobile sensing, a dynamic incentive system, and feedback from social networks. The paper describes how the digital tripzoom service implements this conceptual approach, outlines the forthcoming living lab evaluation in several European cities, and discusses critical issues connected to such operations, e.g. business model implementation (Bie et al. 2012). The value that the article brings to business model activities

within EMPOWER is foremost connected to value proposition design and evaluation; the contribution is summarized in Table 3.12.

Category	Input to activities within EMPOWER
Business model design	• Provide a reference case that can inspire/support the design of the value proposition for the services that EMPOWER will test in the lead cities. • Identifies key stakeholders that could constitute an ecosystem for the EMPOWER services: city, travellers, community, 3rd party providers of services. • Exemplifies the implementation of a service that aims to support travellers to make smart transport choices based on mobility sensing.
Business model implementation	• N/A – not covered in the article
Business model evaluation	• Exemplifies how Living Lab Evaluation can be organized in terms of data collection, using both the mobility service as such as a collector of evaluation data (with indicators implemented) and user observations/surveys as means to collect experiences.
Key take-away	• Make sure to do develop a value proposition that do not only address one stakeholder group. The EMPOWER service will have several stakeholder groups and should thus provide different value for these groups.

Table 3.12: Lessons learnt from Bie et al. (2012)

3.12 Ferro & Osella (2013): Business model archetypes for open data services

Ferro & Osella (2013) recognize that the release of open data, besides enabling novel and promising forms of governmental accountability, also paves the way to third-party developed products and services that provides both social and commercial value. Nevertheless, the re-use of data by private sector entrepreneurs is not easy from a business perspective; actually 3rd party developers struggle to take-off due to the presence of numerous inherent roadblocks which are coupled to a certain vagueness surrounding the rationale underlying open data development as business endeavours. The article introduces eight archetypal business models that third-party providers can use and be inspired by when developing sustainable business endeavours based on open data (Ferro & Osella 2013). The EMPOWER services that should be tested in the lead cities does not however require but will certainly benefit by integration to other existing services. The business model archetypes provided by Ferro & Osella (2013) will be used as points of reference when appropriate business models are crafted for the lead cities in EMPOWER. The article's input for activities in EMPOWER is summarized in Table 3.13.

Category	Input to activities within EMPOWER
Business model design	• Eight archetypical business models as points of reference in the design work. • The metaphor business model archetype will be used to inspire the development of the business model templates that should be included in the EMPOWER toolbox.
Business model implementation	• The article provides experiences from businesses that have utilized the archetypes introduced in the paper. The experiences will guide how the business models developed in EMPOWER will be tested in the living labs.
Business model evaluation	• The outcome from EMPOWER may 1) verify, improve and clarify the business archetypes in the article, 2) provide additional archetypes not covered in Ferro & Osella (2013).
Key take-away	• Eight business model archetypes that acts as inspiration in the development of EMPOWER service business models: Premium Product / Service, Freemium Product / Service, Open Source Link, Infrastructural Razor and Blades, Demand-Oriented Platform, Supply-Oriented Platform, Free as Branded Advertising, White-Label Development

Table 3.13: Lessons learnt from Ferro & Osella (2013)

3.13 Berkers & Roelands (2013): Constructing multi-sided business models

Berkers & Roelands (2013) address the topic that digital services, especially those providing social value, often cannot involve one firm or organization but instead require a complete network ore-

cosystem of partners to operate and thus to be successful. In order to implement a viable business ecosystem they investigated how a smart horizontal service platform can bring value to all required ecosystem stakeholders. Through the use of an example application domain case, Berkers & Roelands (2013) construct a multisided business model illustrating how a viable business ecosystem can be achieved leveraging the key platform features. The input that the article brings to activities in EMPOWER is summarized in Table 3.14.

Category	Input to activities within EMPOWER
Business model design	• The article provides insights about the value that a sensor-based service platform creates for different stakeholders • The article address the business situation wherein an organization (service provider) creates value by enabling direct interactions between two (or several) distinct types of connected customers (e.g. an incentive provider and a traveller (incentive receiver)) • Illustrates the multi-sided market for traffic applications
Business model implementation	• Provides a running case that illustrates the implementation of a smart horizontal service platform bringing value to different actors • Presents experiences from implementing the service platform which can be used as guideline for the Living Lab operations in EMPOWER.
Business model evaluation	• N/A – not covered in the article
Key take-away	• When multiple stakeholders are involved, a common vocabulary regarding the EMPOWER tool/service should be established in the beginning and all the perspectives on "value" should be taken into account

Table 3.14: Lessons learnt from Berkers & Roelands (2013)

3.14 Klang et al. (2014): The business model paradox

Klang et al. (2014) applies a narrative approach to recognizing and interpreting the fact that business models receive outstanding popularity and at the same time receive severe criticism. Second, as a result of elaborating on recurrent themes and tensions in the body of knowledge, Klang et al. (2014) extend the literature on business models through theorizing on the core of the concept along the dimensions of classification, constitution and configuration. In particular, the authors identify the simultaneity of separation and attachment as the main antecedent of the business model paradox. The input that the article has on activities in EMPOWER is summarized in Table 3.15.

Category	Input to activities within EMPOWER
Business model design	• The article provides insight into that different target groups view business model concept differently. This is of importance in EMPOWER being an innovation consortia that involves practitioners (from different areas, public/private), scholars/researchers and the public.
Business model implementation	• The article highlights that the business models developed in the EMPOWER project should be described differently depending on project phase and different target audiences involved in the process.
Business model evaluation	• The article provides a model that could be used to develop generic business models (to be implemented in the EMPOWER toolbox) based on the experiments performed in the living labs.
Key take-away	• In the design of the business models, the business modellers in T3.3 must be sensitive to that business models are understood differently by different stakeholders and adopt the language depending on target audience.

Table 3.15: Lessons learnt from Klang et al. (2014)

3.15 Bocken et al. (2014): Developing sustainable business model archetypes

In Bocken et al. (2014) eight sustainable business model archetypes are introduced to describe groupings of mechanisms and solutions that contribute to building up business models for sustainability. The authors' aim with these archetypes is to develop a common language that can be used to

accelerate the development of sustainable business models in both research and practice. The archetypes are: Maximise material and energy efficiency; Create value from 'waste'; Substitute with renewables and natural processes; Deliver functionality rather than ownership; Adopt a stewardship role; Encourage sufficiency; Re-purpose the business for society/ environment; and Develop scale-up solutions (Bocken et al. 2014). As in the case of Ferro & Osella (2013), one main value that Bocken et al. (2014) brings to the activities in EMPOWER is that business cases can be based on previous experiences constituted by business model archetypes. This may support and even catalyse the design process performed within the project. The input to activities within EMPOWER is summarized in Table 3.16.

Category	Input to activities within EMPOWER
Business model innovation	• The article provides eight business model archetypes, illustrated with value proposition, delivery and capture, that can stimulate and catalyse the development of appropriate business models for the EMPOWER services. • Introduces the concept of sustainability benefit to complement value creation in terms of monetary revenue streams
Business model implementation	• Constitute a set of reference cases with experiences that support the implementation of business models in the EMPOWER project.
Business model evaluation	• The outcome from EMPOWER may 1) verify, improve and clarify the business archetypes in the article, 2) provide additional archetypes not covered in Bocken et al. (2013).
Key take-away	• Business model archetypes that will inspire the design of business models for the EMPOWER services: Maximise material and energy efficiency; Create value from 'waste'; Substitute with renewables and natural processes; Deliver functionality rather than ownership; Adopt a stewardship role; Encourage sufficiency; Re-purpose the business for society/ environment; and Develop scale-up solutions

Table 3.16: Lessons learnt from Bocken et al. (2014)

3.16 Janssen & Zuiderwijk (2014): Infomediary business models

The aim in Janssen & Zuiderwijk (2014) is to contribute to the understanding of the diversity of existing so-called "infomediary" business models that are driven by open data access and social media exploration. Multiple cases presenting different modes of open data utilization in the Netherlands are investigated and compared yielding six types of business models: single-purpose apps, interactive apps, information aggregators, comparison models, open data repositories, and service platforms. The investigated cases differ in their levels of access to raw data and in how much they stimulate dialogue between different stakeholders involved in open data publication and use. For example, apps often are easy to use and provide predefined views on data, whereas service platforms provide comprehensive functionality but are more difficult to use. In the various business models, social media is sometimes used for rating and discussion purposes, but it is rarely used for stimulating dialogue or as input to policy making (Janssen & Zuiderwijk 2014) as envisioned in EMPOWER. The value that the article brings to activities in EMPOWER is summarized in Table 3.17.

Category	Input to activities within EMPOWER
Business model design	• The article provides six infomediary business model archetypes that can stimulate and catalyse the development of appropriate business models for the EMPOWER services.
Business model implementation	• The article provides an insight that social media is rarely used in the business setup beyond the purpose of rating and discussion.
Business model evaluation	• The outcome from EMPOWER may 1) verify, improve and clarify the business archetypes in the article, 2) provide additional archetypes not covered in Janssen & Zuiderwijk (2014).
Key take-away	• In order to achieve social change EMPOWER envisions that social media and networking can be used as incentive for supporting people to make smart travel choices.

Table 3.17: Lessons learnt from Janssen & Zuiderwijk (2014)

3.17 Kranenburg et al. (2014): Business models for behavioural change

Kranenburg et al. (2014) explores the observation that novel businesses today are looking for ways to reduce the negative effects of congestion. The authors explore this challenge by introducing business models that support businesses to achieve more cost efficiency through the stimulation of more sustainable travel behaviour. At the same time, the models contribute to positive environmental effects such as the reduction of carbon emissions and improvement of air quality in urban areas. Kranenburg et al. (2014) introduces three new business models and adapts four existing business models to stimulate new innovation based on existing best practice. The value that the article brings to activities in EMPOWER is summarized in Table 3.18.

Category	Input to activities within EMPOWER
Business model innovation	• The article provides three new business models and four adapted existing business models that can stimulate and catalyse the development of appropriate business models for the EMPOWER services.
Business model implementation	• Scaling up can be a challenging process and governmental support is viewed as crucial. • Focus on business models that prove to be (economically) viable in the long term, supported by the public sector during the initial phase.
Business model evaluation	• Measuring effects and making them visible for different target audiences contributes to the awareness of the benefits for stakeholders. Exploit the technical opportunities for measuring, informing and influencing travel behaviour (see Bie et al. 2014)
Key take-away	• The article provides key recommendations when developing viable business models for sustainable transport solutions: business modelling should begin early on in the innovation project; customers and their needs should be the basis for the business setup design.

Table 3.18: Lessons learnt from Kranenburg et al. (2014)

3.18 Butzin et al (2014): Theoretical approaches to social innovation

Butzin et al. (2014) provides a comprehensive literature review into social innovation and adjacent fields such as design thinking, open innovation and change. They target social innovation studies, innovation studies and social practice approaches. By integrating these multiple sources of knowledge Butzin et al. (2014) identifies that social innovations encompass new practices – that involves concepts, policy instruments, new forms of cooperation and organisation – methods, processes and regulations that are developed and/or adopted by citizens, customers, politicians and other stakeholders in collaboration. Collaboration in networks/ecosystems is core in order to meet social demands and to resolve societal challenges in better ways than existing inclusive practices. The emergence of such new social practices, including patterns of imitation and adaptation, will have an effect on both the design of new services but also the development of sound and viable business models. The input for activities within EMPOWER is summarized in Table 3.19

Category	Input to activities within EMPOWER
Business model design	• Business modelling should be viewed as one of several practices that should be performed in social innovation and change • A single firm perspective is not appropriate in social innovation instead should collaboration across organizational borders and stakeholder domains be stimulated.
Business model implementation	• N/A – not covered in the report
Business model evaluation	• The report provides several sets of evaluation techniques that could be used to assess the impact of the business model during the Living Lab trials.
Key take-away	• Respect the fact that in the “right” side of the Business Model Canvas (regarding the Customers), multiple dynamics can be at play and made use of such as (social) networks, active and passive citizens, capacity building among citizens for empowerment, etc.

Table 3.19: Lessons learnt from Butzin et al. (2014)

3.19 Peters et al. (2015): Developing business models for complex services

Peters et al. (2015) observes that business models for complex e-services are rare and often not successful so far. By applying a design science approach, they build and evaluate an analysis framework for creating business models for complex services using the field of telemedicine as experiment domain. The framework produced is a morphological box with dimensions derived from existing literature. The framework is applied to 16 services and the resulting artefact reveals three types of typical business model: enablers, supporters and consumer-centred innovators. The framework's structure allows for the elicitation of white spots – so far not existing patterns – for future business models and facilitates the provider's strategic positioning of the service on the market place (Peters et al. 2015). The value of the article for the activities in EMPOWER is summarized in Table 3.20.

Category	Input to activities within EMPOWER
Business model innovation	• The article provides three new business models for complex digital services that can stimulate and catalyse the development of appropriate business models for the EMPOWER services. • The article is based on a design science research approach which can be an appropriate technique to use to present the outcome from task 3.3 in EMPOWER.
Business model implementation	• The article provides three running cases describing how the business models where implemented in the case organizations.
Business model evaluation	• The outcome from EMPOWER may 1) verify, improve and clarify the business archetypes in the article, 2) provide additional archetypes not covered in Peters et al. (2015).
Key take-away	• The article provides a framework to analyse and assess the implementation of business models in complex service settings. The framework can be used to structure the business model evaluation in EMPOWER.

Table 3.20: Lessons learnt from Peters et al. (2015)

3.20 Rauter et al. (2015): Developing business models for sustainability

Rauter et al. (2015) conducts a qualitative multiple case study in cooperation with 10 Austrian companies with the aim to investigate business models for sustainability and better understand how they operate and what the drivers for developing these business models are. Half of the companies involved were founded with the intention of complying with sustainability principles. The results show that business models incorporating aspects of sustainability do not differ substantially from traditional business models. However, they do require specific adaptations and extensions that are elaborated on in the article. Furthermore, Rauter et al. (2015) highlight the significance of company leaders in organizing change processes so as to encompass sustainable business practices. The findings reveal that business models undergo constant change, and that sustainability plays a central role, both internally and externally. The input that the article can have in activities within EMPOWER is summarized in Table 3.21.

Category	Input to activities within EMPOWER
Business model design	• The article provides insights into the relationship between business strategy, business model and operational activities. • The article summarizes business model work using Osterwalder (2004) as primary modelling approach
Business model implementation	• The article describes a set of drivers of business models for sustainability that is argued to be of importance when such business models are implemented.
Business model evaluation	• N/A – not covered in the article
Key take-away	• Each building block in Osterwalder's Business Model Canvas can be considered from a sustainability perspective, e.g. in the choice of partners, combining distribution channels, consider re-use or cradle-to-cradle in the value proposition, etc.

Table 3.21: Lessons learnt from Rauter et al. (2015)

3.21 Herrardo et al. (2015): Incentive-based solution for sustainable mobility

In their article Herrardo et al. (2015) introduce "Incentivized Sustainable Mobility" as a conceptual business model that involves four stakeholders: citizens, municipalities, commerce, and mobility services. A platform named "ISUMO" (Incentivized Sustainable Mobility) provides technological support to this business model, integrating a set of metaservices that unifies the existing ICTs of transportation plus a unique patented QR-based low-cost charging device for electric vehicles. Essentially, the system tracks and registers citizens' transportation activities (anonymously and voluntarily) and evaluates each through a scoring system while their ecological footprint is calculated. Afterwards, citizens are able to exchange their accumulated points for discount QR coupons, to be redeemed in the associated commerce in order to purchase their products or services.

Herrardo et al. (2015) argues that the breakthrough of this business model is that it enhances awareness of sustainable mobility practices, increasing their attractiveness as perceived by the stakeholders with diverse benefits; citizens (and indirectly, the municipalities) initiate a new consumption pattern of "coupons culture" linked to sustainable mobility, the urban economy is stimulated, and the use of mobility services grows, providing a new business opportunity regarding electric vehicles (Herrardo et al. 2015). Table 3.22 summarizes the input the article can have to activities within EMPOWER.

Category	Input to activities within EMPOWER
Business model design	• Provide state-of-the art case examples within the same domain as EMPOWER, with meta-services and incentive insights, that can be used within the project to stimulate appropriate business model designs for the four lead cities.
Business model implementation	• Provides running examples of business model implementation that state important experiences to take into account when the business models are implemented in EMPOWER during 2016-2017.
Business model evaluation	• Provides an illustrative example how the business models developed within EMPOWER can be evaluated and also presented to different target audiences.
Key take-away	• State-of-the art case examples, including Commute Greener, that will inspire and influence the design of business models for the EMPOWER services.

Table 3.22: Lessons learnt from Herrardo et al. (2015)

3.22 Summary of findings and impact on EMPOWER

Table 3.23 summarizes the findings from the literature review and matches these against tasks that will be performed within EMPOWER in order to facilitate the transferring of experiences from task 3.1 to efforts that will be performed in other tasks and work packages in the continuation of the project.

Reference	Business model design	Business model implementation	Business model evaluation	Impact on tasks and deliverables
Kotler & Zaltman (1971)	Method support	Examples of barriers	Basis for indicators	T3.2, T3.3, WP5, WP6
Osterwalder (2004)	Method support	Guidelines	Indicators and best practice	T3.2, T3.3, T3.4, WP5, WP6, T7.4
Osterwalder et al. (2005)	Level structure	Guidelines	Scorecard	T3.2, T3.3, T3.4, WP5, WP6, T7.4
Enquist & Juell-Skielse (2010)	Business model types	Patterns	Presentation model	T3.2, T3.3, T3.4, T7.4
Demil & Lecocq (2010)	Guidelines	Strategy	Guidelines	T3.2, T3.3, T3.4, WP5
Zott et al. (2011)	Perspective	Strategy	Basis for indicators	T3.2, T3.3, T3.4, WP6
Limonard et al. (2011)	Method support	Best practice	Guidelines	T3.2, T3.3, T3.4, WP5, WP6, T7.4
Burkhart et al. (2011)	Perspectives	Best practice	Basis for indicators	T3.2, T3.3, T3.4, WP6
Zolnowski & Böhmann (2011)	Guidelines	Clarification	Basis for indicators	T3.2, T3.3, T3.4, WP6
Bie et al. (2012)	Best practice	N/A	Best practice	T1.1, T1.2, T3.2, T3.3, T3.4, WP5,

Ferro & Osella (2013)	Archetypes	Best practice	Results framing	T3.2, T3.3, T3.4, WP5
Berkers & Roelands (2013)	Best practice	Best practice	N/A	T1.1, T1.2, T3.2, T3.3
Klang et al. (2014)	Guidelines	Strategy	Presentation model	T3.2, T3.3, T3.4, WP5, WP6, T7.4
Bocken et al. (2014)	Archetypes	Best practice	Results framing	T3.2, T3.3, T3.4, WP5
Janssen & Zuiderwijk (2014)	Archetypes	Strategy	Results framing	T3.2, T3.3, T3.4, WP5
Kranenburg et al. (2014)	Method support	Strategy	Strategy	T1.1, T1.2, T3.2, T3.3, T3.4, WP5, WP6, T7.4
Butzin et al. (2014)	Perspective	N/A	Method support	T1.1, T1.2, T3.2, T3.3, WP6
Peters et al. (2015)	Archetypes	Best practice	Method support	T3.2, T3.3, T3.4, WP5, WP6
Rauter et al. (2015)	Perspective	Strategy	N/A	T1.1, T1.2, T3.2, T3.3, T3.4, WP5, WP6
Herrador et al. (2015)	Guidelines	Best practice	Strategy	T1.1, T1.2, T3.2, T3.3, T3.4, WP5, WP6, T7.4

Table 3.23: Summary of literature review contribution and impact on EMPOWER

4 State-of-the-art case review

The third part in this international review of business models for incentive-scheme based services includes a review of state-of-the-art cases that provide positive incentives to participants in the scheme to stimulate them to change their travel behaviour. It covers six cases from within as well as outside Europe. The aim has been to grasp the business case for these services and based on the analysis identify key lessons to be used within the EMPOWER project.

4.1 State-of-the-art case review process

In the state-of-the-art case review, a predefined structure based on Osterwalder's business model ontology (Osterwalder, 2004) is used to review the identified cases involving six categories of analysis (see Table 4.1) that are based on Enquist & Juell-Skielse (2010), Kranenburg et al. (2014) and Osterwalder et al. (2005).

Pillar	Category	Description	Examples
	Solution description	The category gives an overall account of the state-of-art solution reviewed in terms of background, history, objective and challenges addressed.	- Background of the service / firm - History / evolution of service / firm - Service objective - Challenge addressed by service
Infrastructure management	Key stakeholders	The category describes the key actors involved in delivering the solution to target customers.	- Primary stakeholders to the service - Secondary stakeholders - Key actors enabling the service
Product	Value proposition description	The category provides an overall account of the solutions bundle of products and services that are of value to the customer.	- An account of the mission with the service - Overall description of the value proposition - Value proposition matched against the target customers and different key stakeholders
Customer interface	Target customers	The category states the segment of customers the solution offer value to.	- Primary customers targeted by the service - Secondary customers targeted by the service - Customer characteristics
	Elementary offerings	The category lists the actually offerings that the solution consists of delivering value to the targeted customer.	- An account of the solutions that is offered through the service
Financial aspects	Basic revenue model	The category describes the way the solution reviewed creates monitory value through a variety of basic revenue flows.	- An account revenue streams that the service generate - A description of the business setup for the service

Table 4.1: Categories for analysing state-of-art case examples

Table 4.2 provides an overview of the cases selected for the review. It involves three solutions that currently targets Europe (Mobidot, SMART, Slim uit de Splits), one solution that is operational in Europe, Asia and Latin America (CommuteGreener), one solution that has been launched in cities in north America but is based on a service launched in Singapore (Travel Smart Award / Urban Engines) and one loyalty discount oriented program operated in Canada (Merci).

	Type of case			Access to data	
Name of case	Frontend service	Backend platform	Country(ies)	Primary data	Secondary data
Mobidot		X	The Netherlands and EU	X	
SMART	X		The Netherlands	X	
CommuteGreener	X	X	Sweden, India, Mexico	X	
Travel Smart Reward	X		Singapore, USA (Urban Engines)		X
Merci	X	X	Canada		X
Slim uit de Spits	X	X	The Netherlands	X	X

Table 4.2: Overview of state-of-art cases included in the review

The solutions selected involve both pure frontend and backend platforms as well as solutions that include both components. Access to data has in the majority of cases been primary data as several of the solutions reviewed are represented by partners in the project, however data has also been secondary data in the instances that no direct access to representatives has been possible. Secondary data in these cases has been in the form of documents, reports, and information available on the Internet.

4.2 Case: Mobidot

Mobidot is a Dutch spin-off company from technological top-institute Novay and the European R&D project SUNSET. SUNSET was a part of the European Commission's Seventh Framework programme Smart Cities & Sustainability under DG Connect. Mobidot was founded in February 2013. The goal is to support and help organisations who are active with mobility and transport management to get insight into the travel behaviour of their target groups in a flexible and cost-effective manner and to provide them with incentive tooling to influence the travel behaviour of people in a personal way.

Category	Description
Description of solution	Mobidot is a white-label technology service provider and specialist in multimodal tracking and analysing personal travel behaviour using the Smartphone. Using knowledge on how an individual travels, Mobidot offers a platform-based service for personalizing and incentivising a range of Business-2-Consumer mobile services, applications and Apps. With the platform Mobidot's customers can create more compelling or more functional mobile and digital products by understanding and anticipating the real-life context and behaviour of their connected audience. For example providing relevant travel or health information, unique rewarding functionality for 'good' behaviour and optimal travel experience is provided for Mobidot customers and the end users based on detailed knowledge of travel behaviour, situation and context.
Key stakeholders	Travellers, cities, transit operators, employers, (mobility) service providers, and consultancy firms
Customers targeted	City mobility and traffic management authorities, transit authorities/operators, (mobility) service providers, insurance companies and consultancy firms
Description of value proposition	Mobidot delivers Business-2-Business solutions where either low cost personal level travel data or capabilities to effectively influence traveller behaviour are the two main value drivers.
Analysis of elementary offerings provided	State of the art service offering with a clear business case for customers, such as Data: insights into traveller behaviour on a detailed level to increase capabilities for effective policy development, monitoring and evaluation and delivered in the form of a transparent Mobility-As-A-Service model outweighs the monthly pay-per-use service fee costs. Behaviour: capabilities to create more compelling or more functional mobile and digital products with increased end-user engagement triggering behavioural change of the user base outweighs the costs of licenses for customers.
Description of revenue streams	Licensing, Pay-per-user service provisioning and support to customers.

Table 4.3: A summary of the business setup for Mobidot

4.2.1 Description of solution

The Mobidot service model supports value creation of customers directly or via additional 3rd parties to end-users via their respective App portfolio. To that purpose the Mobidot service consists technically of a software front-end and a back-end part, see Figure 4.1.

The frontend parts consists of a Sensing Library integrated as software component in an arbitrary App. This Sensing Library is available for Android and iOS. It allows customers to incorporate behavioural profiling services and context-aware capabilities into their mobile Apps. After user consent, the Sensing Library quietly collects sensor data from the Smartphone . The Sensing Library works in the background on the Smartphone of a user without any needed user interaction. The Sensing Library interfaces with the Mobidot back-office platform. In the back office the sensor data is processed and enriched into personal mobility profiles. These profiles can be accessed by customers via an API for further processing, App personalisation and incentivising, service provisioning or user engagement. Mobidot offers some additional modules to support customers in this process. The back office in-

cludes a management dashboard to manage measurement and analysis settings and to create views on the collected floating traveller data of the user base.

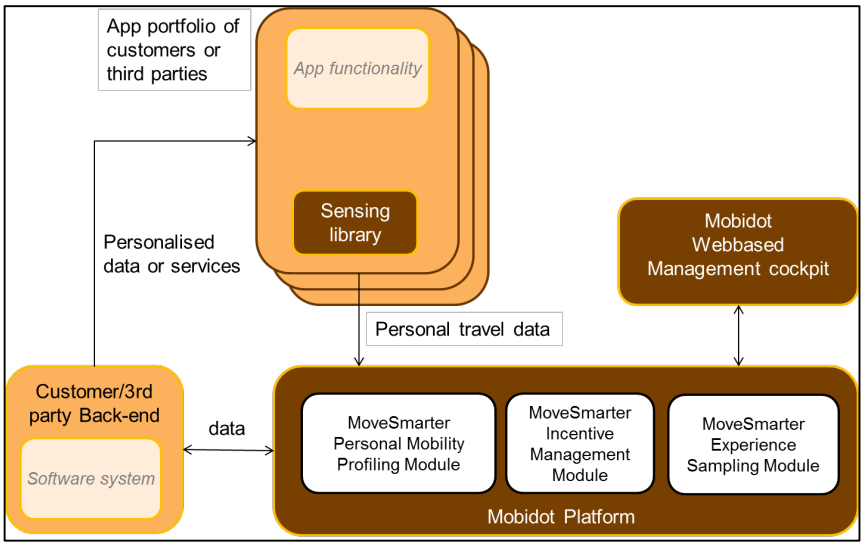


Figure 4.1: Overview of Mobidot's solution

4.2.2 Key stakeholders

Key stakeholders of the Mobidot solution are:

- Travellers: Travellers are the end-users of the Mobidot enabled Apps and services of Mobidot's customers and provide user-generated content (data).
- Cities, transit operators and employers as part of the service delivery process to end-users. They function then as proxies and provide the marketing and promotional channels Mobility service providers and consultancy firms can deliver additional value to the customer processes and products

4.2.3 Customers targeted

Key customers of the Mobidot services are:

- City mobility and traffic management authorities either as data-oriented customer or as service provider incentivizing travellers
- Public/private transit authorities/operators either as data-oriented customer or as service provider incentivizing travellers
- Mobility service providers and insurance companies for personalisation of their offerings to consumer of business markets
- Consultancy firms: Customer of big data

4.2.4 Description of value proposition

For cities: situational awareness on an individual traveller level at a low cost, with capabilities to challenge (groups of) travellers to optimise their travel behaviour in line with city level sustainability, safety and congestion reduction goals. The Mobidot solution also provides access to a knowledge base of floating traveller data for policy development, monitoring and evaluation. For public/private transit operators: situational awareness on an individual traveller level at a low cost, with potential to add end-user loyalty and incentive programs. For (mobility) service providers and insurance companies: personalisation capabilities at a low cost, with potential to add end-user interaction and incentive programs or expand services for employer market. For consultancy firms: big datasets on floating traveller data at a relatively low cost to provide a knowledge base for policy development, monitoring and evaluation

4.2.5 Analysis of elementary offerings

The Mobidot service integration and provisioning offering provides a flexible, low-entrance approach for customers. It enables an effective way to create more compelling or more functional mobile and digital products with increased end-user engagement based on knowledge and understanding of the real-life context and behaviour of the user base. Such a next-generation solution in a competitive market where user involvement, interaction and engagement is key outweighs the costs of licenses for customers.

4.2.6 Description of revenue model

Mobility-as-a-service value proposition unburdens organisations with products, services or stakes in mobility. Fee-based pay-per-user model creates a flexible and transparent price model. Data centre-based platform creates economy – of-scale (users, regions). Apps create economy-of-scope (application areas).

4.3 Case: Self Motivated and Rewarded Travelling (SMART)

The concept of SMART started in 2009 with the idea that the City of Enschede in the Netherlands should stimulate sustainable modes of transport and reduce car traffic via positive incentives. The benefit was (and is) a more liveable city but also less cost for infrastructure investments. In the project i-Zone (incentive zone) the first concepts were developed. During the SUNSET project the idea, concept and technology became clearer. This all paved the way to the SMART tool, which is an implemented service to stimulate the user to travel smart.

Category	Description
Description of solution	SMART is a tool that gives the traveller an automatic generated personal mobility profile (1), insight in the car-traffic situation (2), a multi-modal route planner (3), a scheme of challenges and rewards (4), an experience sample module (5), a web shop (6); all via an application (7) and a website (8).
Key stakeholders	The key stakeholder is the city government. Besides that, there are the different service providers, businesses to fill the web shop, app-developer and web developer
Customers targeted	Primarily car commuters, secondary commuters in general
Description of value proposition	SMART is a B-2-C solution for travellers. The city organizes the whole chain because of the benefit for the city as well as because of the lack of market (so far) for developing the service as a whole.
Analysis of elementary offerings provided	The tool contains an smartphone application with multiple features, a website and a webshop with multiple features
Description of revenue streams	Less investments in infrastructure because of less car use, Less investments in monitoring multi modal traffic flows because of the sensing of personal mobility patterns. Less investments in surveys on travel behaviour because of the experience sampling module

Table 4.4: Summary of the business setup for SMART

4.3.1 Description of solution

SMART as a solution (see Figure 4.2) gives the traveller an automatic generated personal mobility profile (1), insight in the car-traffic situation (2), a multi-modal route planner (3), a scheme of challenges and rewards (4), an experience sample module (5), a web shop (6); all via an application (7) and a website (8). In the figure below the architecture of the system is shown.

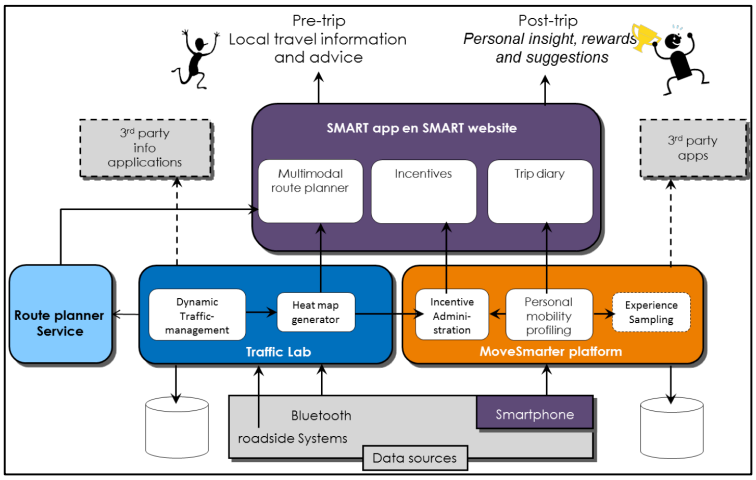


Figure 4.2: System overview and components SMART service

4.3.2 Key stakeholders

The key stakeholder for the SMART service is the city government for integration of the different aspects (overall customer). The basic idea is that the combination of the different services provides the tools to persuade travellers to use more sustainable modes of transport. This goal is the basis for the city government to run SMART. Besides that, there are the different service providers on 1-5 (above), businesses to fill the web shop (6), app-developer (7) and web developer (8). They are all building blocks of the total solution.

4.3.3 Customers targeted

Since the goal is to improve the accessibility of the city by shifting people to use more sustainable modes of transport, the 'frequent car users' are the primary group of customers to target. And the biggest problem (congestion, air quality) is during the peak hours; therefor the focus is on the frequent car users who travel during peak times. To be able to create a peer-group, a group to compare with, which can work as stimulus for the frequent car users, means that another target group consists of the people who already cycle, walk or use Public Transport. This means that SMART rewards the people who change their behaviour in a positive way as well as the people who already show desired behaviour. The SMART tool itself can offer value for all travellers, depending on how the challenges and rewards are formulated.

4.3.4 Description of value proposition

The value for the city government is in the outcome of the use of SMART: more liveable city, less investments in (car) infrastructure, less costs for monitoring. The value for the service providers and technical partners is the fee they get paid by the city government as well as the reuse of the different components in their other business activities. The value for the web shop contributors is the free advertisement and possible extra customers. This tool as a whole gives value to the consumer, the user of the service. The actual value depends on the user needs and interests:

- Time (insight in travel time over time)
- Costs (insight in costs of travel)
- CO2 (insight in CO2 produced)
- Calories (insight in Kcal burnt)
- Modal split (insight in personal modal split)
- Easier travel (multi modal route planner to plan a route)
- Competition (challenges that connect to personal interest)
- Rewards (points as reward, transferable into 'real' goods via the webshop)

4.3.5 Analysis of elementary offerings provided

The SMART tool offers the value to the user via an application and a website as well as a webshop which can be approached via the website as well as the application

Figure 4.3: Overview screen the SMART app, Website and Webshop

4.3.6 Description of revenue streams

The revenue streams of SMART are several, for SMART as a whole as well as for the separate components of SMART. The different service-providers who deliver a building block for SMART have their own revenue stream (which is the City is paying them a fee, or the SMART tool generating extra business/sold items via the web shop).

For SMART as a whole the conceived revenue is threefold:

- Less investments in infrastructure because of less car use
- Less investments in monitoring multi modal traffic flows because of the sensing of personal mobility patterns
- Less investments in surveys on travel behaviour because of the experience sampling module

4.4 Case: Commute Greener

Commute Greener was launched back in 2009 and as described in Chapter 2 it is an innovative solution that involves several business model aspects. Figure 4.4 illustrates some key elements that the following table and text will elaborate by providing contextualization.

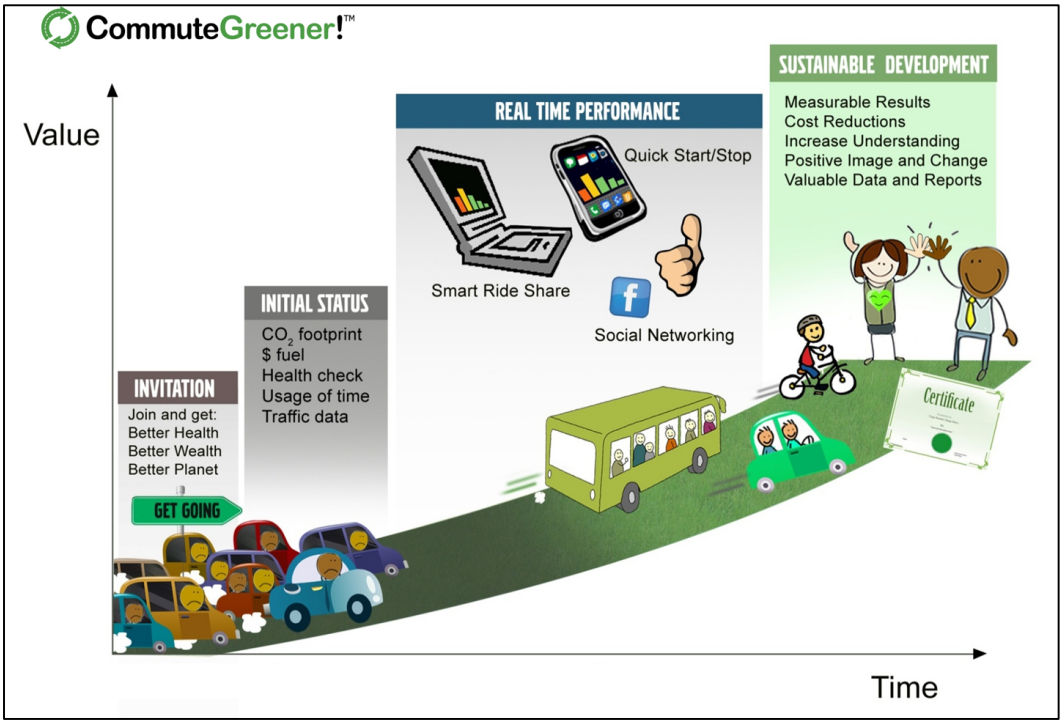


Figure 4.4: Commute Greener enable value creation over time

Category	Description
Description of solution	Commute Greener has a proven track record of helping cities, corporations and citizens towards more sustainable mobility. The solution support ways to measure and reward improved everyday travel behaviours as well as enable smart ride-sharing including social network features. The dominating use of Commute Greener is as a campaign tool creating value over time as depicted into Figure 4.4. The platform include web technology for smartphones (available through apps into Apple Appstore, Android Google Play, Facebook Appcenter), GPS, ICT mechanisms for challenges and points for improvements made, distances with multi-modal journey capabilities to/from work, logs for analytics of money, time, CO2, health etc.
Key stakeholders	City and regional authorities, corporate employers and equivalent organisations that enable contacts with end-users who are mainly driving alone in CFVs.
Customers targeted	CSR responsible at corporations, city authorities concerned with congestion and environment, fleet owners and transport planners.
Description of value proposition	By offering expertise and a scalable system set-up it is possible for cities, corporations and citizens to gain measurable results and improve the situation for everyday travel.
Analysis of elementary offerings provided	Authorities: Get measurable results and experience of mobility management campaigns with innovative ICT; Support the work to improve urban travel (reduce congestion and pollution) Operators/green fleets: Attract new customer base and increase sales; Gather travel patterns in multi-modal travel chains; Gain brand recognition Companies: Engage employees; Contribute to work with CSR and part of EMS Individual (end-users): Contribute to positive changes; Cost and time efficiencies as well as direct rewards; Positive health effects from bicycling and social activities
Description of revenue streams	Commute Greener is sold as a campaign tool or as pay-per-use through projects.

Table 4.5: Summary of the business setup for Commute Greener

4.4.1 Description of solution

Commute Greener is a solution that can be described with technology components (product features) and ways of working (service concepts). In terms of business model description, see Figure 4.5 for an illustrative view, a fundamental part of the Commute Greener innovation comes in terms of 1) New services and bonuses. First of all these attract people to make improvements. These improvements give a win+win+win (good for the individual, good for the employer or sponsoring business, good for authorities or new businesses. 2) Social network aspects and challenges promotes the ef-

forts into situations where the more that shift from going alone in cars the better. 3) Air quality and cost from congestion is reduced when all key stakeholders gain from sustainable development.

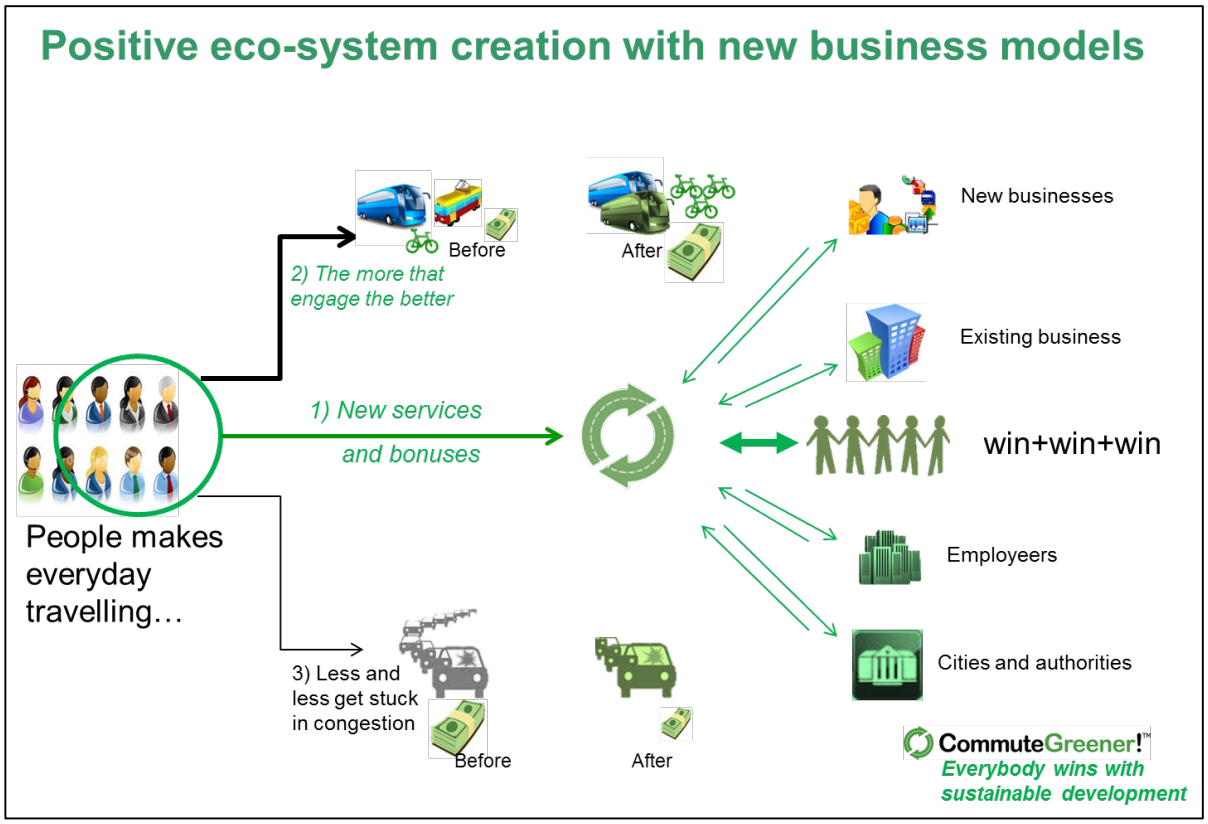


Figure 4.5: An eco-system view a basis for sustainable business models

4.4.2 Key stakeholders

As described above the key stakeholders engage in a seamless interplay according to different value proposition 'what is in it for me'. As an example does the benefit of being an employee in a certain organisation or having social network references lower the barrier to share a ride as there is more trust among those who start to ride share. Similarly, an employer or a business can announce a challenge that provides a positive incentive for people to join the challenge and make improvements.

4.4.3 Customers targeted

The customers who pay for the Commute Greener solution are primarily corporations who want the benefits of measurable results in the area of everyday transports. Similarly, cities or fleet owners (e.g. car pools or bus operators) are paying customers. The everyday traveller is also a customer, while not paying for using the solution as such; he/she contributes to the joint progress.

4.4.4 Description of value proposition

Each stakeholder needs a specific value proposition and a corporate campaign can share one of these and thereby serve as an example into this case. An employer, e.g. an insurance company, wants to reduce their emission footprint from CFV. They understand that also indirect emissions, such as travels by their employees to and from work add up to a large amount of CO2. Furthermore, parking space is expensive and employee health influence corporate productivity. But how can the company influence their employees, how can the company even measure their own footprint?

The company uses Commute Greener to design a campaign. Invited employees set their baseline for their regular commute (at the same time this gives the company an aggregated initial status, which

can also be used for policy measures and/or tailoring as well as fine tuning of future challenges). The first challenge that the company had set was to reward employees who take bicycle, at least part of the way to work. The employees get Zero Emission Miles and compare it a bit to the Frequent Flier Miles of airlines, but here it is good for health, environment as well as corporate awards attached. After 12 weeks there are considerable value gained comparing the results with the baseline and initial status. The social network features of Commute Greener and smart rideshare stimulate improvements.

4.4.5 Analysis of elementary offerings

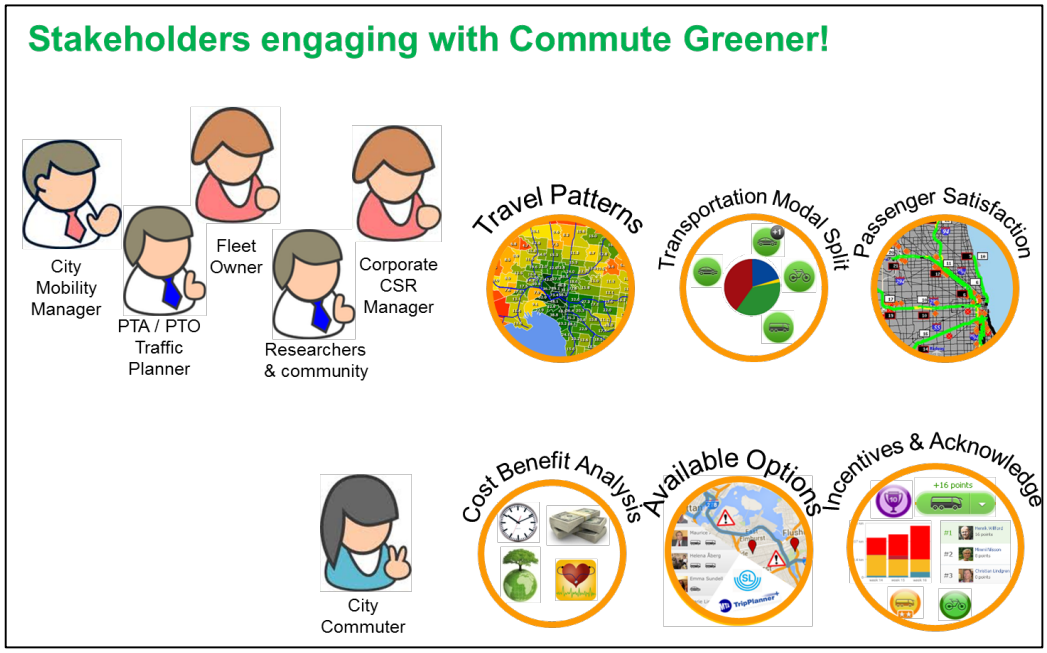
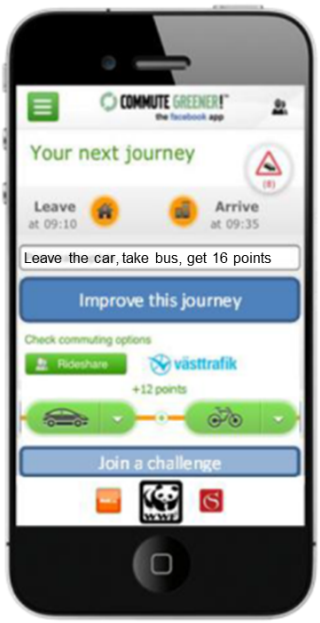


Figure 4.6: Involved stakeholders in Commute Greener



The city commuter gains in three ways, by a cost/benefit analysis, by getting aware of options and through incentives and acknowledgement. These are shown in the lower part of Figure 4.6. By seeing the costs of everyday travel in terms of time, money as well as impact on environment and health the basis of 'what gets measured gets done' gets a reference to the baseline. The baseline embrace that each individual have different prerequisites, but also that almost everyone who travel by CFV have possibilities to make improvements. Awareness of available options is a key success factor. This can be to get rideshare suggestions, including public transport. Incentives and acknowledgement is the offering to join challenges, including getting real-life rewards. To change actual behaviours is much more that a smartphone interface, such as seen in Figure 4.7, but nevertheless technology is a pre-requisite for both availability and scalability.

Figure 4.7: Smartphone app interface as illustrative for features in Commute Greener offering

The offering for a city mobility manager, a fleet owner or a corporate CSR manager provide gains in terms of better understanding of: Travel Patterns; Transportation Modal Split and Passenger Satisfac-

tion. Travel patterns for multi-modal journeys are often difficult to get, at the same time they can provide valuable information for transportation network design as well as in terms of policy making. The modal split is a key aspect for transportation stakeholders and it may help an employer who is devising a campaign on which modes of transport that need to be incentivised to achieve larger improvements. The passenger satisfaction is valuable to find structural changes as well as to analyse social impact.

4.4.6 Description of revenue model

The revenue model of selling a campaign is straight forward and either has a fixed price in relation to variables such as number of users / sites / challenges / time period or is set-up as a project to tailor the solution usage and support.

4.5 Case: Travel Smart Rewards (TSR)

The Travel Smart Rewards (TSR) program in Singapore, formally branded as INSINC rewards public transit riders with distance based points. The analysis of TSR is based on secondary data access provided via online resources[4], all accessed and visited in May-June 2015. In Table 4.6 is a summary of the business setup for TSR presented.

Category	Description
Description of solution	Public transit customers receive distance based points for using public transportation. More points can be earned for travelling outside the peak. The system is based upon the CEPAS card transactions. The points can be transferred to cash or can be used in lottery games with chance on higher prices. The system has different tier levels (bronze, silver, gold, platinum) with different point levels.
Key stakeholders	Land Transport Authority in Singapore, TransitLink, SMRT, Urban engines
Customers targeted	Public transit users
Description of value proposition	Earn monetary rewards for using public transit. Tier levels and lottery system is added to increase attractiveness for users to participate and to share their participation on social media so new users are attracted.
Analysis of elementary offerings provided	Website of link to social media for registration. CEPAS public transit card number is coupled to account and transaction data is retrieved from the transit operator back-end system.
Description of revenue streams	Reduction in transit operation costs through peak spreading of demand of the transit system finances system.

Table 4.6: Summary of the business setup for TSR

4.5.1 Description of the solution

The system is supported by the Land Transport Authority and the SMRT transit operator. The objectives of the system are to attract more customers to off-peak periods. This serves two purposes: increased revenues and reduced operational costs. It builds on the traditional incentive-scheme to provide reduced tariffs outside peak hours, however adds personalisation and feedback on actual behaviour, which is something that traditional incentive-schemes based on reduced tariffs do not have. The system is based on transaction data from public transit cards. The transit card system is operated by TransitLink a subsidiary to LTA. For each kilometre travelled participating customers receive points and further incentives are given to avoid the peak hours. Customers can register through a website where they can also see their current level of points received. Frequent travellers are rewarded extra through four tier levels are incorporated in the system: bronze, silver, gold, and platinum. Higher tier levels lead to higher off-peak points compared to the bronze level. The points

[4] www.cscollege.gov.sg/knowledge/ethos/ethos%20issue%2012%20june%202013/pages/Governance%20Through%20Adaptive%20Urban%20Platforms%20The%20INSINC%20Experiment.aspx
http://web.stanford.edu/~balaji/papers/13INSINC.pdf
www.lta.gov.sg/apps/news/page.aspx?c=2&id=07c27cb3-e1f0-4a84-a075-f3c1d91cf36c
www.lta.gov.sg/apps/news/page.aspx?c=2&id=b89eb65a-f4ca-42de-8199-2ab7c50bd04f

can be transferred to transit card credit or the points can be used in a lottery that offers chances for higher rewards. The system is designed by urban engines and had in 2014 about 140 000 users.

There is a strong social element in Travel Smart Program. Participants may invite their friends from social networks and email services (Facebook, Gmail, Yahoo etc.), and they earn bonus credits when their friends sign up. Friends are displayed on a participant's TSR page in a "ranking list" style: off-peak commuting friends on top, followed by others. Every Friday, at 10 am in Singapore, commuters receive a "magic box offer", which is an offer of extra rewards should they achieve behaviour targets the following week. For example, a commuter traveling consistently in the peak hour may receive extra credits for off-peak travel the following week, while a different commuter may earn extra credits for inviting friends, and a new participant may get extra credits for learning some "TSR facts". Personalized offers allow administrators to understand a participant's utility function: i.e., a commuter's willingness to exhibit a particular behaviour, measured in monetary terms.

4.5.2 Key Stakeholders

The system was designed and built by Stanford University (now urban engines) and supported by public authorities (LTA) and public transit operator (SMRT). The system is operated by TransitLink, a subsidiary of LTA, which provides public transit card services (customer services, back office, etc.).

4.5.3 Customers targeted

The system targets public transit users in general, but the system is made more attractive for customers that travel frequently and customers who can travel outside peak periods.

4.5.4 Description of value proposition

The value propositions from the Travel Smart Rewards program can be taken almost directly from the information provided on their website, see Figure 4.8.

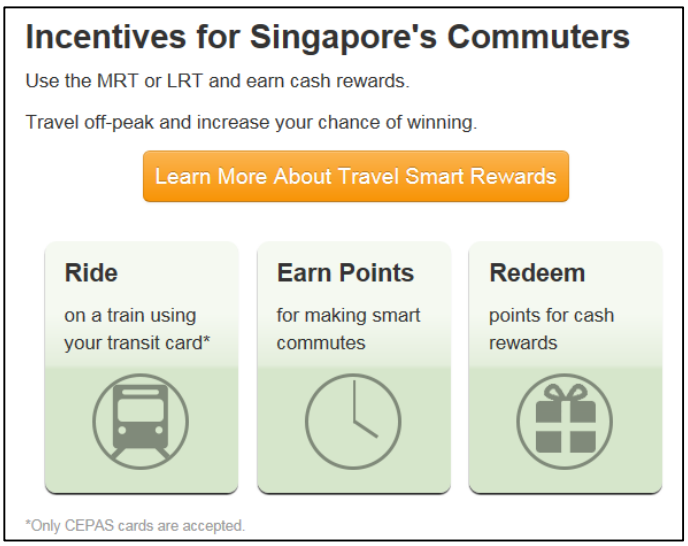
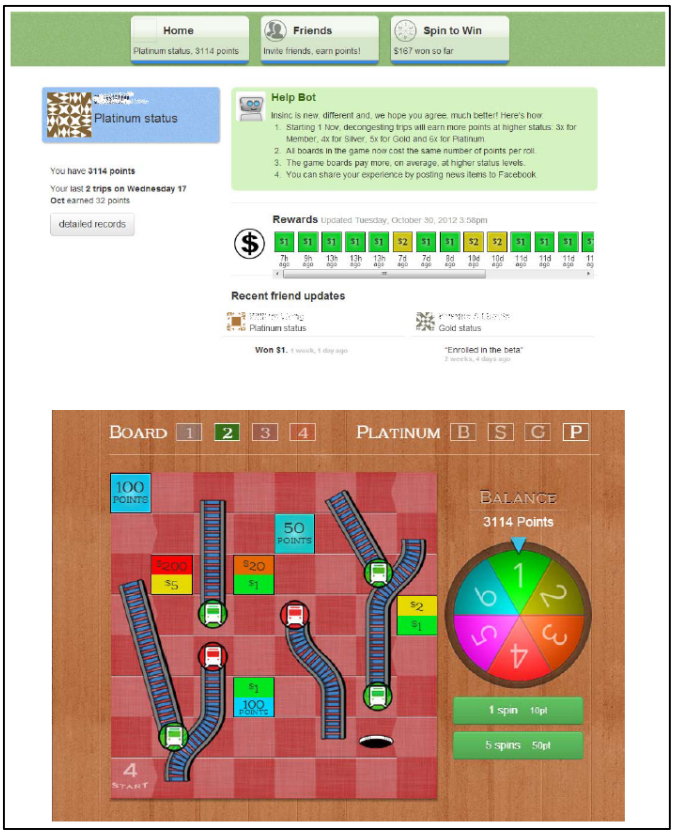


Figure 4.8: Value proposition of the Travel Smart Program

The proposition is that loyal customers earn cash rewards by using public transportation. The traveller earns points by taking train trips using the CEPAS card registered in Travel Smart Rewards. The traveller will automatically earn 1 point for every one kilometre travelled on the train all day - Monday through Friday - weekends are excluded from the scheme. Designated decongesting hours earn extra points with the aim to move travellers to these hours. During these decongesting hours a traveller can earn 3, 4, 5 or 6 points per kilometre if the traveller has reached Bronze, Silver, Gold or Platinum tier. Figure 4.9 summaries the reward scheme divided on tier level.

Monday - Friday	Bronze	Silver	Gold	Platinum
Before 6:15am off-peak	1x	1x	1x	1x
6:15 - 7:15am decongesting	3x	4x	5x	6x
7:15 - 8:45am peak	1x	1x	1x	1x
8:45 - 9:45am decongesting	3x	4x	5x	6x
After 9:45am off-peak	1x	1x	1x	1x

Figure 4.9: Reward scheme Travel Smart Program for different tier levels



One of the special features in the value proposition is that besides a cash payment of points at an exchange rate 1000:1, travellers can use points in lottery games and have a chance at winning higher prices. This serves two purposes. Firstly, the customers are more satisfied with the rewards offered, even if they in fact do not receive higher payments. This leads to higher engagement and easier retaining of participants. Secondly, the incidental higher pay-off leads to more sharing on social media by the winners, which attracts additional customers. It is basically a Snakes-and-Ladders game, see Figure 4.10, that allow you to win random prizes, from 50 points to $200. The traveller can manually play the Spin to win the game or can allow the system to play automatically once a week, and then notify for the traveller via email about how much the traveller has won for that week.

Figure 4.10: Probabilistic rewards lead to higher behavioural responses

4.5.5 Elementary services provided

For the end users a website and an app are provided. Users can see their current tier level, number of points and historical travel data (points earned per individual recorded trip). The back-office provides analyses tools for travel behaviour of participants as well as functionality to introduce magic boxes (personalised incentives).

4.5.6 Revenue streams

The revenues come mostly from reduced operational costs under peak periods (demand spread leads to less vehicles and personnel), but to some extent higher revenues are generated through increased use of public transit overall.

4.5.7 Urban engines spin-off

The US team that was involved in developing the INSINC (pilot to the Travel Smart Rewards program) has created a spin-off company focussing at providing business intelligence to public transit operators at an individual traveller level while also opening for customer loyalty and incentive programs. The have a back-office system and an app for end-users. The app, if no reward scheme is connected, provides real-time public transit information (not only arrival times and connections, but also vehicle occupancies).

Urban engines is a technology provider mainly targeting transit operators and cities with services for public transit operations. The services include a back office that based on the data from the front-end user app and/or transit card user data constructs a management dashboard on how public transportation is being used. Since the data is disaggregated to individual travellers, a lot more information than vehicle occupancies can be derived. The front-end application for iPhone and Android provides users with real-time transit information.

The urban engines system runs in 16 major US and Canadian cities and is in principal a system to improve insight in the use of the transportation system for operators and a personal travel assistant for individual users. To this however incentive programs can be added. Points can be earned for certain behaviour and these can be converted to trips or other monetary value. Urban engines use badges and incentives (points) to motivate people to extent the network and engage their social media networks to participate. Urban engines also has a probabilistic reward system, meaning that people can use points in lottery games to have a chance at winning something bigger. It is reported that this also increases engagement and sharing on social media, which in return draws in more users

4.6 Case: Montreal loyalty program Merci

The transit authority in Montreal (Société de transport de Montréal STM) in a joint venture with SAP launched in 2013 a customer loyalty program called Merci. Merci offers participating public transit users with discounted offers from participating third actors. The more people travel the higher the discounts. The offers people receive are location specific, e.g. based on where individuals' travel they get specific offers. The analysis of Merci is based on secondary data access provided via online resources[5], all accessed and visited in May-June 2015. In Table 4.7 is a summary of the business setup for TSR presented.

Category	Description
Description of solution	Public transit users get personalised location based (depending on lines and stations used) offers from engaged external partners. The system is connected to the transit card back office to analyse individual travel behaviour of participation customers. The system has three tier levels, offering better deals to those who use the public transit more.
Key stakeholders	Société de transport de Montréal STM, SAP, 340 merchants and 1,000 event partners ranging in size throughout the city and suburbs of Montreal in the system.
Customers tar-	Public transit users

[5] www.constellationr.com/content/sna2013/pierre-bourbonniere-la-soci%C3%A9t%C3%A9-de-transport-de-montr%C3%A9al-stm
www.metro-magazine.com/management-operations/article/211834/montreal-transit-app-rewards-riders-with-personalized-offers
http://business.financialpost.com/uncategorized/a-joint-venture-with-sap-theres-an-app-for-that-montreal-transit-users-get-more-than-a-ride
http://www.news-sap.com/stm-interacting-with-million-commuters/
http://www.stm.info/en/offers-and-outings/Merci-program/discounts-and-offers-merci/discounts-and-offers-merci/discounts-and
See also the YouTube video on the Merci system for more information: http://youtu.be/tBIJ_Rcva_Y

geted	
Description of value proposition	Public transit customers get personalised and location based offers where higher tier levels (more transit use) results in better offers. For third party partners the value proposition is that they have a new cost efficient personalised marketing channel which is also location based (they are certain that customers are within a reasonable distance of their store)
Analysis of elementary offerings provided	Website of link to social media for registration. Public transit card number is coupled to account and transaction data is retrieved from the transit operator back-end system.
Description of revenue streams	Reduction in transit operation costs through peak spreading of demand finances system, increased revenues from ticket sales and, in the future, minor fee for merchants to reach consumers.

Table 4.7: Summary of the business setup for Merci

4.6.1 Description of the solution

Merci was implemented by the technical partner SAP and it provides loyal customers with special location based offers (depending on transit lines and stations used) with different tier levels. STM enrolled 340 merchants and 1,000 event partners ranging in size throughout greater Montreal in the system. Partners include e.g. the Opera de Montreal, coffee shops and drug store chains, taxi companies and a number of grocery stores. Similar to marketing activities in subway stations and on buses, STM will monetize the service by offering the mobile app as a channel for a fee to merchants to reach consumers. STM asked its partners for three levels of offers to reward riders based on how often they use transit. For example, a top-tier offer would be a 50% discount on a product, 30% off for the second tier, and a 10% to 15% discount for the third tier. The system automatically selects STMs best customers to participate in the scheme. When accepting an offer via the mobile application, the rider receives a unique bar code to use to claim it. If the first 50 most frequent riders have not accepted the "top-tier" offer, it moves on to the next 50 according to the STMs system. The app also recognizes the location the rider has travelled to and sends the traveller offers at stores and for events in the travelled area.

The pilot was launched in May 2013, and since then STM and SAP have tracked how many consumers downloaded and used the app, as well as the offers redeemed, from a representative sample of 20,000 consumers. According to STM: "With mobile, personalized, context-aware interaction, rates go up to 67%; two out of three consumers that have received information will take an action," STM has then shifted from a pilot setting to a full-scale market entry. From fall 2013 anyone can now download the app and participate in the scheme.

While privacy was a concern in implementing the project due to regulations that do not allow the transit system to keep non-critical information collected from customers. To cope with this, STM put the critical information for riders they are allowed to collect, such as first names, purchases and trips, in a database. Any non-critical information the agency is not allowed to keep, such as last names and purchasing preferences, goes into the cloud. It only comes together to provide offers. Despite privacy being a potential issue, more than one-half of participating consumers went through the entire personalization process, which consists of a five-page online questionnaire, to increase the quality and relevance of the offers they get. Travellers can also opt out of providing information and get offers that have a decreased level of personalization and relevance. In order to boost the rate of more personalised rewards, users get rewarded with better offers through a game in the mobile application that is based on how frequently they use public transit, giving them the chance to "save trees". STM made it available to 2.5 million OPUS card users in early 2014 and within 48 hours after its introduction, the STM Merci was the #1 Lifestyle app in the AppStore in Canada.

4.6.2 Key Stakeholders

STM is the initiating actor and public transit operator and is therefore crucial for the service. However SAP as the system developer and integrator is also an important actor for delivering the service. The system is however unattractive to customers without good offers from third parties, vendors and

partners. The 340 merchant and 1000 event partners tied to the program deliver the value to participants.

4.6.3 Customers targeted

Public transit users are one key target group for the service, but since offers are location based different areas may it constitute different target groups. Another key target group for the service is the vendors that for a fee is offered to reach public transit users by the millions using the mobile application as a channel.

4.6.4 Value proposition

STM continues works on Merci being attractive for both public transit users as well as merchants and other third actors. It has on its website two value propositions for each of these groups. Figure 4.11 shows on the left side the value proposition for the public transit users. The key message is that by becoming a member you will get exclusive offers based on your public transit use.

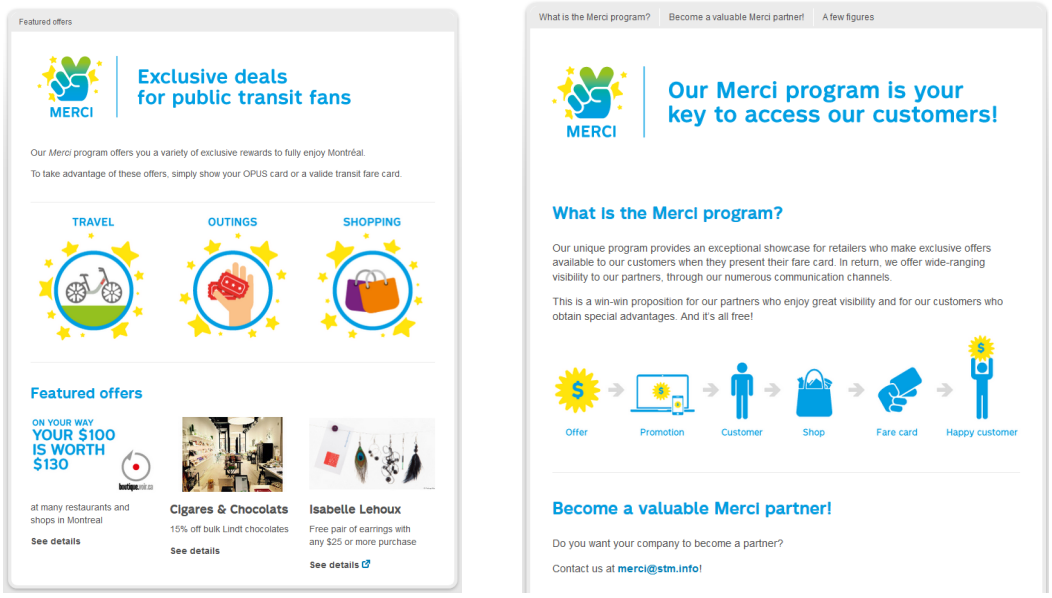


Figure 4.11: Value proposition for public transit users (left) and for partners (right)

On the right side, Figure 4.11 presents the value proposition for partners in the Merci program. It is more elaborate than the value proposition for the public transit users. The service offers the partners to get access to a new personalised marketing channel that is to increase sales and customer satisfaction.

4.6.5 Elementary offerings

STM introduced the OPUS card, a smartcard that commuters use to load their individual and season-ticket fares, back in 2008. But STM wanted a loyalty program that would offer customers better and more relevant rewards. Based on the smart card transactions public transit customers are assigned to a specific tier level and receive personalised location based offers. The end users register as a member and download either the iPhone or Android app. There is an opt-in option for getting better deals that requires completing a survey on personal preferences. SAP Precision Marketing from SAP is the solution at the heart of STM's initiative. This is a cloud-based B2B2C solution that sits between and integrates to our mobile application with their back-end CRM system and their merchant offer portal via accessible APIs.

4.6.6 Revenue stream

The Merci system is promoted as a win-win-win system. STM gets more and more satisfied customers, which increases revenue streams for STM. Partners get cheap access to a personalised marketing channel which reaches about 1.2 million inhabitants which increases sales. The public transit riders get personalised deals and better STM service. Pierre Bourbonniere, Head of Marketing at STM described the system as follows[6]:

> *"STM Merci! has dramatically enhanced STM's image and brand with local merchants and riders. Partner interest far exceeded expectations – over 340 merchants have committed to the initiative, from leading stores to corner stores, from grocery stores to specialty shops, from retailers to entertainment providers, from city center to suburbs. 48 hours after launch, consumer adoption was stellar. The STM Merci mobile app was #1 on the App Store in Canada under lifestyle. There were over 6,200 unique sessions, over 325,000 promotions were sent, and offer conversion rates on personalized offers peaked at 47%. Since the launch in early May, the results are validating the promise of the STM Merci initiative and the underlying solution, SAP Precision Marketing. Consumer adoption continues to grow, based on word-of-mouth only and no marketing budget. In the first 3 weeks, over 1 million consumer impressions were delivered. Consumers are showing their willingness to share profile interest if they get relevant, high value offers in exchange – over 50% of all users have completed their profile and preferences. Large volumes are making this marketing channel relevant to merchants, as more than 900,000 offers have been sent. And we're seeing substantial impact on consumer behavior – the top 10 offers enjoy an overall conversion rate of up to 33% and on average, 24% of the coupons seen by consumers are validated"*

One challenge with the Merci system might be, similar to other discount based schemes such for example Groupon, that customers only come to buy the specific item they have a discount for and nothing else. Such undesirable effects are however not reported in the case of Merci.

4.7 Case: Slim uit de Spits (SUDS)

The Arnhem Nijmegen City Region is exploring the possibilities for behavioural campaigns in order to relieve peak hour congestion on the (highway) network around the cities of Arnhem Nijmegen. Slim uit de Spits (Smart away from peak hours) is the latest (2013-2015) project in a series of behavioural campaigns. Currently, a follow up scheme is to be introduced around a series of major road works. The analysis of SUDS is based on primary data access as well as secondary data access provided via online resources [7] all accessed in June 2015.

Category	Description
Description of solution	Latest of on-going efforts towards a reduction of peak hour traffic in the Arnhem Nijmegen City region. It was aimed for an open-for-all system, less reliant on costly ANPR-systems and with the introduction of private funding.
Key stakeholders	The regional government rolled out the project, together with a commercial service provider and a project manager.
Customers targeted	The key target group are car travellers who travel regularly or incidentally on the regional (highway) network.
Description of value proposition	Initially there was a monetary reward, which was later converted to a point based system. Next to this, the app provided a fun factor and feedback on the travellers' behaviour.
Analysis of elementary offerings provided	A website for overviews and project information, together with an app for tracking trips and giving pre-trip traffic information.
Description of revenue streams	Mostly publicly funded, although the project aimed for the involvement of private partners, in order to steer the business case away from a fully publicly funded system.

Table 4.8: Summary of the business setup for SUDS

[6] https://www.constellationr.com/content/sna2013/pierre-bourbonniere-la-soci%C3%A9t%C3%A9-de-transport-de-montr%C3%A9al-stm

[7] Project website (Dutch): https://www.slimuitdespits.nl/
Walkthrough of the app (Dutch): http://slimuitdespits.nl/resultaten/6-app_ui.html

4.7.1 Description of the solution

The Arnhem Nijmegen City Region has a highly congested highway network around the two main cities: Arnhem and Nijmegen. A first initiative to work with behavioural campaigns was the reconstruction of one of the bridges between both cities. The first project worked with registration based on ANPR (Automated Number Plate Recognition), where drivers were recruited by (traditional) mail. A personal budget was given to all participants, with withdrawal of several euros each time a car would be registered on the bridge. During the years 2013-2015 a new scheme was introduced. Next to the ANPR-technique of the first wave, a tracking app was introduced. With the app, users were asked to track their commuting trips. In addition to the specific SUDS-app, five national traffic information services could be used to participate as well. Whenever a trip was registered at one of the control points (Figure 4.12) outside of peak hours, a reward was given. Also, additional bonus challenges where introduced to increase the usage of the app. The Arnhem Nijmegen City Region aimed to evolve form predecessor projects, achieving the following (policy) goals:

- Increase the number of participants
- Increase the number of " spitsmijdingen"(trips converted out of peak hour)
- Transition ANPR → GPS / Smartphone
- Open up the system for all
- Add fun factor / gamification
- Establish behavioural change
- Include private investments

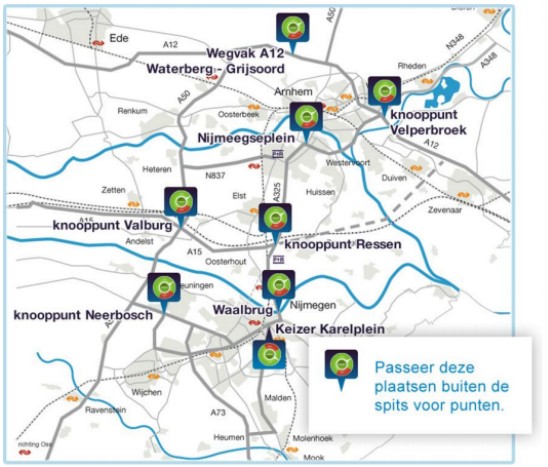


Figure 4.12: Control points for SUDS 2

4.7.2 Key Stakeholders

The Arnhem Nijmegen City region (regional government) had a predecessor project with the ambition to reduce peak traffic on the highway network around the cities of Arnhem and Nijmegen. Based on the success of this first project, they started a tendering procedure to find a service provider for the continuation of the project. A service provider has built and designed the technical system. This includes both the road side tracking with ANPR as well as the development of the app including GPS tracking (Android and iOS). A commercial consultant supported the City region with the operation of the scheme, including recruitment, communication and evaluation. Also, they took care of the arrangement of web shop offers.

4.7.3 Customers targeted

The system targets car travellers on the regional (highway) network. Automatic Number Plate Recognition was used to select participants during the pre-project period. These travellers participat-

ed in the part of the project with the cash rewards. Also, a general call for participants was sent out to invite other participants as well. These travellers did not fulfil the criteria to be invited in the first cash scheme, but they could use the app and get point rewards (points represent a small monetary value) instead. Participants were challenged to change travel behaviour and register their travel behaviour by app and on specific points (see Figure 4.12) rewards were given. Figure 4.13 shows the number of users in the system over the course of the project.

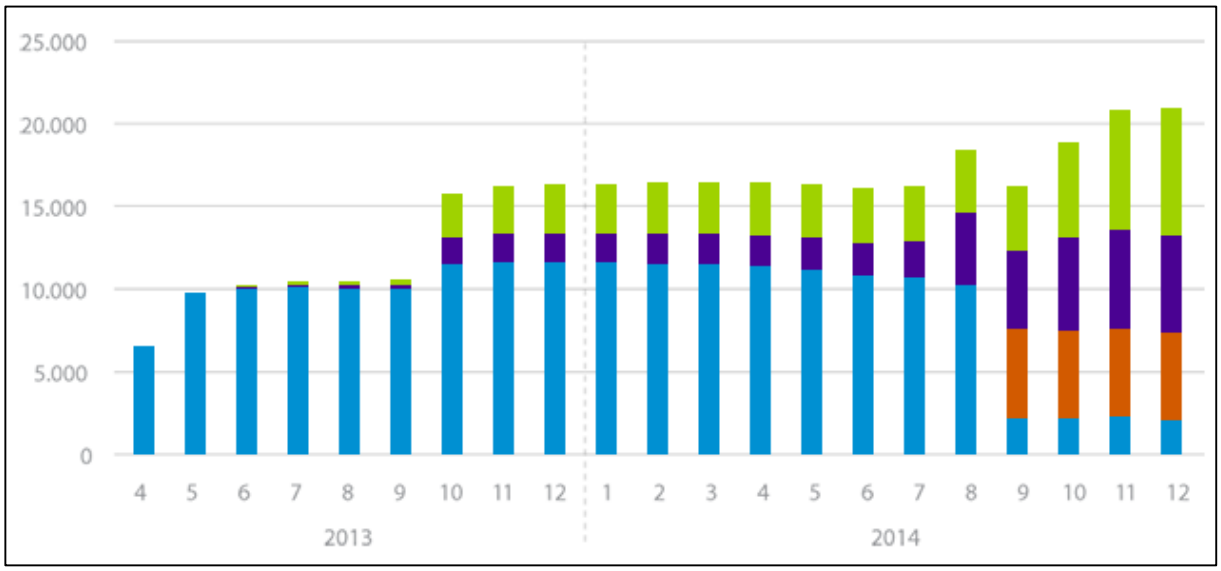


Figure 4.13: Number of users participating in the project

Blue represent camera registered users, purple represent frequent commuters with app, green represent infrequent commuters with app and orange display users using the information services.

4.7.4 Description of value proposition

The City Region offered a cash reward in the first stages of the project. Later on, a conversion took place towards a points based system (1 point = € 0,01). Points were rewarded for off peak trips during the entire project. Additionally, the City region was able to implement several challenges (e.g. bike challenges, roadwork challenges). Every challenge was open for a new target group.

Using the points system, people could get different rewards from the web shop. This shop offered different kinds of articles. Most claimed are vouchers with a monetary value. The top ten rewards chosen contain nine vouchers in four categories: general, appliance store, cinema and flowers. The only other reward in the top ten was a Public Transport card.

Of the points rewarded, 50-60% was saved over a longer time in order to exchange for greater products. In the end, 80% of the points were exchanged in the web shop.

Next to the reward system, the service was fun to use and gave feedback on the personal achievements.

4.7.5 Elementary services provided

The service consisted of a website and an app. The website was used for general information about the project, as well as a personal dashboard with an overview of points rewarded and the ability to claim offers from the website. The app was mainly used to track trips, but included a local traffic map and a trip profile as well.

4.7.6 Revenue streams

The project was mainly driven by public money. Although the ambition was there to include private revenue streams, it did not take place within the projects scope. The ambition work on private revenues is still there, but in the course of the project a focus had to be chosen. There were other need-to-have aspects to work in, which hampered the involvement of private money.

The project concluded that a different approach towards the market has to be chosen, in order to get to feasible business cases where private money does take a considerable role. Ideas on linking specific challenges to specific rewards have been developed, and might be tested in future stages of the on-going roll-out of Slim uit de Spits.

4.8 Comparison

Table 4.9 displays a comparison of the six state-of-art solutions analysed. The comparison is based on the categories used for analysis and covers 1) Mobidot, 2) SMART, 3) Commute Greener, 4) TSR, 5) Merci and 6) SUDS.

#	Description of solution	Key stakeholders	Target customers	Value proposition	Elementary offerings	Basic revenue model
1 Mobidot	Platform-based service enabling personalizing and incentivising end-user mobile services	Multiple, e.g. cities, transit operators, employers, travellers, service providers	Organizations: e.g. city mobility and traffic management authorities, transit authorises	B2B solutions where low cost personal level travel data or capabilities to influence travellers behaviour are the main value drivers	Multiple: analysis of travel behaviour, incentive provision, behavioural change mechanisms	From operators (e.g. cities): Licensing, Pay-per-user service provision, and support fees from customers
2 SMART	End-user mobile service that enables traveller to understand travel behaviour, organize traveling and be stimulated to make smart travel choices	Multiple, e.g. city government, service providers, incentive partners and systems developers	Individuals: car commuters and commuters in general	B2C solution for travellers to understand and organize travel behaviour. The city or transit operator can stimulate travellers to make smart travel choices	Multiple end user features (e.g. mobility profile, multi-modal route planner) delivered through a mobile application, a website and a web shop	From operators (e.g. cities): less investments in infrastructure, monitoring multi-modal traffic flows and surveys on travel behaviour
3 Commute Greener	End-user service providing ways to measure and reward improved everyday travel behaviours as well as enable smart ride-sharing including social network features.	Multiple: e.g. city authorities, employers and equivalent organisations that enable contacts with end-users who mainly is driving CFVs	Organizations: corporations, city authorities concerned with congestion and environmental impact from CFV use	The solution offer expertise and a scalable system set-up enabling cities, corporations and citizens to gain measurable results and improve everyday travel.	Multiple: e.g. campaign tool, measurement tool for travel behaviour, reward tool to stimulate smart travel change, ride-sharing support and social network features	From operators: the solution is sold to the operator as a campaign tool or as pay-per-use service
4 TSR	End-user service wherein public transit users receive transferable points, based on CEPAS card transactions, for using public transit weekdays with a boost on time slots where the demand on the system is lower	Multiple: city authorities, transit operators, service providers	Individuals: public transit users	B2C solution that enables customers to earn monetary rewards for using public transit. Tier levels and lottery system is added to increase attractiveness. The value for the operator of the solution is to spread demand of public transit from peak hours.	Website for registration, social media application for lottery and game and information. Solution connected to CEPAS public transit card.	From operators: the solution reduces transit operation costs through peak spreading
5 Merci	End-user service wherein public transit users get personalised location based offers from engaged external partners	Multiple: city authorities, transit operators, third party providers of offers (in Montreal 340 merchants and 1000 event partners), service providers	Individuals: Public transit users	B2C solution that enables customers to get personalised and location based offers where higher tier levels, i.e. more transit use, results in better offers. B2B solution: a cost efficient channel for merchants to reach consumers	Multiple: Website of link to social media for registration. public transit card number is coupled to account and transaction data is retrieved from the transit operator back-end system.	From operators: reduction in transit operation costs through peak spreading and increased revenues from ticket sales From engaged external partners (future): minor fee

6 SUDS	Slim uit de Spits (Smart away from peak hours) is an end-user service aimed towards car travellers in the regional network to avoid peak hours and be rewarded for that change in behaviour	Multiple: city of regional authorities, commercial service provider and project management	Individuals: car travellers using the road network on a regular or incidental basis	B2C solution: initially a monetary reward, which was later converted to a point based system to promote changes in travel behaviour. Next to this, an app provide a fun factor and feedback on the travellers' behaviour.	Multiple: app with features for tracking trips and provide pre-trip traffic information. Website that provides overview information and registration.	Main flow from operators: publicly funded scheme. Secondary flow: involvement of private partners

Table 4.9: Comparison of state-of-art solutions using incentive-scheme based business models

The individual case analyses together with the comparison in Table 4.8 display similarities but also differences in the state-of-art solutions reviewed. Two of the solutions aim primary to stimulate public transit usage, and secondary to congestion reduction in the transit system (Singapore) or modality shift (Montreal). These solutions are the schemes that have generated the most users. One explanation for the success in impact can be that these two target customers that the operator of the solution already has somewhat control over as well as knowledge about, as the solutions are integrated in the public transit back-end systems. They also utilize established communication channels to reach out to customers. Road authorities or cities have not in the same way as public transit operators such control and such channels available. As operator of an EMPOWER system cities and road authorities do not either have established easy accessible customer-supplier relationships to build on, which a public transit operator has with its customers. The lesson learned here is that successful incentive-scheme based solutions seems to be based on utilizing existing customer-supplier relationships and add value to that relationship. Hence, a challenge in EMPOWER is that CFV users and cities / road authorities has to establish relationships or form alliances with proxy organizations (e.g. insurance companies, employers, car sharing companies) that possess such relationships to bridge the gap between CFV users and the city / road authority. The incentive-based business model in Singapore and Montreal are both connected to an existing transit system that the operator of the incentive-based solution runs. The incentive solutions are thus integrated in existing transit business models and the value proposition for the new solution is therefore *an add on* to an already existing value proposition - i.e. travel with public transportation - which the users already have accepted and sees as valuable, or new users easily can understand, accept and join. The financial flow for the operator are in these solutions also clear as new customers contribute directly to already established revenue streams incorporated in transit systems. For road authorities and cities new revenue streams has to be defined and designed or tapped into for the EMPOWER system to succeed.

In EMPOWER the aim is thus more aspiring in comparison to the two most successful schemes in operation, as it aims to incentivise users of CFVs in more open environments to change their behaviour. A future operator of an incentive-based scheme from EMPOWER will operate in an open environment with much more implicit boundaries compared to TSR and Merci. The operator will likely initially not have the same control over the users as these two operators have. The operator will also probably target users that they do not already have a customer-supplier relationship with, which means that the business model must include actions to create and explore a new customer base. This means that the EMPOWER solutions must provide incentives that are perceived so valuable for the traveller using CFVs to first make them to join the scheme, then change their travel behaviour (which may include modality shift) and then retain that behaviour over time. This involves campaigning, which Commute Greener successfully has achieved using social networking and systematic marketing techniques. Another good example of attracting and retaining users through social media use is TSR in Singapore. One tentative assumption is therefore that incentive-scheme based solutions within EMPOWER require social network utilization in order to rapidly grow in number of users and survive. Such services cannot solely rely on expensive traditional marketing campaigns to attract and retain user base. Instead such solutions must be complemented with social media channels to establish and maintain user involvement.

In a study performed by Amelsfort et al. (2014) incentive provision in open environments is studied, and the experiments they perform indicates a need to mindfully personalize incentives that is distributed to CFV commuters entering a scheme with the purpose to change their behaviour. Context and person dependent characteristics should be used to develop incentives so they become valuable for the CFV users and increase their acceptance of the scheme as a whole, the success of triggering shifts in behaviour and increase the level of behavioural change over time (Amelsfort et al. 2014). Both the SMART service and the Mobidot platform provides offerings to cost-efficiently develop understanding about, travellers that the operator of an EMPOWER service has less control over, in order to design appropriate incentives, and in the Mobidot case, also a tool to craft and distribute incentives in environments with lesser explicit boundaries than schemes operated in closed public transit systems.

A complimentary explanation for the success of the solutions operated in public transit systems might also be that the reward mechanism is connected to the public transit card transaction and thus that the reward (in the TSR system) or the discount offer (in the Merci system) is delivered in close adjacent to the actual travel situation. This means that incentive-based solutions within EMPOWER should strive to deliver the proposed value to the traveller in close adjacent to the travel situation that generates the reward. Amelsfort et al. (2014) argues, based on their experiments with car commuters, that rewards quickly delivered to CFV commuters in early stages in a scheme will trigger the users to take on the challenge more seriously to change travel behaviour. Having a marginal pay-off for each reward, rather than posing a high threshold for winning something at a certain tier level, may boost this effect and also bring more users on-board early. This means that in order to attract users in early stages in EMPOWER, the business model should be developed evolutionary with an initial value proposition that gives the end users rapid payback on involvement. In later versions of the business model, when a critical volume of users has been created, the value proposition can be transformed toward a tier-based level system, similar to TSR and Merci, to boost user involvement and retaining of users in the system. Connected to this is also that too complex challenges, e.g. the combination of simultaneous needing to change mode and departure time seems to be too high a burden to make for users (Amelsfort et al 2014). Additional evidence for this is the SUDS, Merci and TSR schemes wherein the challenges, as well as the rewards, are very streamlined: e.g. avoid peak hour or travel with public transit more frequently and receive points that are easy to monetize for the end user and thus transformed into value.

Regarding the basic revenue streams, the state-of-art analysis provides the lesson that incentive-based solutions heavily relies on initial operator funding, either exclusively by the operator (as in the case of SMART, SUDS, and TSR) or in partnership with a service provider (as in the case of Merci, Commute Greener and Mobidot). The main current revenue streams seem for cities and road authorities be reduction of costs for investment in infrastructure and services that the solution instead more efficiently provide or reduction in transit operation costs through peak spreading. The Merci case however provides insights in an alternative future revenue stream. When the system is fully operational with a large customer base it will be an attractive and cost efficient channel for merchants in a city or geographical area to use to connect to potential customers. The operators will then be able to monetise the system and collect small fees from the incentive and reward partners to utilize the system. This will provide an external revenue stream in the business models. In similar terms can for example Mobidot, or the city or road authority that in collaboration with Mobidot runs the platform, for a fee provide aggregated information about the travel behaviour of users interested in such data. This is also example of external revenue streams that incentive-based solutions can generate. However, the lesson is that these revenue stream will first appear in volume when the system has a reached a critical user base and proven technical sound to the paying customer.

5 Conclusions: challenges and key factors in designing incentive-scheme based business models

The work performed within T3.1 demonstrates great potential for the solutions that EMPOWER aims to develop for urban environments, but have also several challenges related to the technical system, incentive provision and business model design for solutions of this kind. Such challenges are:

- Challenge 1: How create customer relationships between a city or road authority and CFV users when no accessible relationships are in place that can be used as base to add new value on?
- Challenge 2: Offering value so that travellers will choose other travel options than the car. Where is the value for the CFV user to shift modality? Why would they chance on a perceived second best travel option? How do the incentives provided solve the life puzzle in a way so that the CDV is needed less?
- Challenge 3: How is a large user base generated, using for example social networking, without continuous expensive marketing campaigns?
- Challenge 4: How can societal benefits be monetized in order to build and operate the system if there are no clear and direct monetary benefits for operators such as road authorities or cities?

In order to cope with challenges such as these connected to business model design (T3.3) and also support mindful design of appropriate incentives and facilitate the technical development (WP 1-2 WP 4-5), T3.1 has generated a number of key take-away's from the extensive literature review and the state-of-art case review performed. Based on the work presented in D3.1, ten insights have been elicited as key success factors for designing and implementing incentive-scheme based business models within EMPOWER promoting the reduction of CFV use:

1) Incentive-scheme business models require a **strategic marketing approach** to attract both users and incentive providers to the scheme, utilizing not only traditional expensive marketing campaigns but also mindfully designed social media utilization to create impact.
2) An Incentive-scheme business model is **not a static entity**. It should be viewed as an evolutionary process that involves continually changes in the business model setup and also the organizational design.
3) Incentive-scheme business models should **evolve in terms of the value proposition.** The model should not be over-engineered to suit only one ideal situation, rather should the design meet conditions connected to different phases: e.g. a value proposition when the service is introduced, a value proposition to build user base and user engagement and a value proposition when extensive user base is reached.
4) An incentive-scheme **business model should be developed intertwined with the technical solution**; i.e. the design of the technical system and the incentives that operationalize the value propositions in the model
5) An incentive-scheme business model should be **designed for a multi-sided market** that goes beyond the dyadic relationship between one buyer and one seller, and might require the design of new relationships between customers and suppliers or the utilization of proxy organisations that provide such relationships to the market.
6) An incentive-scheme business model should be a **win+win+win enabler** providing value to several different stakeholders and customers (service operator, incentive partners, travellers). The value that the EMPOWER services provide for stakeholders lies in the new value that is created through the provision of positive incentives that in turn should be connected

to smart travel choices. The perspective of different stakeholders should be included when the business model is designed.

7) Incentive-scheme business models promoting the reduction of CFV use **rely in early stages on operator funding**, but alternative and complementing **commercial revenue streams can be created and should be identified** for a situation when the system reaches a large user base.
8) An incentive-scheme business model should be developed based on **available techniques and best practice**. EMPOWER will use state-of-art modelling techniques and existing business model archetypes to speed-up the development process and enable easy communication of results.
9) An incentive-scheme business model should provide **a comprehensive and attractive model** for the business setup. When multiple stakeholders are involved, a common vocabulary regarding the EMPOWER tool/service should be established in the beginning and all the perspectives on "value" should be taken into account.
10) Incentive-based business models should be **designed mindfully in respect to sustainability**. E.g. in the choice of partners, combining distribution channels, consider re-use or cradle-to-cradle in the value proposition, etc.

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