

	<p>Methods, pilot platforms and recommendations for active mobility and sustainable lifestyle</p> <p>Deliverable 2.4 and 8.4</p>
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Project website:	www.simplicity-project.eu
Main authors by institutions in alphabetical order:	<p>Guntram Geser, Veronika Hornung-Prähauser, Claudia Luger-Bazinger, Bernhard Schrempf, Petra Stabauer and Diana Wieden-Bischof, Salzburg Research</p> <p>Thomas Layer-Wagner, Irina Paraschivoiu and Christoph Wögerbauer, Polycular</p> <p>Petra Gruber, Gerlinde Kämmerer and Nina Mostegl, SIR</p> <p>Franz Huemer, City of Salzburg</p> <p>Johan Rosen and Johan Rubbestad, Uppsala kommun</p> <p>Linus Jonsson, Sprocket Event</p> <p>Edith Ngai, University of Uppsala</p>

Methods, pilot platforms and recommendations for active mobility and sustainable lifestyle

Final SimpliCITY project report

Editor: Veronika Hornung-Prähauser and Diana Wieden-Bischof, Salzburg Research
Forschungsgesellschaft mbH

Contributions to this final report:

<p>Chapter 1. Introduction</p> <ul style="list-style-type: none"> • <u>Part of D. 2.1.: Pre-Study –Scientific framework: Methods and tools for incentivising the use of smart sustainability services</u>; Petra Stabauer, Bernhard Schrempf, Christina Bliem, Guntram Geser and Veronika Hornung-Prähauser, Salzburg Research
<p>Chapter 2.1. Open innovation and co-creation approach: hackathons</p> <ul style="list-style-type: none"> • <u>Part of D. 3.3.: Sustainability service hackathon report</u>; Petra Stabauer, Bernhard Schrempf, Salzburg Research and Thomas Layer-Wagner, Polycular
<p>Chapter 2.2. Stakeholder mapping of Regional Sustainability Services (RSUS)</p> <ul style="list-style-type: none"> • <u>Part of D. 2.2.: Mapping of Regional Sustainability Services (RSUS)</u> Johan Rubbestad, Uppsala kommun and Bernhard Schrempf, Salzburg Research • <u>Part of D. 6.2.: Community engagement plans</u> Nina Mostegl, Gerlinde Kämmerer and Petra Gruber, SIR • <u>Part of D. 7.2.: Evaluation Results</u> Claudia Luger-Bazinger, Veronika Hornung-Prähauser, Diana Wieden-Bischof and Guntram Geser, Salzburg Research
<p>Chapter 2.3.: Service Provider Engagement Process</p> <ul style="list-style-type: none"> • <u>Part of D. 2.3.: Guidelines and toolkit for engaging activities - stakeholder dialogues</u>; Petra Gruber and Nina Mostegl, SIR
<p>Chapter 2.4.: Game design elements in non-game context</p> <ul style="list-style-type: none"> • <u>Part of D. 7.1.: Evaluation Plan and D. 7.2. Evaluation Results</u> Claudia Luger-Bazinger, Veronika Hornung-Prähauser, Diana Wieden-Bischof and Guntram Geser, Salzburg Research
<p>Chapter 2.5. Digital nudging as a behavioural change approach</p> <ul style="list-style-type: none"> • <u>Part of D. 7.1.: Evaluation Plan and Part of D. 7.2.: Evaluation Results</u> Claudia Luger-Bazinger, Veronika Hornung-Prähauser, Diana Wieden-Bischof and Guntram Geser, Salzburg Research
<p>Chapter 3.: Pilot platforms</p> <ul style="list-style-type: none"> • <u>Part of D. 6.3.: Steering groups / clinics with service providers; Part of D. 6.4. User workshops and pop-up activities; Part of D. 6.5. Pilot demonstration</u> Nina Mostegl, Petra Gruber, Gerlinde Kämmerer SIR and Franz Huemer, City of Salzburg
<p>Chapter 4: SimpliCITY Policy Recommendations</p> <ul style="list-style-type: none"> • <u>Part of D. 7.3.: SimpliCITY Policy Recommendations</u> Guntram Geser, Veronika Hornung-Prähauser and Claudia Luger-Bazinger, Salzburg Research



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SimpliCITY project consortium:



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1 INTRODUCTION - EXECUTIVE SUMMARY

In the past decades, European cities have set ambitious goals for low carbon transition, but regional sustainability services (RSUS) lack an active user base. Only 15% of consumers take sustainability of these into account during a purchase and “rebound effect” can reach 80%. At the current pace, RSUS will fail to develop into sustainable business models and cities’ efforts remain insufficient to meet targets set for 2050. SimpliCITY aims to boost the digital competences of the urban communities in Salzburg, AT and Uppsala, SE. Both pilot cities, Salzburg and Uppsala, are so-called smart cities with different action fields, targets and coordination offices.¹

This report informs about the activities and results of the European project “SimpliCITY” (JPI Urban Europe; running from 10/2018-6/2021) in which a hybrid approach was developed, using both physical and digital participation and incentive methods and tools. SimpliCity examined how to increase the usage rate of regional sustainability services and how to drive the community towards these services by means of two novel web platforms and applications (“Stadtmacherei Salzburg” and “Cykla med Pelle”). In the long term, they will lead to a better visibility of regional sustainability services. More information about the project and its result can be found at: www.simplicity-project.eu.

1.1 Objective of the final SimpliCITY report

This document serves to provide a thorough understanding of the different methods and approaches used during the various steps of the SimpliCITY project. Furthermore, it gives an overview of the pilot platforms and apps in Salzburg and Uppsala and offers recommendations relevant for initiatives that aim to use digital methods for promoting behaviour change towards sustainable urban mobility, particularly active mobility.

Besides, a pre-study (Del. 2.1) conducted at the beginning of the project also serves as framework for the content of this document. The pre-study provides a thorough understanding of the theoretical models and insights into (digital) incentivisation methods, commons-based business models and the relevance of principles of behavioural design for sustainability services and target-group specific innovation barriers and learning goals. It was intended to lay out scientific foundations in the interdisciplinary field of SimpliCITY and was then used and integrated in planning the intervention designs, platform functionalities and the guidelines for better uptake of smart city services to be developed in other work packages.

¹ Information about the Smart City Salzburg can be found on <https://www.stadt-salzburg.at/internet/websites/smartcity.htm>, information about the Smart City Uppsala on <https://international.uppsala.se/content/the-smart-city/>.

1.2 Structure of the document

The final project report is organised in the following chapters:

- Chapter 2 offers insight into the different approaches and methods used in the various stages of the development of the SimpliCITY framework, like the organisation of hackathons as an open innovation and co-creation method.
- Chapter 3 presents the two different city platforms and apps (Stadtmacherei Salzburg city app and Uppsala city app – Cykla med Pelle) invented during the SimpliCITY project.
- Chapter 4 provides a comprehensive insight on policy recommendations and focuses on the themes of city governance, behaviour change methods, digital and other services, and legal and ethical aspects.



Figure 1: Structure of the final SimpliCITY project report

Source: Diana Wieden-Bischof, 2021

2 METHODS AND PROCESSES

The purpose of this section is to provide an insight into the different approaches and methods used in the various stages of the development for the SimpliCITY framework. In particular, the section illustrates the method and results of the open innovation and co-creation approach hackathons, multiplier stakeholder mapping and their engagement process plans as well as the gamification and nudging approach.

This study deals with a new approach of motivating and guiding people's decisions in the direction of using sustainable solutions.

2.1 Open innovation and co-creation approaches

In the last decades, many European cities and smart city initiatives have started to develop new regional and sustainable services to help achieve CO2 savings and the climate targets set for 2050. Unfortunately it is still unclear how to increase the trust of the citizens and how they can be motivated to use these new intelligent services for the benefit of the climate. What would help people in their everyday lives to change routines and behaviours as well contribute to a smart sustainable city lifestyle?

Therefore, SimpliCITY project aims to integrate and to interact with as many people as possible in order to jointly develop a solution for the pilot cities of Salzburg and Uppsala and its citizens. According to this, we used an open innovation and co-creation approach within the project and participated in several hackathons in Austria and Sweden in order to get insights and to benefit from the expertise from students, start-up companies and experts and interested people.

2.1.1 Purpose of the hackathons

The word hackathon is a so-called neologism, combining the words hack or hacking and marathon and was used for the first time in the year 1999 in the course of a software engineering event (Pogačar and Žižec, 2016). A hackathon is an event that is lasting usually for several hours or days and where clearly defined problems need to be solved or predefined topics are covered. Therefore, close collaboration between the participants is necessary and emerging (Zapico et al., 2013).

An essential part of every hackathon is the creativity in solving problems of the individual participants. Various experts with heterogeneous qualifications and skills (often free of charge) are required to develop a finished product, service, process, prototype, idea or concept at the end.

Hacking has in recent years been applied to a great deal to non-software or even to non-computer matters. One such area – also highly relevant for SimpliCITY – is urban development, where the collaborative approach of hackathons is applied to different urban problems like overpopulation, inequality, pollution or sustainability.

Another valuable property of hackathon is the fact that problems and solutions are usually up to-date and mostly not yet implemented. As SimpliCITY and the platform developed therein aims to make use of the newest technology available, hackathon can have significant impact at different stages.

While the major part of technology research and development is done by the project team, hackathons open up this research process to a skilled community. That brings several benefits:

- New and not considered ideas regarding platform structure
- Novel opportunities, methods and software tools for the implementation
- Early fault detection
- Use cases and opportunities for future development or follow-up projects

Finally, the hackathons organised both in Salzburg and Uppsala open our own research process to a wider community to enable a correct evaluation of the potential of these new technologies. Therefore, a guideline and a set of technical tools was openly available to hackathon participants for preparation and solution design.

Additionally, the solutions designed during the hackathons will be subject to open source access, to be reused by the project team and/or other interested third parties without costs.

2.1.2 Participation of SimpliCITY in hackathons

The challenge proposed for the social hackathons, which were organised by local institutions such as the University of Applied Sciences Salzburg, the initiative “Industry meets Makers” Austria (IMM, <https://www.industrymeetmakers.com>) or the City of Uppsala and the Sustainability InnoCenter Sweden (SIC, <http://sustainabilityinnocenter.com>), was about identifying the requirements for the briefings of the hackathons.

Hackathon at the University of Applied Science in Salzburg

One social hackathon took place at the University of Applied Science Salzburg from the 28th of February to the 2nd of March 2019. It was promoted as an ‘initiative to inspire and create innovative technology and tools that we care about in our daily lives’. Within 48 hours, voluntary social innovators, developers and designers worked together with students of various areas (e.g. Social Innovation, Design and Product Management, etc.) to answer the overall question: How

can technology help us create social, behavioural, and practical change for societal challenges? To break it down, the hackathon had a selection of 15 diverse social topics (for more details see <https://social-hackathon.fh-salzburg.ac.at/2019-02-28>).



Figure 2: Social hackathon 2019 at the FH-Salzburg

Source: <https://social-hackathon.fh-salzburg.ac.at/2019-02-28>; 28.07.2021

The 48 hours of the hackathon were divided into ideation-, design- and coding phases. The outcome of the hackathon had to be a prototype of smart digital solutions for one concrete societal challenge. While the participants had access to a set of expert advisors and mentors from local organisations, two SimpliCITY project members (Petra Stabauer, Salzburg Research and Thomas Layer-Wagner, Polycular) came into action as jurors at the final presentations of each hackathon team. The hackathon finished with a showcase and a pitching competition where the ideas had to be presented in front of Petra Stabauer and Thomas Layer-Wagner and other experts.

The topics of the presented projects were highly relevant in relation to the SimpliCITY focus on local production & consumption and social inclusion. Here is a brief overview of the related projects:

- Meetsila: learn sign language via an app that connects learners and native speakers
- Words in Motion: a game that teaches sign language by practicing sign language as a core communication/interaction mechanism in the game
- Foohoo – The social Food-Hood: meet and share ingredients to reduce food waste
- The Blind Spot: an interactive game app that teaches about bullying
- Hero 2 Hero: Connect people with a handicap with volunteers
- Roomy: an app to organise the use of common rooms in buildings

In total, around 90 voluntary social innovators, developers, designers and students participated in the hackathon and provided qualified solutions to the defined problems and challenges.

Hackathon as part of the Industry meets Makers initiative in Austria

The second hackathon format was Industry Meets Makers (IMM). IMM is conceived as an open innovation community building format with focus on Austria. It aims to initiate new collaboration models between (top) industrial partners on the one hand and creatives or young makers on the other hand. Emerging collaborations should be fruitful for both parties by creating and fostering business and innovation potentials.

The current concept focuses mainly on the fact that industrial companies present “briefings”, which are predefined problem statements in future technology areas like robots, Artificial intelligence (AI), 3D printing, Internet of Things (IoT), big data or blockchain. Makers – a composition of start-ups, small and medium-sized enterprises (SMEs), freelancers, designers, pupils, students and hobbyists – are welcomed to listen to the presentations (briefings) or check them on the IMM website. The actual work starts when makers decide on a briefing and try to solve the underlying problem. To do so, they work together with the industrial partner and start a co-creation process. The entire process from getting to know each other until the outcome/end presentation is limited to a period of approximately six months (20th of March until 4th of November 2019). In the best case, a successful, joint follow-up project based on this can then be launched.



Figure 3: Industry Meets Makers (IMM) – Token 4 Sustainability

Source: <https://www.industrymeetmakers.com/salzburg-research-polycular-token-4-sustainable-city-services/>; 28.07.2021

Salzburg Research and Polycular got the opportunity to put together a briefing named “Token 4 Sustainable City Services”. The focus of the briefing was the strengthening of sustainable and

integrative urban services through incentivisation, nudging and reward systems and these components should be built on blockchain or distributed ledger technology (DLT). The main goal for makers was to develop a concept or a prototype together with contact persons of the SimpliCITY project, which was presented at the Best of IMM 2019 event on the 4th of November 2019.

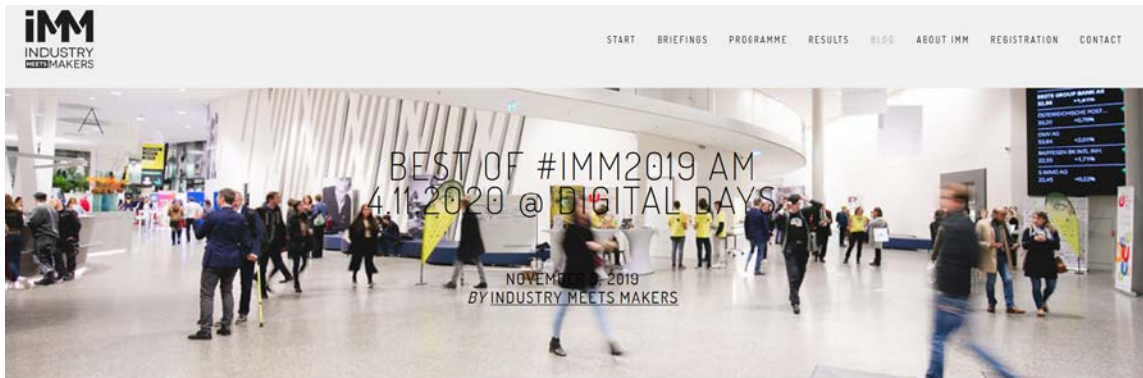


Figure 4: Best of #IMM 2019

Source: <https://www.industrymeetmakers.com/blog/2019/11/5/best-of-imm2019>; 27.07.2021

The kick-off event for “IMM goes West”, which connected local makers from the western region of Austria with the hosts of the challenges, took place on the 21st of March 2019 at the Grand Garage in Linz (<https://grandgarage.eu/>; makerspace, innovation, business and start-up hub). It was a networking event and enabled the project team to connect with makers, technology experts, regional policy makers and other challenge owners. The team presented both the challenge and the SimpliCITY project to the participants and had first conversations about both the platform and on technology implementation details of the platform and a token solution. There were also further occasions like the “IMM goes South” kick-off event on the 26th of March in Graz, where the briefings were presented to other interested groups like makers again.

From June 25th until June 28th, another event called “1. Future Tech Bootcamp on AI, IoT & Blockchain”² of the IMM format was hosted, which is from its characteristics similar to a hackathon. It was an intensive 4-days co-creation session with focus on IoT, artificial intelligence (AI) and blockchain. The event enabled industry and makers to co-create together with the support of tech experts and with the help of innovative tools and infrastructure (developer kits, chips, access to rapidM2M technology, LoRaWAN, cloud, relevant data and blockchain platforms and the electronics laboratory of the FH St. Pölten, etc.) new IoT, AI & blockchain solutions with real practical relevance. The challenge of SimpliCITY-challenge was presented there to more than 60 participants.

² 1. Future Tech Bootcamp on AI, IoT & Blockchain; <https://www.industrymeetmakers.com/blog/2019/7/16/1st-future-tech-bootcamp-on-ai-iot-and-blockchain>, 27.07.2021

Participation of SimpliCITY in a hackathon organised in Sweden

On the 29th of March 2019 from 9am to 5pm, the Sustainability InnoCenter Uppsala (working together with Uppsala University and the Center of Sustainable Development (CEMUS)) organised a sustainability hackathon event in Uppsala. Participants of the hackathon addressed the following questions:

- Are you interested in contributing to a more sustainable society?
- Do you want to come closer to renown companies and experts working with sustainability?

The sustainability hackathon started with a number of presentations and a panel of sustainability experts. Then, the hackathon challenges were presented. The SimpliCITY project team presented one of them with the underlying question: How to hack growth for sustainability incentivisation platform? Hackers needed to come up with content for the SimpliCITY platform, a possibility to access multiple services on the platform and the creation of ideas about simplifying the consumer experience.

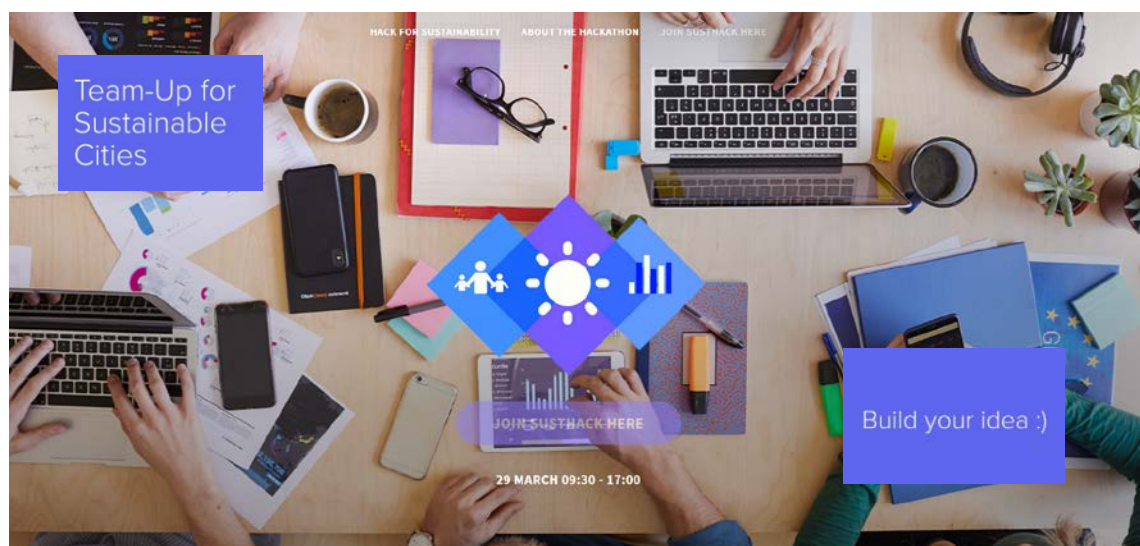


Figure 5: Sustainability Hackathon in Uppsala 2019
Source: <https://www.susthack.com>; 27.07.2021

Additionally, suggestions concerning a (sustainable) revenue model and a strategy for reaching consumers was requested. The Sustainability Hackathon enabled the generation of 35 creative solutions and ideas of green technologies and sustainably innovations that transcended areas of expertise and national borders to real-life scenarios presented by the companies and organisations. In the end, four teams were elected as prizewinners by the jury, whom among others, got offers of internships at Vattenfall, business guidance from Drivhuset and an opportunity to assist the Swedish CleanTech Challenges winners (e.g. others than the Hackthon finalists) to London's

Global final. In addition, more than 10 teams were supported in the further development of their ideas in the future with other possible internships.

Lessons learned: Use of open Innovation formats, such as hackathons

- Hackathons are a useful format as an add-on for the SimpliCITY aspirations. External parties deliver valuable input and fresh ideas and, they offer new background and proficiencies, with which-tackle SimpliCITY related challenges from different angles. The limited, but intensive time slots of hackathons allow a deep dive into the presented briefings and results, often in focused concepts or prototypes
- The feedback regarding the SimpliCITY briefing (in its different versions) was above average and gave as the confirmation that we are on the right track with regard to hackathons. The flexibility of the format will give us the chance to participate also in upcoming hackathons in both the pilot cities and locations outside of them.
- The expertise of people participating in hackathons depends highly on the proposed theme of the hackathon. In order to gain more people with firm skills in blockchain, sustainability and incentivisation, a self-organised hackathon in Salzburg or Uppsala is conceivable.

2.2 Stakeholder mapping of Regional Sustainability Services (RSUS)

An essential part of the platform and app implementation process in the city of Salzburg and Uppsala was the building, development and expansion of the community. This community consists of different target groups, in general citizens, smart city managers and service providers, initiatives as well as NGOs. Therefore, the main goal of the mapping was to identify which multipliers are the most suitable for a broad community building.

In order to identify and map relevant regional sustainability services (RSUS) in an efficient and consistent way, an appropriate process with a clear method was needed. Therefore, the task was to identify and cluster regional sustainability services in both pilot cities Salzburg and Uppsala. The services build the backbone of the project and therefore an accurate and sound selection is essential. The method and final outcome of this process is described in detail in the following chapters. The overall mapping process followed the standard process of defining, analysing, planning and engaging the stakeholders.

2.2.1 Definition of RSUS for SimpliCITY

Before the process could be started, a consistent definition of RSUS had to be found, in order that the whole SimpliCITY project team talks about the same thing and can exclude irrelevant concepts.

The term RSUS can be divided on the one hand into regional and on the other hand into sustainability service and stakeholders. For SimpliCITY, the decision to specify sustainability services in geographical terms was taken in order to keep the focus (at first) on the two pilot cities, Salzburg and Uppsala. Regionality refers to the origin of the respective product (e.g. Salzburger Milch) or service (e.g. bike map for the City of Uppsala) or to the sales market ("product/service comes from my region"). Besides the fact that regional products guarantee a lower transport effort, they also create added value that remains in the region.

The second essential part of RSUS form the sustainability services. Services are defined as intangible goods that arise when one economic subject performs a paid activity for another. Except for the intangibility of services, also inseparability, heterogeneity and perishability are key characteristics (Wolak et al., 1998). The counterpart to services are goods or products. While some companies are characterised as pure service providers, others offer a mix between products and services

Another essential component that services must fulfil is sustainability. Sustainability means to meet our own needs without compromising the ability of future generations to meet their own needs (Brundtland, 1987). The concept of sustainability understood as holistic approach, which focuses on three dimensions: ecological, social and economic.

Definition: In combination with the above outlined description of services, sustainability (or sustainable) services are...

...offerings that create either a positive impact in ecological and/or social terms or decrease negative environmental and/or social benefit for the consuming parties. In the project, the focus is such services within the three thematic areas: bike mobility, local food consumption and social inclusion, and within the regional boundaries of the respective federal state/county.

2.2.2 Identify stakeholder services

The first step in the mapping process was to set a common understanding of what stakeholders in the context of SimpliCITY are and how to identify relevant RSUS within the pilot regions.

McGrath and Whitty (2017) state that a stake is an interest in an idea, product, topic or project, and a stakeholder is subsequently the associated entity with a stake (interest) in the idea, product, topic or project. According to Littau et al. (2010), who investigated the classification of stakeholders, all definitions can be arranged into three groups: stakeholders with an interest-in or stake-in, an affect or is affected by an idea, product, topic or project and hybrids.



Figure 6: Process of identifying and selecting RSUs
Source: Diana Wieden-Bischof, 2021

Therefore, a set of search criteria was defined, which facilitate the identification of sustainable services. With the help of these criteria, the possibility to engage only those services that are relevant for SimpliCITY could be increased significantly.

Criterion	Description
<i>Regionality</i>	Service with availability (exclusively) in the pilot cities Salzburg and Uppsala
<i>Sustainability</i>	Service creates benefit in environmental and/or social term or decreases negative environmental and/or social impact for consumers
<i>Thematic focus</i>	Service within the three focus areas: bike mobility, local food consumption & digital inclusion
<i>Target group</i>	Service directly addresses citizens of the pilot cities
<i>Readiness</i>	Service is finished and usable for the end user
<i>Technical integrability</i>	Service can be part of the SimpliCITY platform or essential parts are integrable
<i>Digital component</i>	Service is not entirely physical, but at least some components are accessible via a digital medium (e.g. booking, map,
<i>Compliance with Smart city goals</i>	Service contributes to the formulated (sustainability) goals in both pilot cities
<i>Impact</i>	Service has a positive effect on environment and/or society

Figure 7: Definition of search criteria

Source: Bernhard Schrempf and Johan Rubbestad, 2019, p. 10; D.2.2.

Based on the listed criteria, a first screening of relevant RSUS was started individually in both pilot cities (Salzburg and Uppsala). In order to identify suitable RSUS, different sources like websites, various social media channels and events were screened, interviews with smart city managers and direct contacts to well-known service providers were conducted and Stakeholder workshops in the sense of a co-creation event with different companies, organisations and associations were organised. The result was a first list of potential services.

In the following, some assessment criteria were determined, to guarantee a structured documentation of the identified services. The criteria were transferred to an online Google Table sheet list and contains the following items:

- Name of service
- City
- Thematic service area
- Sustainability targets
- Impact/indicator
- Digital or analogue

- Description
- Technical requirements
- Link
- Commercial or non-commercial
- Contact person/owner
- Responsible for
- E-mail
- Already in contact
- Notes

Name of service	City	Thematic service area	Sustainability targets (based on)	Impact / indicator	Digital or Analog	Description	Link	Commercial service
Bike energy	Salzburg	Bike mobility	* Sustainable mobility (infrastructure)	CO2 emissions reduction	Analog	* Solutions for e-bike and e-cars charging systems to e-bikers, DIY bicycle repair shop, where you can get tools and tips to	https://bike-energy.com/	yes
Bike Kitchen	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* The City of Salzburg offers free public self-service bike stations. Is part of the Radikarte => With the rain radar, bikers can forecast	https://www.marksalzburg.at/projects/	no
Bike self-service stations	Salzburg	Bike mobility	* Sustainable mobility (infrastructure)	CO2 emissions reduction	Analog	* In 2018, the City of Salzburg will continue to support the purchase of weather-protected, vandal-proof bicycle parking facilities in	https://www.stadt.salzburg.at/internet/	no
Rain radar	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Digital	* The cycling map Salzburg was developed by the city and the CargoBike for free sharing. You can check online the required	https://www.wetteronline.at/vogelradar/	yes
Bike wheel trailers	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* The Mobilitätsratgeber (mobility guide) can be seen as a helpful	https://www.salzburg.at/service-tipp	no
Bike boxes (radbox.at)	Salzburg	Bike mobility	* Sustainable mobility (infrastructure)	CO2 emissions reduction	Analog	* With the planned S-Bike system, a further component is to be	http://www.radbox.at/de/start/index.asp	yes
Bike-App City of Salzburg (Radix Salzburg)	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Digital	* Developed in cooperation with Salzburg police, bike coding is a	https://www.radkarte.info/	no
Cargobike Sharing	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* Die Boten.at is the new messenger service in Salzburg	https://www.das-lasterad.at/verleihdata	no
Mobility guide (Mobilitätsratgeber Salzburg)	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* The aim of the bicycle check is to increase safety for cycling. If in this course the participants will be introduced to the practical and	https://www.stadt.salzburg.at/pdf/mobi/	no
S-Bike	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* Facebook page for bike cities to discuss about bike mobility and	https://www.stadt.salzburg.at/internet/	no
Bicycle Coding (Rad Codierung)	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* Food delivery service by bike. Private company	http://www.radinfo.at/service-erreichbar	no
Bike messenger service (Radbot Salzburg)	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* Radinfo.at is a webpage provided by the city of Salzburg offering	http://www.dieboten.at/	yes
Bicycle check (Rad Check)	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* When companies let their employees use the company	https://www.salzburg.at/service-tipp	no
Driving safety training and service Salzburg	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog	* A parking deck with access to mobility solutions such as car	https://www.salzburg.at/gemeinden/	no
Radwegverbesserungen Facebook Salzburg	Salzburg	Bike mobility	* Sustainable mobility (infrastructure)	CO2 emissions reduction (indirect)	Digital	* Rent e-bikes from a bike dock in Uppsala through an app. Pilot	https://www.facebook.com/groups/267	no
Food Ninjas	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Digital	* Rental bikes	https://foodnjas.at/	yes
Radinfo	Salzburg	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Digital	* Public do it yourself bike-service station for washing, cyclepump	http://www.radinfo.at/start/	no
Cycafforman	Uppsala	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog		https://www.shattoveriet.se/matcykel	no
Mobileteishus	Uppsala	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog		http://www.mymenysdesk.com/salpress	no
E-bikes	Uppsala	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Digital		https://se.arrowspeedbikes.com/uppasa	yes
Solar bike	Uppsala	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog		https://aktiviteteln.nu/cykel/	yes
Bike-Service Station	Uppsala	Bike mobility	* Sustainable mobility	CO2 emissions reduction	Analog		https://www.upsala.se/boende-sch.bj	no

Figure 8: Assessment criteria and collected services (extract) for bike mobility (Salzburg and Uppsala)

Source: Bernhard Schrepf and Johan Rubbestad, 2019, p. 13; D.2.2.

Afterwards, the identified services (in total 102 services - 61 in Salzburg, 41 in Uppsala) in the categories of bicycle mobility, local food production and consumption as well as social inclusion were not just listed but also examined and described in more detail (see Figure 9).

S1	Radboxen (Bike Boxes)
Link: http://www.radbox.at/	
Service provider: City of Salzburg	
Thematic service area: Biking	
Digital <input type="checkbox"/>	Analog <input checked="" type="checkbox"/>
Commercial <input type="checkbox"/>	Non-commercial <input checked="" type="checkbox"/>
Description: <p>The bike boxes of the city of Salzburg are a service for bikers, who need a weather-protected, vandal-proof bicycle parking facility in their everyday life. The boxes are located at strategically valuable locations, e.g. at the main railway station or at stations of the local railway stations and therefore beneficial for commuters (but not only). Bikers can rent a box for one year (depending of the respective suppliers), however, short-term booking models are already available at federal state level. An online map shows the locations and availability of the bike boxes, gives information concerning the price and offers a direct link to the booking platform. In the case of an already booked box, bikers can subscribe to a waiting list. Overall, the bike boxes offer the following advantages: promotion of bike & ride, increased comfort for cyclists, theft and vandalism protection for bicycles and accessories, weather protection for bicycles and accessories, located where public transport stops, uncomplicated handling and quick information for rent.</p>	

Figure 9: Service description

Source: Bernhard Schrempf and Johan Rubbestad, 2019, p. 16; D.2.2.

After the first collection of the RSUS and after the descriptions were done, workshops followed, where the services were analysed and evaluation criteria that could be applied to all stakeholders invented.

The first workshop took place during the second consortium meeting in Uppsala (March 2019). The aim of this workshop and the related discussions was to come up with a concrete plan and detailed criteria to decide on those services that will find their way on the platform. This means, those services have enough potential to be (digitally) incentivised. Furthermore, it was decided that not only public (city) services will be included in the platform, but also private and commercial services of all three categories (bike mobility, local food consumption and social inclusion) in order to guarantee openness, transparency and equal opportunities for all service providers.

A second workshop was held in course of the pilot planning workshop in Salzburg (February 2020). Based on the discussions held in Uppsala, the output of this meeting was the assessment of selected services based on the following criteria:

- Customer benefit
- Service contribution to smart city goals

- Readiness of service
- Existence of service in both cities
- Evaluability/documentability
- Baseline data
- Intensity/extent of integration

The output of this workshop was a matrix (see Figure 10) that highlights the current status of the services and their potential for further integration.



Figure 10: Output matrix of service assessment

Source: Bernhard Schrepf and Johan Rubbestad, 2019, p. 32; D.2.2.

In the end, the listing of stakeholders provided a first overview of the number of services associated with each topic (i.e., biking, social inclusion, and local production) in each city and built the basis for the closer analysis of the stakeholder and selection of the most suitable engagement methods for each target group. Altogether, 114 different RSUS were involved in pilot phase 1. These RSUS could be clustered into 7 different categories (see Figure 11). This number of involved RSUS is more than five times of the goal reach of SimpliCITY.

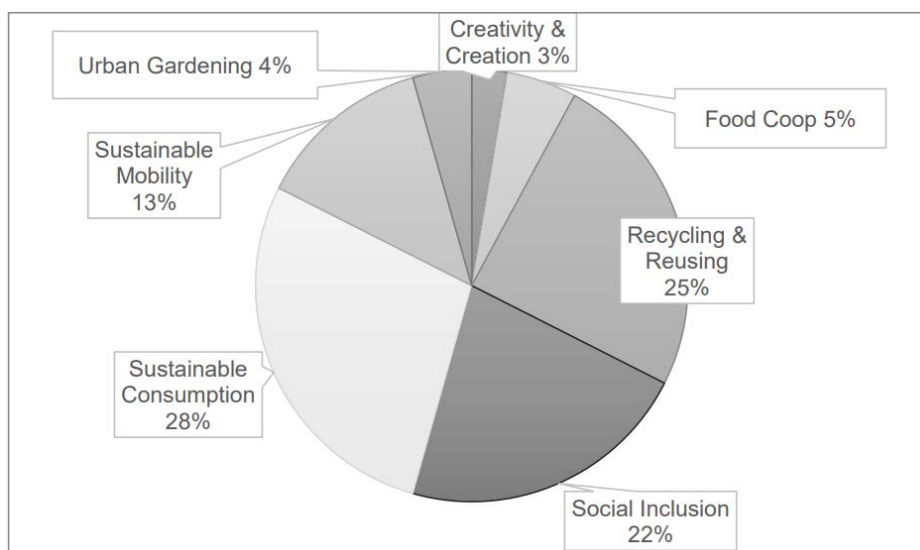


Figure 11: Categories of RSUS involved in the “Stadtmacherei”-web platform and app

Source: Claudia Luger-Bazinger et al.2021, p. 16; D. 7.2.

Lessons learned: Identify stakeholder services

- In Salzburg and Uppsala exist several services that fit perfectly into the SimpliCITY project framework. As argued in the proposal, there are (city) services that are ready from the technical side, but still lack a broad user base. First research and discussions have revealed that this is mainly due to the fact that they are still unknown by the majority of citizens (see Deliverable regarding User Requirements).
- The structure of the services is different in the cities. While it was easy to come up with city services of the City of Salzburg (especially for biking), most of the services available in Uppsala are offered by private service providers and usually, one service provider offers one service. The City of Salzburg offers several services, what makes it easier to clarify different terms, because the requirements are the same, whereby different providers tend to various ones.
- While the focus regarding the service selection and listing for the first pilot lied basically on bicycle mobility that had to be reconsidered, mainly because of missing services regarding bike mobility in Uppsala and the “over-supply” by other projects in the city. Therefore, services of all three areas of focus will be part of the first pilot, but with themed weeks.
- Most of the services (still) have an analogue component or they are completely analogue. They are usually harder to integrate in a proper manner (e.g. use digital features), because citizens mostly have to go to a physical place to use it.

2.2.3 Analyse stakeholders

In this section, we describe how the analysis of the stakeholders and the planning of their engagement was implemented. The first step of the analysis involved establishing coherent evaluation criteria that could be applied to all stakeholders. The following evaluation criteria used are based on the approaches by (e.g.) McGrath and Whitty (2017), Jepsen and Eskerod (2009), Achterkamp and Vos (2008) or Mitchell et al. (1997). The way the results are presented follows the recommendations by Andersen et al. (2004).

Services (indirect criterion)

This criterion describes the number of sustainable services that the stakeholder owns and is willing to integrate into the app. The number is mapped in whole numbers. The services is labelled as indirect criterion, as it is not weighted in the subsequent process and only functions as a qualitative criterion to inform the engagement plans.

Network

This criterion considers the size of the network of the respective stakeholder; the more extensive the network, the larger the community that the stakeholder can mobilize and the higher its visibility. The criterion is rated on a scale from 1 (small network) to 3 (extensive network).

Engagement

Engagement is a measure that describes how active the stakeholder is in the city (based among others on the number of yearly events, outreach activities, etc.). The criterion is rated on a scale from 1 (low engagement) to 3 (high engagement).

Visibility

The criterion describes how perceptible the stakeholder is in the city when actively reaching out to the community. This criterion is closely related to the network and engagement but not directly dependent on either. The criterion is rated on a scale from 1 (low visibility) to 3 (high visibility).

Support

The support refers to the level 9 of activity of the stakeholder in the SimpliCITY project. The level of support was determined based on the activity level in the workshops and solidified through subsequent individual discussions with the stakeholders. The criterion is rated on a scale from 1 (little support) to 3 (full support).

Commitment

The criterion is evaluated by how much the stakeholder has committed to participate in the app. On the one hand, this criterion is impacted by a signed declaration of consent and cooperation agreement. On the other hand, the subsequent discussions also shaped this commitment. The criterion is rated on a scale from 1 (low commitment) to 3 (broad commitment).

Impact

The impact describes how much influence (positive or negative) the stakeholder can exert on the project's outcomes. The criterion is rated on a scale from 1 (low impact) to 3 (high impact).

Intensity (indirect criterion)

The intensity refers to the number of exchanges between the project team and the stakeholder, which is related to the commitment criterion but is more concerned with the lived practice and the actual number of interactions. The criterion is rated on a scale from 1 (low intensity) to 3 (high intensity). The intensity is labelled as indirect criterion, as it is not weighted in the subsequent process and only functions as a qualitative criterion to inform the engagement plans.

Role (indirect criterion)

The criterion describes the position of the contact person in the stakeholder organisation. The role is essential as representatives from a management level can make more dependable and reliable decisions, thereby increasing the commitment to the project. The criterion is rated on a scale from 1 (employee) to 3 (decision-maker). The role is labelled as indirect criterion, as it is not weighted in the subsequent process and only functions as a qualitative criterion to inform the engagement plans.

Contribution

This criterion is based on discussions with stakeholders regarding their active contribution to the project. Specifically, this shows whether the stakeholders

1. are willing to plan and offer an individual tour
2. can acquire additional services (and would like to do so)
3. would like to develop facts and quizzes
4. want to become a point of interest
5. want to provide incentives for the users
6. actively disseminate the project
7. are only interested in exchange
8. want to appear exclusively in the service listing.

The results are listed in tables.

Name	Field	Service (indirect)	Network	Engagement	Visibility	Support	Commitment	Impact	Intensity (indirect)	Role (indirect)
name of stakeholder	Thematic field	Number of relevant services	Size of network	How active is the stakeholder in the city?	How visible is the stakeholder in the city?	How active is the stakeholder in the project?	Level of commitment of stakeholder	Impact/Influence on the outcomes of the project	Intensity of exchange	Role of contact in the institution
Karl Talham	Local consumption	1	1	1	1	1	1	1	1	1
	Local consumption	1	1	1	1	2	3	1	1	1
	Local consumption	1	1	3	1	1	1	1	1	2
für Stadtplanung und Verkehr	Local consumption	1	1	1	1	1	1	1	1	2
	Local consumption	2	3	2	1	3	3	2	2	1
	Local consumption	7	3	3	3	3	3	3	3	1

Figure 12: Screenshot of results of the criteria evaluation

Source: Nina Mostegl et al., 2021, p. 13; D. 6.2.

Next, a weighting system was incorporated to account for the linkages between the criteria and avoid a disproportionate impact of a single criterion on the stakeholder ranking. For this purpose, three main criteria named legitimacy, importance and outcome were defined which weights from 1 (low weight) to 5 (high weight).

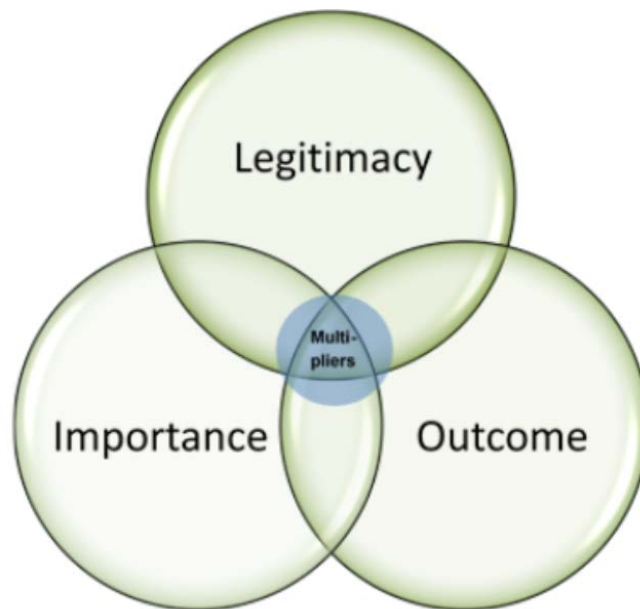


Figure 13: Interaction of the three main evaluation criteria that determine the key multipliers for the project
Source: Nina Mostegl et al., 2021, p. 10; D. 6.2.

Legitimacy

This main criterion determines if a stakeholder holds an influential position with a strong legitimacy within the city of Salzburg. Legitimacy consists of the criteria network, engagement and visibility, whereby visibility is the highest weighted criterion (weight of 5), followed by network (weight of 3) and engagement (weight of 2).

Importance

This main criterion defines the importance of a stakeholder for the project. The aspect entails the impact of the stakeholder, its commitment and the direct support. The support is the highest weighted criterion (weight of 5), followed by impact (weight of 3) and commitment (weight of 2).

Outcome

This main criterion describes how much the stakeholder increases the output of the project. For this aspect, all contribution criteria are weight against each other. The most important contribution are the tours (weight of 5), the provision of facts and quizzes (weight of 4) and the willingness to allocate incentives (weight of 4). POIs and dissemination are weighted as 3, the service listing as 2 and exchange only is weighed as 1.

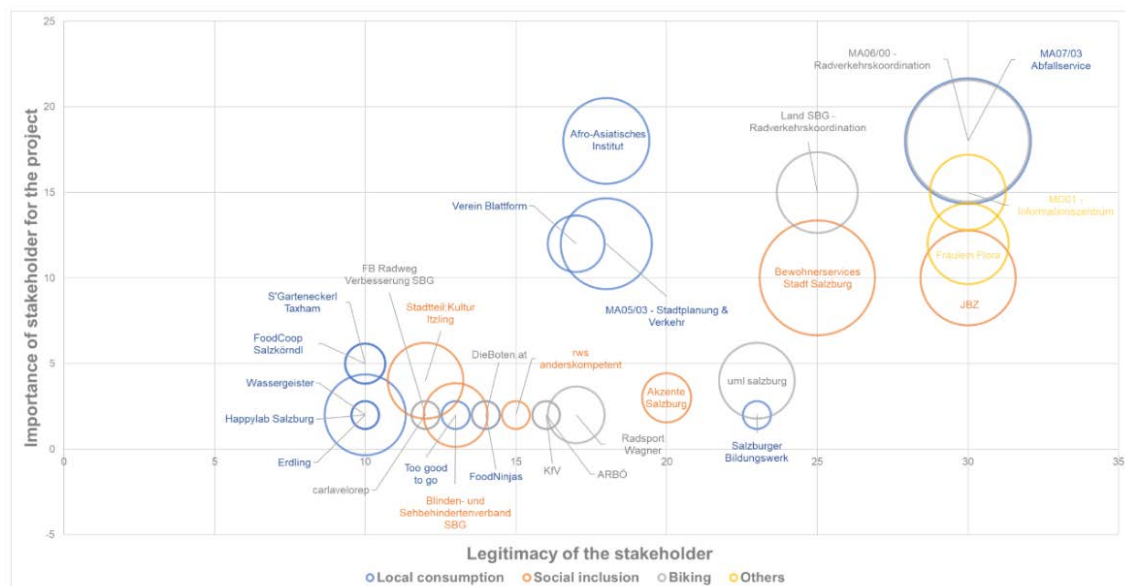


Figure 14: Graphic illustration of the weighed stakeholders

Source: Nina Mostegl et al., 2021, p. 16; D. 6.2.

Figure 14 gives an overview of the weighted results per stakeholder and main criteria. The criteria are additionally assigned to axes (x, y and z values), from which the graphical representation of the stakeholder mapping is derived.

- The **legitimacy** of a stakeholder is shown on the x-axis. This means that the further a stakeholder appears on the right side of the graph, the higher the legitimacy and the influence of a stakeholder.
- The **importance** of a stakeholder for the outcome of the project is depicted on the y-axis. The higher the stakeholder rises on this axis, the larger the impact of its contribution to the project and the more important its involvement.
- The **outcome** is associated with the z-value, which is related to the size of the stakeholder circle. The larger the circle around a stakeholder, the more output (in terms of content development) it can generate for the project.

Subsequently, the stakeholders with the highest multiplier factors are the ones listed in a large circle in the general area of the top right corner of the graph.

2.2.4 Plan stakeholder services

Based on the identification of stakeholder services and the stakeholder mapping, the project partners developed an engagement plan that aimed to maximize the community outreach through a well-structured and coordinated multiplier cooperation and content development.

A lot of different (online) meetings and (transfer) workshops were therefore organised from the beginning on with the expected direct outputs of stakeholders...

- featuring individual services,
- featuring point of interests,
- creating tours or quizzes by stakeholders,
- providing incentives (planting trees, bike repair, bicycle box, vouchers),
- disseminating the project (results, tours, ...),
- organising an event or/and collaborating within events,
- rising awareness for the platform and app.

2.3 Service provider engagement process

Stakeholder engagement can bring a multitude of benefits. For SimpliCITY, an own methodology, which can be seen as the SimpliCITY service provider engagement process was invented. It is becoming increasingly important during a product development process. Engagement not only increases the acceptance of the product, but also enhances its effectiveness by focusing on the needs and concerns of key stakeholders. Due to the diverse approaches and the manifold formats available, this process needs to be planned in detail and executed with special care. It consists of the following stages: analysis and listing, dialogue, enrolment, network and community practice. The results mirror and summarize strongly the interests of the stakeholders and is described in the following.

2.3.1 Involvement of stakeholder

A vital part of the SimpliCITY project is the involvement of relevant stakeholders in the pilot regions Uppsala and Salzburg. The term involvement refers to the creation of the platform together with the stakeholders on the one hand and on the other hand on the needs of stakeholders and the integration of their services into the platform.

In general, the involvement of three stakeholder groups is crucial for the success of the SimpliCITY platform: (1) citizens, (2) service providers, and (3) city administration. This section focuses on engaging activities and stakeholder dialogues with service providers only.

Stakeholder engagement and its benefits

Gould (2012), based on an extensive literature review, concludes that stakeholder engagement establishes tighter shareholder networks that allow for closer cooperation and the development of shared goals and values, as well as a mutual understanding of all parties involved. This common ground increases trust between stakeholders and enables the implementing organisation to access more and also often concealed information and discover the individual needs and concerns. Paskaleva et al. (2015) elaborate that well-connected stakeholders, in addition to locally specific knowledge, hold a thorough understanding of local needs, and have access to local assets and resources.

Examples for benefits of stakeholder engagement

- Informed decision-making (*based on needs and concerns of stakeholders*)
- Improved quality, efficiency, and effectiveness of the platform (*making use of local knowledge and assets; competitive advantage*)
- Reliable network and community (*snowball-effects*)
- Increased reputation
- Better risk management (*identify risks in advance and react to them*)
- Obtain a social license to operate (*higher acceptance of platform*)
- Avoidance of duplication (*saving time and money*)
- Win-win situations for all parties involved
- Increased trust and accountability

Figure 15: Examples adapted from Gould (2012), Hall (2019), Jeffery (2009), Paskaleva et al. (2015) and Taysom (2019)

Source: Nina Mostegl et al. 2021, p. 7; D. 2.3.

Furthermore, the engagement process entails certain costs that need to be taken into account. Jeffery (2009), in accordance with Gould (2012), Paskaleva et al. (2015), and Taysom (2019), states that costs of engagement are mostly related to time, effort, and resources. In addition, the authors also raise awareness of two significant barriers to stakeholder engagement: imperfect information and conflict. Engagement processes can never be perfect in a sense that it is mostly not feasible to include all stakeholders (representativeness and consistency in participation), multiple, divergent information may lead to indecision, and the reliability of information needs to be considered. Conflicts may arise due to a multitude of reasons. Being aware of different agendas, needs, and ideas of participating stakeholders is necessary to resolve and prevent conflicts, yet requires thorough preparation.

Examples for costs of stakeholder engagement

- Time
- Effort
- Resources
- Imperfect information
- Conflicts

Figure 16: Examples adapted from Gould (2012), Hall (2019), Jeffery (2009), Paskaleva et al. (2015) and Taysom (2019)

Source: Nina Mostegl et al. 2021, p. 7; D. 2.3.

2.3.2 Goals of the stakeholder engagement process

The main goal of the stakeholder engagement process in the project SimpliCITY was to systematically identify, explore, and integrate the views of those relevant to this project. Through the integration of stakeholders at an early stage, we aimed to build upon the stakeholders' needs, knowledge, expertise, skills, and assets and create win-win situations for all.

Only through cooperation and stakeholder engagement is it possible to develop a relevant, trusted, and supported product. Ultimately, the objective of the engagement process was to establish a network and subsequently, a community of practice that carries and supports the platform well-beyond the timeframe of the project.

The expectation of the engagement process was an in-depth and active involvement of the relevant stakeholders and to move beyond the simple enlisting of stakeholders and reach a meaningful engagement and co-production process.

2.3.3 Methodology of the stakeholder engagement process

Networks of stakeholders are complex and nuanced. Hence, to efficiently and effectively involve service providers and develop the envisioned community of practice, the process contained three concrete steps (analysis and listing, dialogue, enrolment), which laid the basis for the network development (Figure 17). The process is based around the question of how to incorporate service providers in a way that provides better access to and inclusion into the platform, but also that empowers the stakeholders to act as a catalyst in transforming their services.

Throughout the process, the key principles applied are openness (e.g., the regarding scope of participation and contribution, the impact of contribution or the access to information) transparency (e.g., clarity of goals), fairness (e.g., offering the same opportunities to all providers), equality, trust, respect, accountability, and democratic decision-making.

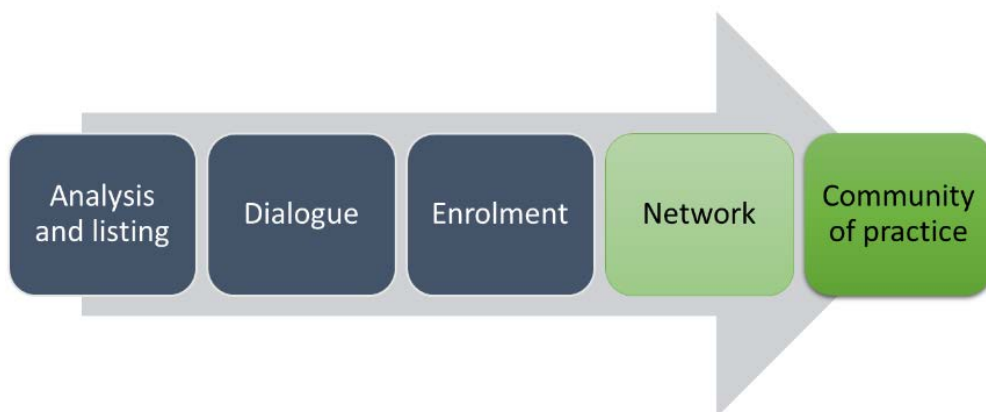


Figure 17: Stakeholder engagement process

Source: Nina Mostegl et al. 2021, p. 9; D. 2.3.

Step 1: Analysis and listing – collecting service providers

The first step of the process included a thorough analysis and listing of existing and active service providers in both cities. The analysis and listing approach is outlined in detail in chapter 2.2.2 and 2.2.3 above.

Lessons learned: Analysing and listing of stakeholders

- The step of analysing and listing stakeholders clearly set the stage for an appropriate stakeholder involvement. Investing time into this task and developing a concise list was well-worth the resources and is considered the only way to allow for transparency and inclusiveness throughout the process.
- Gathering sufficient background information about the services in advance also enables the preparation of targeted and well-structured engagement formats. This task prepares for diverging points of view and allows for risk minimization.
- We learned that even in smaller organisations, multiple people may be responsible for a service. Hence, inclusion goes even further than expected and extending an invitation to all relevant stakeholders is crucial to start building trust.

Step 2: Dialogue – setting up the service provider workshops

The second step of the process entailed the dialogue activities with service providers. The activities were understood as mediation and translation between the potential network actors to bring together those stakeholders that support the goal of creating a new, dynamic, and viable network and community of practice. Ultimately, the activities aimed to...

- introduce the project to relevant stakeholders
- inform stakeholders about the platform's objectives, value, and potential levels of integration
- connect with stakeholders to understand their needs, prerequisites, demands, and need for support regarding the platform,
- consult the service providers on platform formats
- verify stakeholder list and expand through a fan-out method³, and
- build mutual trust and interest in the platform
- for the platform and app.

Based on the results of step one, all relevant stakeholders could be easily picked from the list and subsequently, a suitable engagement format could be selected for the dialogues. As not all the formats apply to every stakeholder group, the following Figure 18 is divided into three sectors that each project a target group: citizens, service providers and city administration. The formats that apply to more than one group are mapped in the overlapping sectors. Relevant are formats associated with the group of service providers, highlighted in orange. As the stakeholder listing indicated that the cities differ in the types and number of services available for each focus topic, the workshop approaches varied.

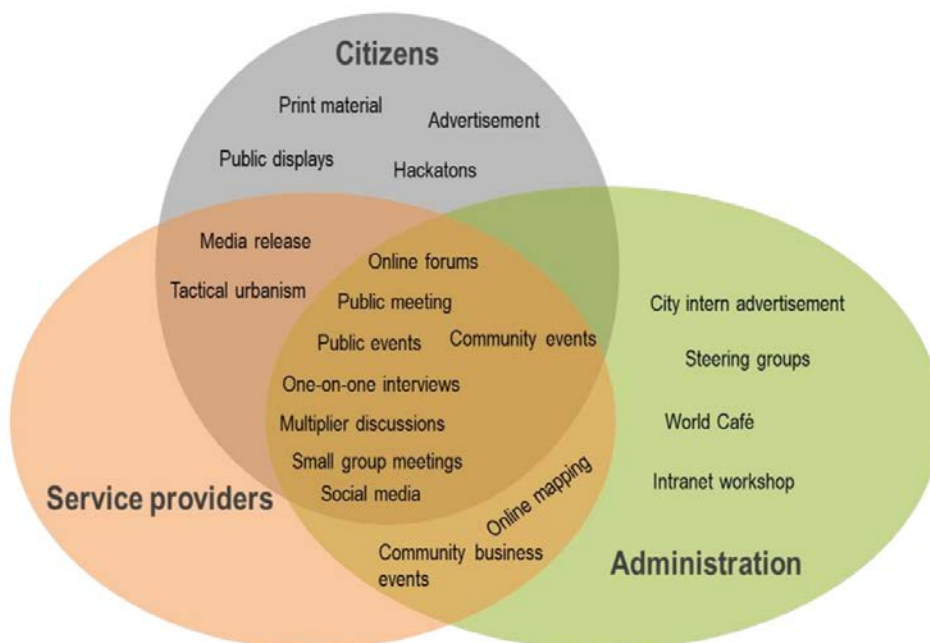


Figure 18: Suitable stakeholder engagement methods

Source: Nina Mostegl et al. 2021, p. 13; D. 2.3.

³ In a fan-out method, participating stakeholders identify further networks or additional stakeholders to engage in the process and give an insight into potential social, environmental, and economic impacts of the platform.

The criteria for inviting a service provider to the workshop were the availability of the service (active and readily available), local context (related to commercial services), and contributing to sustainability in the cities.

Driving questions for the dialogue activities

- What is the status of the services (organizational, technological, user, usage, data collection, evaluation of data, etc.)?
- If and how do the providers aggregate users?
- What challenges and barriers do the services face?
- What ambitions and goals do they hold for the future (further development; increase users or intensify usage; technological approaches, etc.)?
- What are their needs and requirements for participating in the platform? (formats, technological, incentives, gamification, nudging for their services)

Figure 19: Driving questions for the dialogue activities

Source: Nina Mostegl et al. 2021, p. 11; D. 2.3.

The key principles for the workshops were to generate the best interest for the community and the platform, to create an open, honest, and meaningful exchange, to be inclusive, to engage stakeholders as early as possible, to be accurate and easy to understand, and to be transparent in the decision-making process for the platform participants.

Lessons learned: Stakeholder dialogues

- Choosing an appropriate workshop format strongly depended on the number of participating service providers and their backgrounds. Different approaches were needed for Austria and Sweden. Hence, investing time in identifying suitable formats for each stakeholder group was a necessary task to generate the required level of flexibility to adjust and shape the formats as needed.
- Knowing the starting point of your participants (level of knowledge about platforms, interest in digital services, etc.) and their potential agenda (what do they seek to achieve in the workshops) improved the definition of driving questions. The driving questions were crucial in developing suitable workshop goals, objectives, and discussion rounds.
- Developing a detailed workshop plan enabled the moderator to stay on track with their agenda and allowed for a check-up during the workshops to ensure the best output for the project and the platform
- Even throughout the workshops, it may be necessary to adjust the work plan. Flexibility is key.

- It is important, that all participants and the project team gain by taking part in the workshops. Being aware of and communicating advantages for participants and the project generates incentives for participation.
- As the workshop dates overlapped with vacation periods, it was necessary to hold more formats than primary intended. Despite the increased effort, it is crucial to be inclusive as possible, even if this entails face-to-face meetings with individual providers. This approach, however, is only suitable if there are a few number of providers.

Step 3: Enrolment – signing up for the platform

The third step of the progress included the enrolment of service providers to the platform. For the enrolment, a letter of intent was developed, which all participants were asked to fill out and return to the project team. With this letter, the service providers state their interest in cooperating with the SimpliCITY project and further declare on which level their service should be integrated into the platform.

- On level one, the service is integrated with its basic information (what does the service offer, when, where and how can it be used, link to the homepage or further information on the service).
- On level two, the service is integrated with its basic information and can (in the two pilot phases) carry out challenges together with the project team and use other incentive methods of the platform.

For a streamlined enrolment process, participants also received a fact sheet document by mail, which aimed to collect the first information regarding the services and first ideas concerning challenges and incentives. The fact sheet asked the respondents to specify the organisation, name and type of their service, content persons (content, technical, others), content and aim of the service, number of users (optional), reach on online channels, planned events 2020 and 2021, and potential ideas for own incentives and challenges.

Lessons learned: Enrolment

- It is crucial to send out meeting minutes shortly after the workshop. This will remind the participants of the agreed steps and enhances the possible enrolment.
- As enrolment to the platform was slow in Austria, reminders were necessary to retrieve letters of intent. Despite an email reminder, an additional phone call will be for encouragement and proper follow-up.
- In the phone calls, we will work more closely with the advantages that the platform will provide to service providers. Generating an incentive for them for participating through joint value creating may further enhance enrolment.

- Investing resources in this enrolment process is deemed crucial as it will contribute to the development of trust and the establishment of a strong network and, subsequently, a well-working community of practice.

Network – creating a first network as a basis for the community of practice

The network is a natural result of the previous three, active steps of the process. The network results through the enrolment of service providers to the platform and requires proper management, information, and exchange strategies. Only through these approaches, it will be possible to develop the envisioned community of practice. To foster, strengthen, and expand the network, each city aims to conduct further engagement formats to exchange with the service providers, involve them in the improvement and expansion of platform formats and functions, and test its functionality. In addition, these formats aim to increase the snowball effect of the network and to encourage active service providers to engage further stakeholders. The network is the first stage of the envisioned community of practice (in which participants are thought to learn from each other and identify others who work on similar issues and ideas).

Community of practice – the lasting community for the platform

The establishment of a lasting CoP is the envisioned end-product of the stakeholder engagement process and is likely to allow for the continuity of the SimpliCITY platform beyond the project frame. Figure 20 lays out the envisioned characteristics and the purpose of the SimpliCITY CoP.

Characteristics and purpose envisioned for the SimpliCITY CoP

The SimpliCITY CoP shall

- be an **informal, voluntary network** within a predetermined group of individuals (i.e., service providers for biking, social inclusion, and local consumption services), which joins in the development of the platform.
- **contribute** resources, concerns, ideas, needs, experiences, good practices, and knowledge through and based on their services.
- consist of **active and responsive service providers** who share the common goal of fostering sustainable living in the two pilot cities through their services. The community feeds from the passion of its members.
- **strengthen** the sense of a **shared passion, purpose, and value**.
- **regularly communicate and interact** with each other, provide mutual support, and subsequently learn how to advance their services based on the needs of citizens. This approach generates new knowledge, which the members will disseminate to their networks.
- **enable** exchanges, pool, create, filter, and retain tacit / experiential (rather than just explicit) knowledge, amplify ideas, and encourage and motivate people to enhance the quality of their work.
- be **responsive to the needs of all its members**.
- be **dynamic** and will allow for a shift in member involvement over time.
- , despite its informal character, be **directly linked to and (partially) led by the participating cities**. The long-term direction of the CoP will require resources such as time, budget, support, and suitable technologies that cover different means of communication, as well as leadership, which provides (some) of these resources and follows a more or less flexible communication strategy.

Figure 20: Characteristics and purpose of the SimpliCITY CoP

Source: Nina Mostegl et al. 2021, p. 12; D. 2.3.

2.3.4 Overall findings

The following overall findings and lessons learned can be drawn from the engagement process so far:

Lessons learned: Overall findings

- The prior definition of the stakeholder engagement process enhanced the experience of engagement throughout the project and provided a solid framework for application.
- We found that it was no particular challenge to reach broad stakeholder participation in the workshops, despite the lack of prior knowledge of the platform. However, keeping the stakeholders engaged and reaching enrolment requires a proper strategy and resources to follow up with participants.
- Generating a shared understanding, developing joint values, and conjointly working towards the improvement of a product with only a few participants and then fanning-out to others and progressing into the sense-making process was found to be particularly valuable.
- Trust takes time to develop. Investing time in follow-ups and face-to-face discussions enables even further snowballing effects of the network.
- Despite different approaches in both participating countries, the project participants gained extensive knowledge from each other and the exchange was fruitful on all levels

2.4 Game design elements in non-game context

SimpliCITY operates with effects of gamification in order to engage citizens in sustainable behaviour. The main goal of gamification, thus the implementation or addition of game design elements in real contexts for non-game purposes, is to promote citizen motivation and engagement in relation to a specific activity and to further lead to specific behaviours or behaviour changes. Within the “Stadtmacherei city app” users can collect heartbeats for themselves, their district and their city by taking part in various activities (e.g. facing challenges, visiting hotspots, joining a discovery tour) and also gain badges and prizes by reaching a certain amount of heartbeats. The “Cykla med Pelle app” users can gather paw points (for more information, see also chapter 3: Pilot platforms).

Therefore, users are rewarded with heartbeats (Stadtmacherei Salzburg city app) or paws (Cykla med Pelle app) for an active mobility (i.e. bicycling) and for taking part in tours. The effectiveness of these gamification elements was evaluated within the SimpliCITY community. This information is relevant for the project team for further improvement of the app as well as for follower cities.

It is of interest how many heartbeats (i.e., gamified elements as rewards for activities) are collected by the users of the city app and how this is related to user characteristics (e.g., how many

kilometres men or women are bicycling), as it is likely that factors like gender or age influence the effect of gamification on engagement and behaviour (Kovisto & Hamari, 2014). As this also plays an important role in exploring user characteristics and activities, it is closely related to the first aspect in the evaluation, but provides a more holistic view of the app and its gamification elements, while the first aspect is more concerned with particular activities only, like bicycling.

Different tours are offered within both apps (i.e., a selected group of POI in a district that users visit with a set of clues); therefore, it is of interest how interesting these tours are to users. For tours, there is the possibility to rate tours after completing them. This offers additional information about characteristics of popular and less popular tours. An overview of the operationalisation is given in Figure 22.

What	Why	How	When	Area
rating of the tour	Information about which characteristics of tours are popular	rating system after tour and comparison of all available tours	Ongoing data collection	App
User characteristics and gamification elements	General amount of gamified elements collected, relation to user characteristics	Reporting amount of heartbeats for all users and for subgroups	Ongoing data collection	App

Figure 21: Operationalisation of effects of gamifications
Source: Claudia Luger-Bazinger et al., 2021, p. 14; D. 7.1

2.5 Digital nudging as a behavioural change approach

Cities that aim to achieve sustainable mobility behaviours can use different approaches - “hard” ones such as regulations, as well as “soft” behavioural interventions. One approach used within the project is nudging, which is a method of influencing people's behaviour in a systematic and predictable way. This is done without threat, prohibitions and economic consequences. Mostly it happens unconsciously and the interest of the people is taken into account or is even in the centre of attention.

Effectiveness of a (digital) nudging approach- Social comparison theory

The high use of mobile devices (smartphones, tablets) and increasing familiarity of citizens with mobile applications allows within SimpliCITY and the newly developed “Stadtmacherei Salzburg city app” to use digital nudging methods to steer citizens towards adopting more sustainable behaviours with an interactive and game-like approach. Here, the use of a mobile device is coupled with a voluntary behaviour change approach and motivational activities such as campaigns, challenges and competitions that make participation more attractive.

People tend to compare (social comparison theory - Festlinger, 1954) and evaluate their own opinions as well as their behaviour with that of other people. Therefore, social comparison also has the ability to influence behaviour and is one nudge that can be implemented with relative ease and with promising outcomes. The relevant group that the social comparison refers to is of interest and seems to be an essential element of the effect of the nudge.

We have used this approach within the app. A user assigns himself to a specific city district that he lives in (and further, that he collects various gamified elements - heartbeats, badges for). The group he feels connected to, can be therefore the specific city district a user chooses. This identification with the relevant group is fostered by special city district tours that are offered in the app and certain challenges that promote competition between city districts (e.g. a challenge about which district can ride more kilometres on the bicycle). Therefore, district identity (i.e., neighbourhood) seems to be a relevant group within the SimpliCITY community.

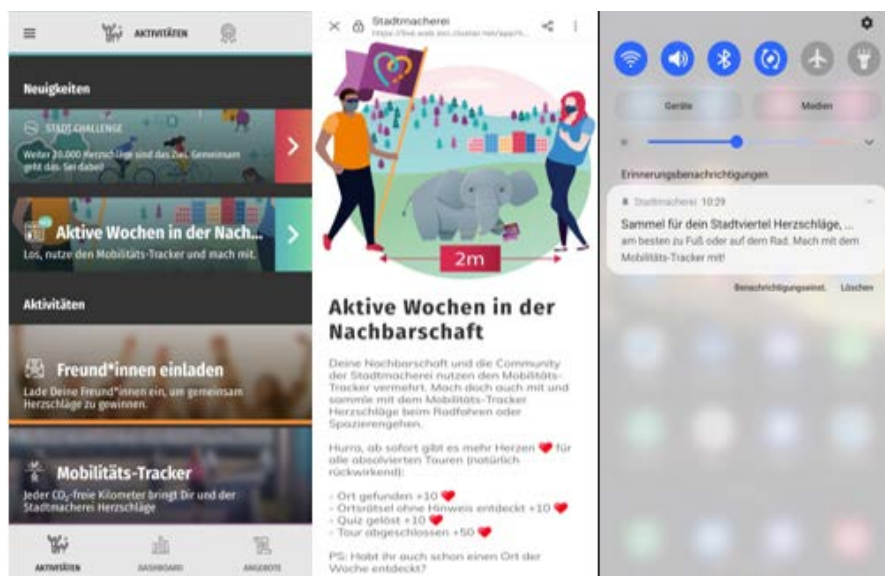


Figure 22: Notifications to motivate to change the cycling behaviour
Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

In order to foster sustainable behaviour, users received in spring 2021 over a period of two weeks, altogether six nudges (notifications), which focused on their own cycling behaviour compared to

other users and tried to get them to cycle more. These nudges based on social comparison indicate that other participants in the app are already showing more of the relevant behaviour. The SimpliCITY community was used here as a reference group.

Notifications

- Did you know that your neighbours are bicycling a lot? Use the mobility tracker today as well!
- Your neighbours are leaving you behind on their bicycles! Catch up and use the mobility tracker today!
- The community is collecting kilometres and heartbeats! Come along and use the mobility tracker.
- Did you already use your bicycle today? People of your district are cycling today, come along and use the mobility tracker.
- Collect heartbeats for your district by bike! Use the mobility tracker today.
- Your neighbours are using the mobility tracker, come along and cycle around the city.

Figure 23: Six nudges (notifications) sent out

Source: Claudia Luger-Bazinger et al. 2021, p. 18; D. 7.2

Using social comparison as nudging methods showed promising results (e.g. more users cycled during and after the nudging period) however, effects are not entirely clear yet. Taking into account context data (e.g. weather) could optimise the nudging method within the Stadtmacherei Salzburg city app.

What	Why	How	When	Area
Effect of social comparison, with interaction of identification with district	exploring nudging effects within SimpliCITY	Notifications that "X% of people have bicycled already z km this week" for experimental group, no notification for control group (comparison km bicycled, shops visited)	Pilot 2	App

Figure 24: Operationalisation of effects of nudging

Source: Claudia Luger-Bazinger et al., 2021, p. 17; D. 7.1

3 PILOT PLATFORMS

The purpose of this chapter is to provide a short overview of the activities related to the pilot demonstration in Austria and in Sweden and the steering clinics, content development and community building necessary to execute such pilots properly.

3.1 Stadtmacherei Salzburg city app, Salzburg

“Be mobile, enjoy locally, engage socially”, this is the “Stadtmacherei Salzburg City app”. Together with the accompanying platform (<https://stadtmacherei-salzburg.at>), it shows the colourful variety of sustainable offers and opportunities at a glance. Incentives, challenges, quizzes and tours thus increase users’ commitment to a sustainable lifestyle. At the same time, members of the community can collect heartbeats for themselves and their city. For Stadtmacherei, sustainability simply means treating the environment and the earth’s resources with care and respect. The app is available for download in the Google Play or Apple App Store⁴.

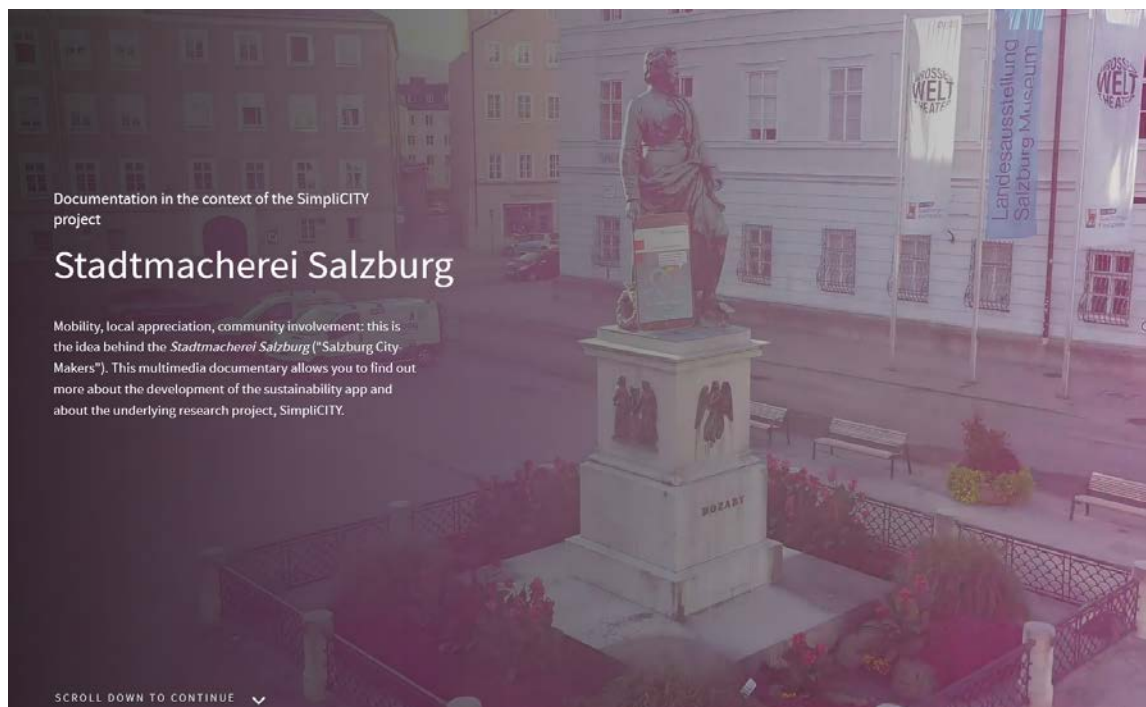


Figure 25: Scrollytelling video in the context of SimpliCITY

Source: <https://www.simplicity-project.eu/stadtmacherei-salzburg/>, June 2021

⁴ Stadtmacherei: Apple App Store: <https://apps.apple.com/at/app/stadtmacherei/id1494908831>; Google Play: <https://play.google.com/store/apps/details?id=com.polycular.simplicity>

After signing up, the users continue with a small self-assessment about their biking, consumption and engagement habits, so the app can suggest appropriate goals and activities for each user.

Die Stadtmacherei Salzburg.
Sei mit dabei.

Email-Adresse _____

Passwort (mind. 8 Zeichen) _____

☐ Ich stimme der **Datenschutzerklärung** zu.
☐ Ich stimme den **Nutzungsbedingungen** zu.

Optional
☐ Ich stimme der wissenschaftlichen Evaluierung im Projekt **SimpliCITY** zu.

Passwort zu kurz.

REGISTRIEREN

Ich habe bereits einen Account und möchte mich **Einloggen**.

Erzähl uns über Dich.

Fülle das **Profil** aus und wähle das **Stadtviertel**, das Du mit den gesammelten Herzschlägen unterstützen möchtest.

Profil

PERSÖNLICHE DATEN
 Mit diesen wenigen Informationen hilfst Du uns bei der Forschung und Entwicklung nachhaltiger Konzepte.

GESCHLECHT
 Bitte auswählen ...

ALTER
 Bitte auswählen ...

STADTTEIL
 Für welchen Stadtteil schlägt Dein Herz? Du hast die freie Wahl. In Stadtteil-Challenges trittet Ihr gemeinsam an.

MEINE HERZEN FÜR
 Bitte auswählen ...

NACHHALTIGES VERHALTEN
 Wenn Du möchtest, verrate uns noch ein wenig mehr von Dir.

AM TAG GEHE ICH
 Bitte auswählen ...

MIT DEM RAD FAHRE ICH
 Bitte auswählen ...

PRO WOCHE FAHRE ICH MIT DEM RAD
 Bitte auswählen ...

NACHHALTIGE SHOPS BESUCHE ICH
 Bitte auswählen ...

WEITER

Figure 26: Stadtmacherei Salzburg city app, Module: sign up, profile and self-assessment
 Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

3.1.1 Listing of sustainability services

The Stadtmacherei Salzburg platform and app offers a listing of local services in the areas of bike mobility, local consumption and products as well as (digital) social inclusion. Service providers are both official municipal institutions and services as well as services offered by third parties (NGOs, companies, associations). The services listed were on the one hand selected in course of the stakeholder mapping process and the workshops (see chapter 2.2.) and on the other hand, synchronised with the “Karte von Morgen” (“map of tomorrow”) from the local stakeholder Afro-Asiatisches Institut Salzburg (www.aai-salzburg.at). The map is an open, interactive online platform and users can independently add services according to the Wiki principle.

In the menu bar, users can select and filter between the three areas. Some POIs are also part of tours and special activities in the app. This gives users the opportunity to get to know new places, offers and services of the city of Salzburg.

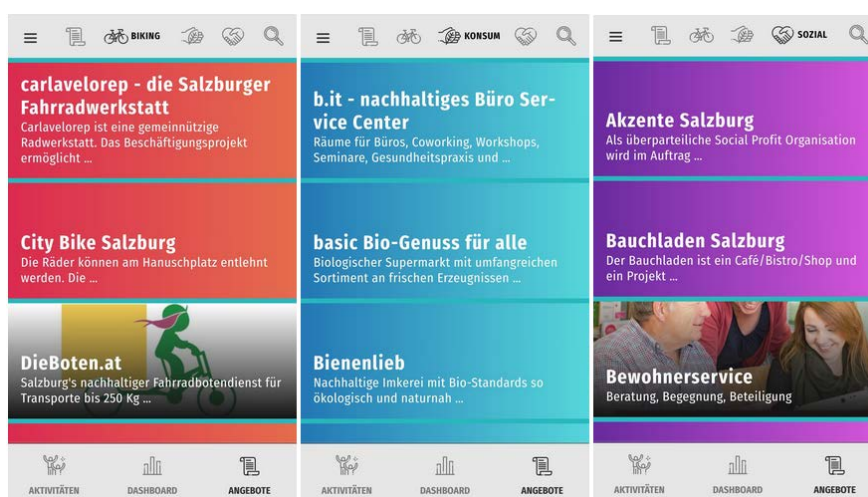


Figure 27: Service listing Stadtmacherei App und Website
Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

3.1.2 Content development

The finalized app and platform include many (interactive) functions that require the regular development of certain content. This content was developed during the project by the consortium on the one hand and provided by cooperation partners (local actors) on the other hand.

App function	Type of content	Extent of content
News section	<ul style="list-style-type: none"> - Updates on app content - Motivational blogs - General information 	Regular content (synchronized with platform)
Monthly topic	<ul style="list-style-type: none"> - Specialized focus topics - Facts of the month as introduction 	Monthly
Tours	<ul style="list-style-type: none"> - Tour routing (path) - Description of tour, including <ul style="list-style-type: none"> • Title, Type, Duration • Locations (latitude, longitude, location description or riddle title, description and hint, quiz question and answers) 	2 Standing tours 11 District tours (2 months) 2 specialized tours (2 months) 11 partner tours (2 months)
Points of interest	<ul style="list-style-type: none"> - Description of featured sustainability service 	Weekly (52 POIs)
Challenges	<ul style="list-style-type: none"> - Challenge details, including <ul style="list-style-type: none"> • Title, Type, Duration • Description, Badge, Reward 	1 City challenge (ongoing) 4 yearly challenges (3 months) 3 yearly biking challenges (4 months); Bi-monthly partner challenges (6); Monthly topic challenge
Surveys	<ul style="list-style-type: none"> - Scientific questionnaires 	Tied to start and end of pilot
Dashboard	<ul style="list-style-type: none"> - Presentation of essential information 	One time – automatic individual updates
Service listing	<ul style="list-style-type: none"> - Selection of services - Check of partner description 	One time per service Regular update of the list (synchronized with website)
Mobility tracker	<ul style="list-style-type: none"> - Description 	One time
Invite friends	<ul style="list-style-type: none"> - Description 	One time

Notifications	- Motivational notifications - Nudges	Regularly (also based on nudging strategy of Salzburg Research)
Feedback	- Description - Response to feedback	One time description development Regular feedback response (synchronized with website)
User profile	- Personal information of users - Selection of features based on evaluation criteria (Del. 7.2)	One time
About	- Description of SimpliCITY project	One time (synchronized with website)
FAQs	- Answers to most frequent questions	One time (update if necessary) (synchronized with website)
Imprint	- Disclaimer and contact information	One time
Terms of use	- Detailed terms	One time
Privacy policy	- Detailed policy	One time

Figure 28: App functions and scheduled content

Source: Nina Mostegl et al. 2021, p. 5; D. 6.3. – 6.5.

More precisely, the different activities for users offered by the “Stadtmacherei Salzburg city app” are e.g. challenges, tours arranged by the consortium or by partners or also points of interest. The activities are sustainable actions in which the user can participate and which are changing over time. Sometimes they are also time-bound activities.

Challenges

A challenge is an activity that is available for a restricted period and requires the participants to perform different activities to collect a certain number of heartbeats. For the successful participation in a challenge, the users will receive a reward. Rewards may either be a badge, incentives (e.g. tickets to museums, bike repair service...) or, for certain challenges, a ticket for the Stadtmacherei Lottery.

Two types of challenges exist:

- Personal challenges, for which users individually collect heartbeats and rewards/badges, are only available for the single user
- City challenge, for which the entire user community collects heartbeats and rewards become available if a certain number of collective heartbeats is reached. Ideally, the prizes can be enjoyed by the entire community (e.g., improvement to public spaces)

In addition, the challenges are divided into...

- ongoing challenges, which has no end date, just a heartbeat limit that can be renewed once reached.
- seasonal challenges, which reoccur based on the season.
- city district challenges, which aim to introduce users to sustainable services in all 24 city districts over the course of a year.

- biking challenges, which aim to motivate and nudge biking behaviour around the year.
- focus topic challenges, which correlate to the monthly focus topic and can also be supplied by partners.
- special challenges, which can be planned around larger events in the city.

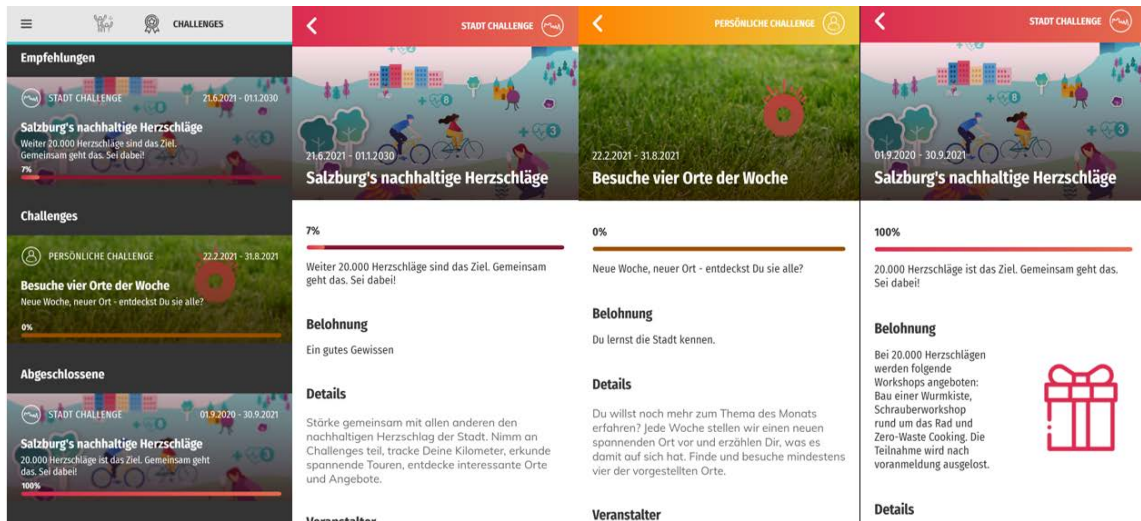


Figure 29: Stadtmacherei City Challenges and Personal Challenges
Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

Tours

A tour is an activity that is constantly available and can be started and completed at any given time. Exceptions to this rule are the “partner tours”, which may be restricted to a certain timer period as they are often linked to a specific challenge. A tour follows a predetermined, fixed route and consists of four to twelve location points. These locations are either revealed directly (by name and location) or described by a riddle – one approach excludes the other for the same location. Users then need to solve the riddle to discover the location. Clues are available for solving these riddles, but their use reduces the heartbeats gained. When users arrive at the correct location, it is described in detail to show its relevance for the respective tour and the Stadtmacherei. Users generate heartbeats for all visited locations, each riddle and quiz they solve and the distance travelled. Tours can only be completed once, but they may be paused and completed at a different time.

Four types of tours exist (the last three of which could theoretically be grouped into one main category – “time limited tours”):

- Ongoing tours, which users can start and complete at any point in time.
- Special tours, which are planned around larger events in the city and implemented by the consortium. These tours can be shorter than a month.
- City district tours, which feature two different districts at a time and are restricted to a

total of two months.

- Partner tours, which are independently developed by the partners.

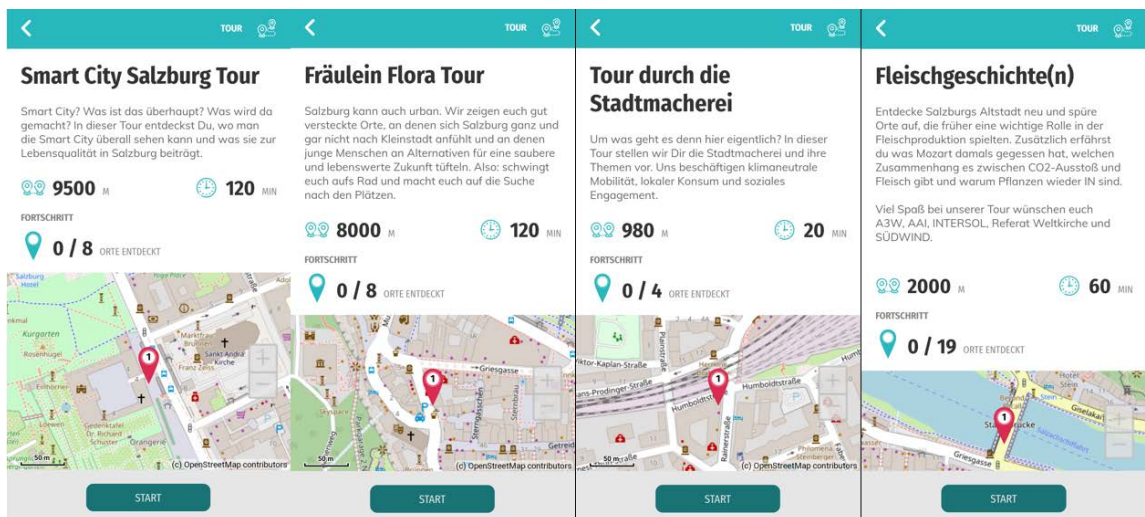


Figure 30: Various Stadtmacherei Tours

Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

Points of Interest



The points of interest present individual places of interest (hotspots) to the Stadtmacherei that generally deal with sustainability. It may therefore occur that the featured places are not included in the service listing. Each week, a new point of interest is presented. Users only see the location of the place, but only discover the place itself when they go to the location. The places correlate with the topic of the month and may also be provided by local stakeholders.

Figure 31: Stadtmacherei Point of interest of the day/week

Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

3.1.3 Stadtmacherei incentivisation system (heart points and badges)

For all activities and completed tours, users collect heartbeats for a common city-related goal, which is announced in the app.

Tour and discovery		i.e. Smart City tour	Points
+ 10	POI discovered	8 POIs	+ 80
+ 10	Riddle solved without using hint (additional to POI discovered)	2 Riddles	+ 20
+ 10	Quiz correctly solved	3 Quizzes	+ 30
+ 1	1 km in mobility tracking (tour related)	Mobility tracking (km)	+ 10
+ 50	Tour finalized	Tour finalized	+ 50
		Total	190

Figure 32: Stadtmacherei heartbeat system and example

The completion of a challenge is also often rewarded with a specific badge. A badge is a small token of appreciation that can be collected, but not traded or exchanged. In the Dashboard section, users can view their collected points and those of the entire community, as well as their special awards or badges for certain activities.

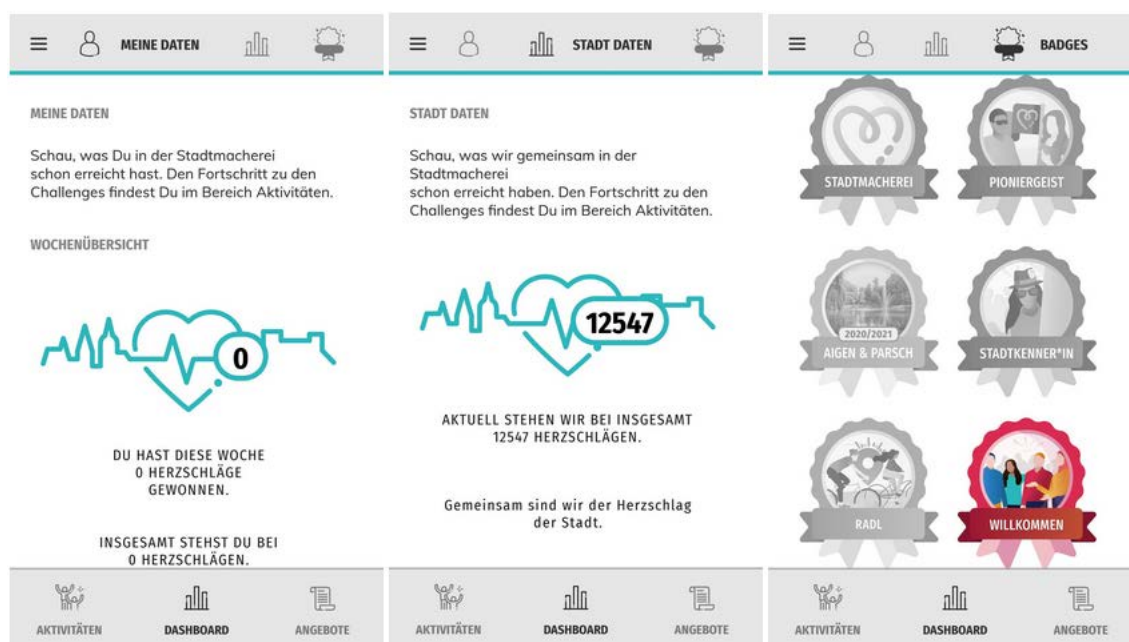


Figure 33: Stadtmacherei dashboard incentivisation system

Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

Also, every climate-friendly kilometre that users cycle or walk while using the app is rewarded with an additional heartbeat for the city and for themselves.

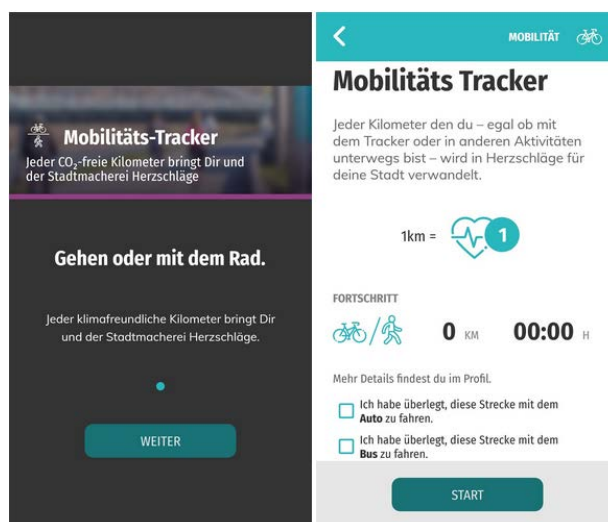


Figure 34: Stadtmacherei - mobility tracker

Source: Stadtmacherei-App, Version 0.13+6ad0550 (live), June 2021

In addition to the badges, heart beat points and physical incentives, a respective lottery was developed to motivate users to participate in challenges. The lottery system allows any user to sign up for the raffle who reached a certain amount of heartbeats during a challenge. The raffle itself takes place anonymously. The fall challenge ("Herbst Roas" September 2020 – December 2020) and the ongoing city challenge ("Salzburg's nachhaltige Herzschräge") are two challenges so far where the community reached the set target of heartbeats.

The awarded prizes are not traditional giveaways and the sustainability aspect was always the essential core of the incentivisation system. Appropriate incentives included in addition to physical prizes (e.g., tickets to museums, vouchers for bike repairs etc.) and also (unique) experiences (e.g. zero-waste cooking or wormery workshops).



Figure 35: Workshop Participants and winners of the Stadtmacherei city challenge, June 2021

3.2 Cykla med Pelle app, Uppsala

Based on the findings of the “Stadtmacherei Salzburg city app” the “Cykla med Pelle-app” (Cycling with Pelle) was developed and launched as part of the SimpliCITY research project for the citizen of Uppsala in Sweden. This app also aims to promote active mobility, to support sustainability issues and to show users the sights of individual city districts by solving different tasks and challenges in a fun way.

The Pelle app is created as a treasure hunt. Each tour has between 6 and 8 stations in different areas of Uppsala with no longer distances than 1-2 km. The first station of each treasure hunt is introduced with a simple quiz. Once this has been solved, participants look for clues to find the next station. The stations are placed so that participants can explore and receive information about an important urban facility in the area. Furthermore, through exploration, they will also find and learn about new recreational areas and smart city services.

In total, over 40 services in the categories of bicycle mobility, local food production and consumption as well as social inclusion have been listed so far and will be integrated in a next step in the app and tours. One of the city services that is already integrated into one of the tours is the new bicycle garage Uppsala. Participants receive information about this service both at the tour start and directly at the station. As a reward and small incentive, participants receive a free parking ticket for their bike when they correctly solve the quiz questions and finish this whole tour. The ticket can be downloaded with a link in the app.

In the future, the treasure hunts will be further expanded. The different treasure hunts also have special themes related to the main topics of the Simplicity project. For example, Pelle is the host for all bike mobility related topics and city services. The other cat characters in the app like Trisse, Gammel, Maja and Murre highlight local consumption and social inclusion in the same manner.

3.2.1 Cykla med Pelle app at a glance

On the welcome page users can choose which of the different parts of the “Cycling with Pelle” app and therefore the city of Uppsala they want to discover. First, the user selects a district that he would like to explore. There are different characters of Pelle’s cat friends that are waiting on various places in the different districts Sävja, Bergsbrunna, Nantuna and Vitan.

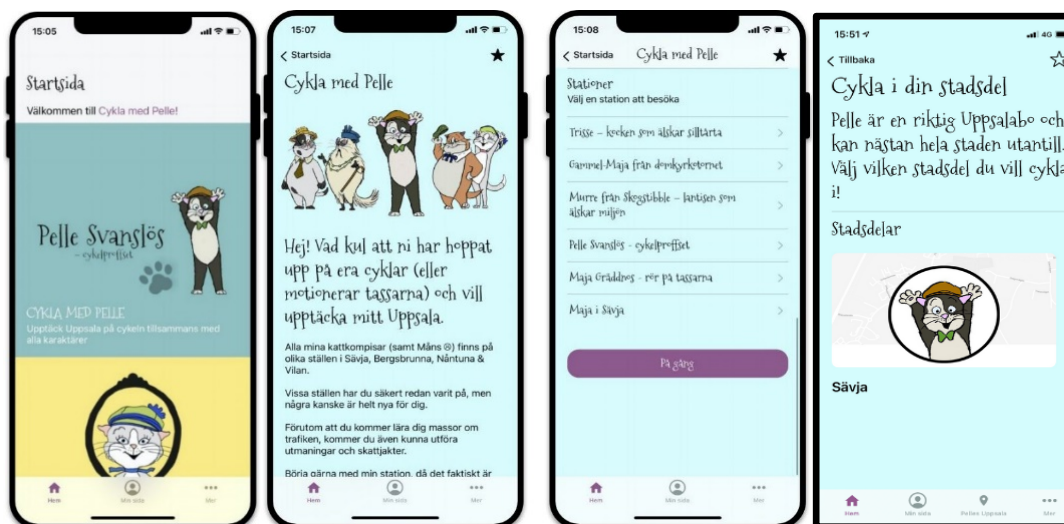


Figure 36: Cycling with Pelle App - main page and start side

Source: Sprocket Event, June 2021

After choosing a tour, a map guides the user directly to selected locations in the surrounding area. Once a location has been found, the user receives information and learns about this new place and service by scanning a QR-code on a physical sign.

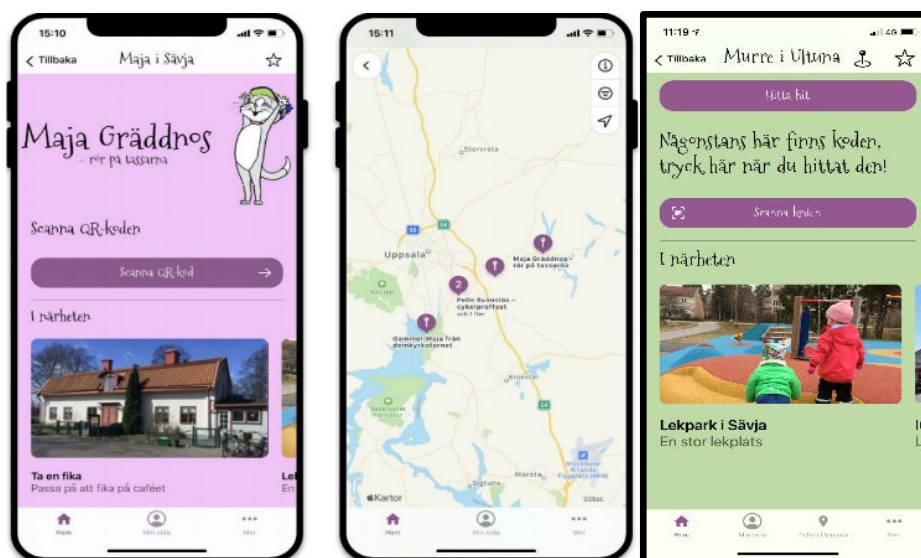


Figure 37: Information Module about new places

Source: Sprocket Event, June 2021

Once the user has scanned the QR code, he can also access different tasks and challenges related to the location. While solving the tasks, quizzes and riddles, users of the app are rewarded with paws for the various activities.

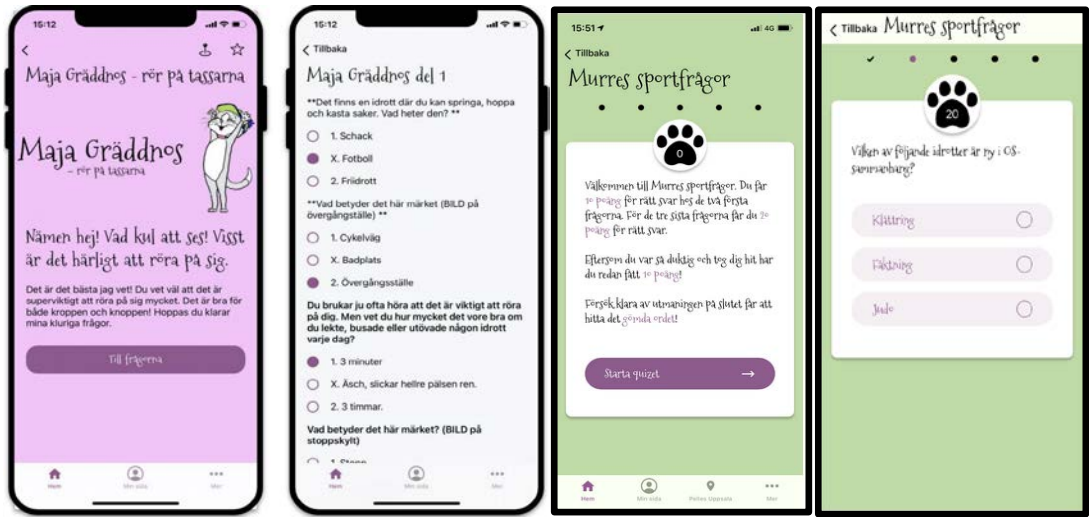


Figure 38: Module: Solve riddles and quizzes
Source: Sprocket Event, June 2021

In addition to riddles and quizzes, there is also a search for letters (letter hunt) in the various districts. This helps participants to get to know the location and the services offered in this district. If a letter is found, it is written directly into the app and automatically finds the right place in the word. If all the letters have been discovered, the solution word is formed from them.



Figure 39: Module: Letter hunt in different districts
Source: Sprocket Event, June 2021

If a treasure hunt with all its stations and tasks has been completed, participants also receive appealing rewards in addition to the paw points.

Activities	Paw points
Finding a station	10 paws
Solve a question – correct answer	10 paws
Solve a treasure hunt	100 paws
Solve all stations within a city area:	100 paws
Taking part on treasure hunts in city areas far from your home	100 paws
Checking in on a city service	100 paws per visit and user

The different incentives that are given to the participants are e.g.:

- giveaways from main sponsors like a cup of coffee from a local café or
- discounts on cycle parking, bicycle repair shops and other services.

Many more incentives will be added when due to the circumstances further treasure hunts can be arranged.

4 SIMPLICITY POLICY RECOMMENDATIONS

Cities often find that useful services they provide are being used by the citizens much less than expected. The SimpliCITY project addressed this issue with new methods for promoting the use of sustainable city services. These nudging methods are challenges, competitions and other game-like methods that encourage citizens to use the services. SimpliCITY focused on services for active mobility, local consumption and social inclusion. The main approach for engaging citizens to find and use available services was active mobility, particularly bicycling.

The SimpliCITY policy recommendations are based on a review of the literature and the project's own empirical research and experiences. The recommendations focus on the themes of city governance, behaviour change methods, digital and other services, and legal and ethical aspects. They address city policy makers, citizens, city services managers, external service providers, and researchers.

4.1 Main themes

The SimpliCITY recommendations are grouped under four main themes relevant for initiatives that aim to use digital methods for promoting behaviour change towards sustainable urban mobility, particularly active mobility. Related to each theme there are some topics which are important in this context.

Main themes	Related topics
<ul style="list-style-type: none"> • City governance 	<ul style="list-style-type: none"> o Sustainable urban mobility goals, policies and plans o Participation of citizens, businesses and civil society organisations o Sustainable mobility infrastructure and promotion of usage
<ul style="list-style-type: none"> • Behaviour change methods 	<ul style="list-style-type: none"> o Individual and social benefits of active mobility modes o Nudging as behaviour change intervention o Social behaviour change approach
<ul style="list-style-type: none"> • ICT and other services 	<ul style="list-style-type: none"> o Use of digital services for behaviour change interventions o Sustainable mobility and mobile applications o Other services for urban sustainability
<ul style="list-style-type: none"> • Legal and ethical aspects 	<ul style="list-style-type: none"> o Personal data protection o Informed consent o Transparent goals and means of nudging

Figure 40: Main themes of SimpliCITY recommendations

Source: Guntram Geser et al. 2021, p. 8; D. 7.3.

4.1.1 Stakeholders addressed

The SimpliCITY recommendations are meant for five groups of stakeholders:

- City policy makers
- Citizens
- City services managers
- External service providers
- Researchers

Obviously, some topics and recommendations are more important to one group of these stakeholders rather than others, while these may still be needed to carry out the activity suggested by a recommendation.

4.1.2 Structure of the recommendations

The SimpliCITY policy recommendations are structured as follows:

- The recommendations are grouped under four main themes,
- Each theme is introduced by thematic background information and literature references,
- For each theme, there is a set of recommendation, introduced by stating which stakeholder groups are addressed,
- A recommendation consists of the recommendation statement (what is suggested) and a brief explanation of why the suggested activity is important, appropriate approaches or means, etc.

4.1.3 Overview of the recommendations

City governance

Recommendations for all groups of stakeholders, particularly when considered in the development of a Sustainable Urban Mobility Plan or mobility related goals of a Smart City plan

- Rec. 1: Embed and strengthen active mobility in city sustainable mobility policies and plans
- Rec. 2: Ensure appropriate involvement of citizens, local businesses and civil society organisation
- Rec. 3: Promote active mobility to achieve environmental targets and health benefits
- Rec. 4: Combine improvement of active mobility infrastructure with behaviour change methods

Behaviour change methods

Recommendations for city and external providers of services for behaviour change interventions:

- Rec. 5: Use behaviour change methods to promote a shift towards active mobility

- Rec. 6: Highlight positive effects of active mobility for the citizens and the community
- Rec. 7: Use behaviour change methods with a social dimension

ICT and other services

Recommendations for providers of digital services that support sustainable behaviours and other local services for urban sustainability:

- Rec. 8: Bring together on a platform available urban sustainability services
- Rec. 9: Use proven digital solutions for motivating behaviour changes
- Rec. 10: Make clear to the users who is responsible for the digital and other services

Legal and ethical aspects

Recommendations for providers of digital services that support sustainable behaviours, citizens who use such services, and researchers:

- Rec. 11: Ensure full compliance of the digital services with personal data protection regulations
- Rec. 12: Use only behaviour change methods that are acceptable in the context of public policy and services

4.2 City governance

4.2.1 Thematic background

Cities are challenged to effectively contribute to climate and environmental targets regarding CO₂ emissions, air quality, pollutants and noise from motorized vehicles while, at the same time, ensuring a balanced development and use of transport access and connectivity choices. Therefore, a core objective is to enable and encourage the necessary shift towards sustainable mobility modes, e.g. using bicycles instead of cars.

Reaching a higher share of cycling in the modal split of transport options used is generally understood as a good measure that a shift is taking place. Besides positive effects on the environmental and traffic situation (e.g. congestion) active mobility contributes to the health of citizens and makes the city more liveable.

This objective of increasing active mobility is often included in Sustainable Urban Mobility Plans (SUMP) which cities currently develop or are already implemented and monitored (ELTIS 2020; Kiba-Janiak & Witkowski J. 2019; Rupprecht Consult 2019). In June 2021, the ELTIS database reported 1,212 SUMPs of cities of the 27 EU Member States and the United Kingdom, although for 201 no document was accessible online.⁵

⁵ ELTIS: City database, <https://www.eltis.org/mobility-plans/city-database>

A SUMP is a strategic plan designed to satisfy the mobility needs of citizens and businesses in a city and its surroundings, with a focus on sustainable mobility. Development of such a plan encourages cross-department coordination of city management and involvement of citizens, civil society organisation and businesses (CH4ALLENGE 2016; SHAPE-IT 2014; on involvement with digital tools see DYN@MO 2014).

With regard to cycling, the plan should foresee a combination of measures, including appropriate infrastructure and services (e.g. bike lanes, safe road crossings, bicycle parking stations) as well as promotion of their usage. Improvement in infrastructure and services alone may not be sufficient to boost cycling, while behaviour change interventions in the absence of these will not be effective and questionable (e.g. regarding the safety of cyclists). Both, good cycling infrastructure and services as well as behavioural motivation are required.

Regarding the motivation to cycle more instead of using the car, initiatives can build on car drivers own dissatisfaction due to congestion, difficulty to find a parking place, etc., while cyclists are generally more satisfied with their active travel mode (Ettema et al. 2016; Willis et al. 2013). Research has also shown that many urban car journeys are shorter than five kilometres (e.g. 43% in seven cities studied by Raser et al. 2018), while cycling is often the most suitable mode for such short distance transport, i.e. holds much potential for switching to this sustainable mobility mode.

A concern that is often raised when promoting cycling is that this could lead to negative effects of air pollution and road traffic accidents suffered by cyclists. However, there is ample evidence that the health benefits of cycling greatly outweigh such risks (e.g. De Hartog et al. 2010; Mueller et al. 2015; Teschke et al. 2012). Nevertheless, cities could often do more to make streets safer for cyclists, encouraging more people to use a bicycle to commute and for leisure activities. Bicycle-friendly cities will also benefit from the “safety in numbers” effect, i.e. cycling gets safer the more people do it (CTC 2009; Jacobsen et al. 2015).

4.2.2 Recommendations

The recommendations that follow are intended for all groups of stakeholders, particularly when considered in the development of a SUMP or mobility related goals of a Smart City plan. Obviously in the context of governance city policy makers and services managers have a leading role.

Rec. 1: Embed and strengthen active mobility in city sustainable mobility policies and plans

A city sustainable mobility plan enables the implementation and governance of policy-driven and integrated measures regarding urban transport choices. Active mobility should be embedded and play a core role in the plan, so that measures for a walkable and bicycle-friendly city are integrated with other measures to improve city transport solutions (e.g. multi-modal transport).

Rec. 2: Ensure appropriate involvement of citizens, local businesses and civil society organisation

Involve citizens, local businesses and civil society organisations in the definition and monitoring of measures for sustainable mobility, so that their needs and own contributions are considered.

Rec. 3: Promote active mobility to achieve environmental targets and health benefits

Cities should make active mobility modes such as walking and cycling an attractive choice for citizens. Active mobility contributes to achieving environmental goals (e.g. reduction of CO₂ emissions, air pollution, noise) while, at the same time, it supports public health and a liveable city. Therefore, wherever possible, active mobility modes should be prioritised in urban mobility policies and plans.

Rec. 4: Combine improvement of active mobility infrastructure with behaviour change methods

A city sustainable mobility plan should include a combination of improvements in active mobility infrastructure and services (e.g. bike lanes, safe road crossings, bicycle parking stations) as well as promotion of their usage. These should go hand-in-hand, as improvement in infrastructure and services alone may not be sufficient to boost walking and cycling. Researchers with expertise in behaviour change can advise on appropriate methods to promote changes in mobility behaviour, i.e. use of a bicycle instead of the car.

4.3 City governance

This section addresses general aspects of using behaviour change methods, while use of information and communication services for such interventions (digital nudging) is covered in the next section.

4.3.1 Thematic background

In recent years, use of behaviour change methods to steer citizens towards more environment-friendly and healthy behaviours has become a thriving field of research. The approach of “nudging” has also been made popular among policy makers through initiatives and reports by the World Bank (2015, 2017), the Organisation for Economic Co-operation and Development (OECD 2017), the European Commission’s Joint Research Centre (JRC 2016), the Nordic Council of Ministers (2016), and national governments and agencies.

These reports describe many examples of the nudge approach in different areas such as public health, energy and water saving, waste reduction. Regarding the area of personal transport, see Mont et al. (2014: 54-61).

A common understanding among researchers and policy makers is that nudging allows to influence citizen's behaviours with "soft" and low-cost methods instead of "hard" regulations such as laws, bans or taxes. Hard measures are often difficult to implement as these require political negotiation and overcoming resistance by affected parties, for example, when trying to restrict car use in city areas.

Instead of applying coercive measures nudging aims to influence citizens so that they change behaviours voluntarily, for example, use active mobility modes to contribute to making the city a more pleasant place to live and work and benefit regarding personal health and well-being. A report of the Netherlands Institute for Transport Policy Analysis (2018) present an excellent compilation of facts and figures on individual and social benefits of cycling.

A nudge basically is a recommendation to citizens together with information that both motivates and helps them follow the suggested behaviour, which is seen as beneficial for the wellbeing of the individuals as well as the social community. In practice a variety of nudging methods is being used, ranging from changes in the physical environment, e.g. narrowing the side-lines on a road to get drivers to slow down, to information-based methods such as enabling people to compare their energy consumption to those of others (see the overview in the appendix).

Behaviour change interventions can focus on the individual or household-level (e.g. consumption of healthier food, household waste reduction, etc.), but motorized mobility effects the community as a whole through CO₂ emissions, air pollution and noise. Therefore, behaviour change methods with a social dimension are preferable, taking into account that behaviours are often influenced by social approval and support by relatives, friends or colleagues.

The behaviour change methods favoured by SimpliCITY are online challenges, competitions and other game-like methods, which can be subsumed under the social influence methods, particularly social comparison where participants can compare their results to those of others (Abrahamse & Steg 2013; in the area of mobility Di Dio et al. 2020; Klieber et al. 2020; Pajarito & Gould 2017).

In addition to individuals this can be implemented for companies, city organisations or districts motivating citizens to do more for a liveable city, based on a sense of own responsibility and social dynamics, i.e. motivating others to participate.

4.3.2 Recommendations

The recommendations that follow are intended mainly for city and external providers of services for behaviour change interventions.

Rec. 5: Use behaviour change methods to promote a shift towards active mobility

Behaviour change methods such as nudging allow cities to influence citizen's behaviours with "soft" and low-cost methods instead of "hard" regulations such as laws, bans or taxes. Instead of applying coercive measures nudging aims to influence citizens so that they change behaviours voluntarily, for example, use active mobility modes instead of the car, thereby avoiding effects such as CO₂ emissions, air pollution and noise. A nudge basically is a recommendation to citizens together with information that both motivates and helps them follow the suggested behaviour, which is seen as beneficial for the wellbeing of the individuals as well as the community.

Rec. 6: Highlight positive effects of active mobility for the citizens and the community

Behaviour change initiatives should highlight the contributions active mobility of citizens makes to city goals regarding the environment, public health, and a liveable city in general. For example, cycling can improve the health and well-being of citizens and, at the same time, make the city a more pleasant place to live and work.

Rec. 7: Use behaviour change methods with a social dimension

Motorized mobility such as personal car use affects the community as a whole through CO₂ emissions, air pollution and noise. Therefore, mobility change methods with a social dimension are preferable to methods that only address the individual or household-level. Approaches that allow social comparison, e.g. challenges, competitions and other game-like methods, can motivate individuals as well as companies, city organisations and districts to do more for a liveable city, based on a sense of own responsibility and social dynamics, i.e. motivating others to participate.

4.4 ICT and other services

This section addresses the use of information and communication services for behaviour change interventions (digital nudging) with a focus on sustainable mobility as well as other local services for urban sustainability.

4.4.1 Thematic background

The high use of mobile devices (smartphones, tablets) and increasing familiarity of citizens with mobile applications allows novel ways of using digital methods to steer citizens towards adopting more sustainable behaviours. These methods not only ease, but go beyond information and behavioural suggestions in that more effective interactive and game-like approaches can be employed. Thereby, the use of a mobile information device can be coupled with a voluntary behaviour change approach and motivating activities such campaigns, challenges and competitions that make participation more appealing and engaging.

ICT services for motivating behaviour changes

Use of ICT services for digital nudging has been proposed as a way to influence behaviours in different domains (Caraban et al. 2019; Hummel & Maedche 2019; Karlsen & Andersen 2019; Meske & Potthoff 2017; Mirsch et al. 2017; Schneider et al. 2018; Weinmann et al. 2016). In recent years various digital nudging methods have also been trialled in the area of sustainable urban mobility (e.g. Anagnostopoulou et al. 2018; Andersson et al. 2018; Bothos et al. 2015; Cellina et al. 2019; Di Dio et al. 2020).

Use of digital nudging requires a platform to organise and run the activities and an app for the participants. The platform is needed for user registration and participation, i.e. receive notifications (alerts, reminders), guidance and encouragement to carry out proposed activities. Results can then be visualised to participants and compared, motivating them to do more personally, as a group or a city district.

In the field of mobility, the use of GPS-tracking enables a better understanding of the mobility behaviour of citizens and allows evidence-based decisions in urban transport planning, which focuses on promoting more active mobility in the city. Beside proper use of GPS-tracking, this of course requires numerous app users (see the guidelines provided in TRACE 2018). The possibility for citizens to share information on travelled routes can provide a useful feedback channel for city service managers (e.g. on required maintenance of cycling infrastructure).

Developers of digital nudging services should take account of what citizens expect from an application aimed to support sustainable urban mobility. Meurer et al. (2019) interviewed citizens in this regard and found that they wished information on how such mobility is measured and monitored, respect for individual mobility situations and preferences, the expected scope of participation, and the sharing of responsibility between citizens and city services.

It must be noted that many digital nudging projects remained at the stage of a prototype and testing, often with only a few test users. Such research prototypes are of course not adequate for cities that require reliable and user-friendly solutions for regular operation.

It is advisable that the platform which supports behavioural interventions (e.g. a competition promoting cycling) is clearly separated from other information services (e.g. a city map of cycling routes) and of course physical services (e.g. the actual cycling routes). But these areas nevertheless are related, as activities promoted on the platform are intended to increase the use of the services. This constellation requires being very clear regarding who is responsible for which service, e.g. city services versus external services. This is important regarding citizen's trust in the services being provided and responsibilities such as personal data protection.

Involvement of other service providers

It is very useful to involve various service providers to create an ecosystem of urban sustainability services of different city departments, civil society organisations and businesses. This enriches the digital platform and can contribute to the take-up and use of the service app. For example the SimpliCITY platform in Salzburg includes many services related to bicycling (e.g. bicycle repair shops, cargo bikes, bike couriers), local consumption (e.g. regional food, second hand shops, waste reduction and recycling), and social inclusion (e.g. civil society groups, support for families and people with impairments).

A common platform allows to increase the visibility of available urban sustainability services, promote synergies between them, and receive contributions from service providers to the operation of the platform and behaviour change campaigns. For example, some digital nudging projects involved local organisations and businesses to offer rewards to participants of urban sustainability campaigns, e.g. people who visited a service station or shop with relevant products. Such rewards can be a voucher (e.g. for a small discount) or participation in a prize draw when users have reached a certain number of active mobility points (i.e. entry into a virtual tombola). Such prizes can support sustainability goals, e.g. a course on urban gardening or zero-waste cooking as in the case of SimpliCITY

4.4.2 Recommendations

The recommendations that follow are intended mainly for providers of digital services that support sustainable behaviours and other local services for urban sustainability.

Rec. 8: Bring together on a platform available urban sustainability services

Cities often find that available services that support sustainability goals are known and used by citizens much less than expected. One reason for this is that such services are dispersed over several city departments and no overview and central information access point is available to citizens. Therefore, it is useful to bring the services together on one platform that allows to better promote their usage. Inclusion also of relevant services of local civil society organisations and businesses can create a rich ecosystem of urban sustainability services.

Rec. 9: Use proven digital solutions for motivating behaviour changes

In recent years, many digital solutions for motivating behaviour changes have been developed which remained at the stage of a prototype. Such prototypes are not adequate for cities. Cities should only use reliable and user-friendly solutions to organise, run and visualise the results of behaviour change activities. In the area of mobility the use of GPS-tracking can also allow cities to better understand citizen's mobility behaviours and make evidence-based decisions in urban transport planning focused on promoting more active mobility.

Rec. 10: Make clear to the users who is responsible for the digital and other services

Some city administrations wish to control any ICT service that concerns their responsibilities, i.e. implement it in-house, while others do not want to add a new system and therefore prefer to have it managed by an external provider based on a service contract. In any case, it is very important making clear to the citizens who is responsible for the digital and other services.

4.5 ICT and other services

This section addresses legal requirements when using digital services that support sustainable behaviours, particularly personal data protection, and ethical aspects of behaviour change methods

4.5.1 Thematic background

When using digital services to promote behaviour changes, a major legal issue to address is the protection of personal data. In the member states of the European Union the General Data Protection Regulation (Regulation [EU] 2016/679), short GDPR, is the core legal framework in this regard. Digital platforms and apps cities or supporting external service providers use for promoting active mobility should fully comply with the rules set by the GDPR.

The regulation is quite complex, however, the main rule to follow is that users of the digital services should give informed consent regarding the use of the personal data they provide for the purposes of the services. A minimum age is necessary to give informed consent, which should not be below 13 years (e.g. in Austria it is 14 years).

Users will have to register and provide personal information (e.g. e-mail address, mobile phone number, etc.) so that they can be informed about the progress of activities in which they participate; in advanced applications they will also have to agree to GPS-tracking of their mobility to fully benefit from the services.

This data should not be disclosed to third parties or, if shared with other services, provided only in anonymized form so that the identity of the citizen cannot be inferred from the data. Service providers must of course also put in place appropriate technical, organisational and procedural measures to ensure data protection and security. The ways data are being processed must be described in a Record of Processing Activities and, in case of a formal complaint, the document provided to the national Data Protection Agency.

Digital service providers should generally not collect and process any sensitive personal information as defined in Article 9 of the GDPR such as data “revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of

genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation".

Ethical issues mainly concern the behavioural change methods digital platforms and apps may employ to nudge citizens towards sustainable mobility choices. In the literature nudging is debated because methods can be used which are not transparent and exploit psychological processes with the effect that people take decisions in a non-reflected, quasi-automatic way (Hansen & Jespersen 2013; Hausman & Welch 2010; Ivanković & Engelen 2019; Sunstein 2015).

The appropriate approach to avoid ethical concerns is to use only methods that are transparent regarding the aims (e.g. increase cycling of citizens instead of using the car) and means (e.g. a competition to promote that behaviour). More background on which methods are appropriate is given in the Appendix on nudge types and ethics.

4.5.2 Recommendations

The recommendations that follow are intended for providers of digital services that support sustainable behaviours, citizens who use such services, and researchers.

Rec. 11: Ensure full compliance of the digital services with personal data protection regulations

Digital platforms and apps cities or supporting external service providers use for promoting active mobility should fully comply with the personal data protection regulations that are in force. In the member states of the European Union, the General Data Protection Regulation (Regulation [EU] 2016/679) is the core legal framework in this regard. In particular, users of the digital services will have to give informed consent regarding the use of the personal data they provide for the purposes of the services.

Rec. 12: Use only behaviour change methods that are acceptable in the context of public policy and services

Ethical issues when applying digital behaviour change methods to promote sustainable mobility can be avoided by enabling citizens to take a well-informed decision regarding the use of such methods and supporting tools. The appropriate approach for this is to use only methods that are transparent regarding the aims, e.g. a campaign aimed to increase cycling instead of using the car, and the means, e.g. a competition to promote that behaviour. Researchers and practitioners in sustainable mobility promotion should be aware of the legal and ethical requirements of appropriate digital nudging.

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<p>Chapter 4: SimpliCITY Policy Recommendations</p> <ul style="list-style-type: none"> • <u>Part of D. 7.3.: SimpliCITY Policy Recommendations</u> Guntram Geser, Veronika Hornung-Prähauser and Claudia Luger-Bazinger, Salzburg Research

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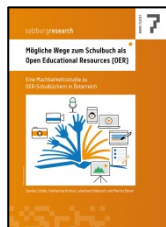
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