Data Management & Ethics Plan

Version 1

Deliverable 1.5

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Document versions:

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V0.2	23.11.2018	Data Collection, Data Storage, Data Protection	G. Geser (SRFG), T. Layer-Wagner (Polycular)
V0.3	24.01.2019	Data Use and Publication, Data Archiving and Access	G. Geser (SRFG)
V0.4	20.02.2019	Data Documentation, Appendices II and III	G. Geser (SRFG)
V0.5	10.04.2019	Ethical Aspects and Appendix I	G. Geser (SRFG)
V0.6	21.05.2019	Responsibilities and Resources	G. Geser, P. Stabauer (SRFG)
V0.7	25.06.2019	Executive Summary, References	G. Geser (SRFG)
V1.0	28.06.2019	Final edited version	G. Geser (SRFG)

List of abbreviations

API	Application Programming Interface
CC	Creative Commons
CC BY-SA	Creative Commons Attribution ShareAlike license
CC0	Creative Commons Zero license
CERN	European Organization for Nuclear Research
DMP	Data Management Plan
DOI	Digital Object Identifier
EU	European Union
GB	Gigabyte
GDPR	General Data Protection Regulation (EU) 2016/679
ISO	International Organization for Standardization
MB	Megabyte
URL	Uniform Resource Locator

Table of content

1. Executive Summary

Promoting city services

Cities often find that useful services they provide are being used by the citizens much less than expected. The SimpliCITY project addresses this issue with pilots that trial and evaluate new methods for promoting city services. These are challenges, competitions and other game-like methods that engage citizens to use and help improve city services. SimpliCITY focuses on services for sustainable mobility (bike mobility), local production & consumption, and digital social inclusion.

Managing project data

The Data Management Plan describes how SimpliCITY manages the data that is being collected for the purposes of the project. The plan addresses all phases of the data lifecycle from data collection to archiving.

Special attention is devoted to the protection of personal data, in line with the General Data Protection Regulation (Regulation [EU) 2016/679). Also the importance of data documentation and archiving for long-term preservation and access is highlighted.

SimpliCITY will use the Zenodo repository to archive scientific publications and research data underpinning the published research results. Personal data that may be included in the research data will be anonymized.

Addressing ethical issues

The citizen engagement methods SimpliCITY is trialling can be subsumed under “nudging” as the aim is to steer citizens towards particular behaviours of a sustainable city lifestyle. In the literature nudging is debated as potentially unethical 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. In the context of public policy and services such approaches are hardly acceptable. Therefore a section of the plan makes clear that the methods SimpliCITY uses are not problematic in ethical terms.

Providing the SimpliCITY Platform

The citizen engagement methods will not be trialled on any of the city services involved in the project but on the SimpliCITY Platform. Technical applications of this platform provide the functionality for the engagement methods. Activities on this platform (e.g. a competition promoting cycling) can be clearly separated from the city information services (e.g. a city map of cycling routes) and of course physical services (e.g. the actual cycling routes maintained by the city). But these areas are related as activities on the SimpliCITY Platform are intended to increase the usage of the city services. This constellation requires being as clear as possible regarding who in the SimpliCITY project is responsible for which services and which data management tasks.

2. Administrative Information

Basic information on the SimpliCITY project and the present deliverable:

Project title	SimpliCITY - Marketplace for user-centered sustainability services
Project coordinator	Salzburg Research Forschungsgesellschaft mbH (SRFG), Salzburg, Austria; project manager: Petra Stabauer BSc MSc
Project partners	Polycular OG, Hallein, Austria Stadt Salzburg (City of Salzburg), Austria Salzburger Institut für Raumordnung und Wohnen – SIR (Salzburg Institute for Regional Planning & Housing), Salzburg, Austria Uppsala Kommun (City of Uppsala), Sweden University of Uppsala, Sweden
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3. Data Collection

This section describes the purposes, sources and methods of data collection as well as how high quality of the data will be ensured.

DMP Element	*Description*
Purposes of data collection	The main purpose of the data collection and use is to explore the effectiveness of novel methods to promote the use of city services. Such methods include challenges, competitions and other game-like methods that engage citizens to use and help improve city online and physical services. In the project these are services for sustainable mobility, local production & consumption, and digital social inclusion.
Data sources	For the cities involved in the project there are no data available yet that have been collected using the citizen engagement methods which will be explored in SimpliCITY. Therefore most of the research data will be collected by partners in the framework of the project. Partners may also have some data that has been collected prior or will be collected in parallel to the project which might be relevant for the contextualization and interpretation of the SimpliCITY research results. Data of third parties for these purposes could be national and European statistics or other publicly available data. Availability of relevant data will be investigated in the course of the project.
Data collection methods	Project partners will collect the primary research data using the following methods:
Collection of quantitative data on the SimpliCITY Platform	Most data will be generated by users of technical applications that are part of the SimpliCITY Platform. The platform is being developed and maintained by project partner Polycular. For each of the city partners, the City of Salzburg and the City of Uppsala, an instance of this platform will be provided by Polycular. The technical applications of the SimpliCITY Platform provide the functionality for the citizen engagement methods that will be trialled and evaluated in the project. Such methods are challenges, competitions and other game-like forms of engagement. The quantitative data will include numbers of log-ins, use of functionalities, interaction with different application features, among others.

Collection of other quantitative and qualitative information for the development of pilots	Other quantitative and qualitative information will be collected mainly to support the conceptual development and design of the SimpliCITY pilots in which the effectiveness of different citizen engagement methods will be tested. Regarding this information SimpliCITY follows a pragmatic approach which allows the regional project teams in Salzburg and Uppsala to decide which collection methods and situations are most useful for the development of their regional pilots. Therefore partners can use any social science methods such as questionnaire surveys, individual interviews, focus groups, expert panels, for instance. The main conditions partners have to take care of is that participants agree to provide information for the project and, if that information includes personal data, that the information will be anonymized so that personal data is not disclosed to third parties. How to anonymize personal data in information collected with the most commonly used methods is briefly described in Chapter 5.
No collection of sensitive personal data	The project will not collect and process any sensitive personal data as defined in Article 9 of the General Data Protection Regulation (Regulation [EU] 2016/679) 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”.
Data of third parties	Relevant data of third parties could be national and European statistics or other publicly available data (e.g. open access research data). Such data can support the contextualization, comparison and interpretation of the SimpliCITY research results. If relevant data for these purposes is available will be investigated in the course of the project. The project will not commission or purchase any survey or other data from third parties.
Data quality ensurance	Measures to ensure data quality will be applied in all phases of the data lifecycle from data collection to data deposition for long-term preservation and access.

The measures include

- Data collection based on standard methods and in conformance with research ethics (informed consent),
- Compliance with personal data protection regulations, e.g. anonymization of research data,
- Following good practices regarding data storage (backup), file formats and naming,
- Data documentation, e.g. provision of rich discovery metadata,
- Data licensing applying a Creative Commons license,
- Repository selection and data archiving for long-term preservation and access.

4. Data Storage

The data storage measures protect the data against loss (e.g. data backup) and support the proper organisation of the data (e.g. data formats, file naming).

DMP Element	*Description*
Data storage and backup	Each project partner will store the data they have collected on a password protected organizational server with state-of-the-art anti-virus software. For regular data backup they will use a well-protected network drive or carrier media. In order to have a common backup mechanism the partners will also provide a copy of the collected data to the project coordinator. The SimpliCITY Platform and its data will be hosted on infrastructure and a dedicated server of a project partner, which is located in the EU.
Data size	The size of the SimpliCITY research and platform data is expected to be rather small, perhaps some hundred Megabytes (MB).
Data formats	Recommended file formats for data preservation and dissemination (cf. DANS: File formats; UK Data Service: Recommended formats): • *Textual data and documentation:* PDF/A (.pdf); Rich Text Format (.rtf); plain text, ASCII (.txt); • *Tabular data with minimal metadata* (column headings, variable names): widely-used formats such as MS Excel (.xls/.xlsx) or MS Access (.mdb/.accdb) are “acceptable”, but comma-separated values (.csv) or tab-delimited file (.tab) are recommended for data preservation; • *Tabular data with extensive metadata* (variable labels, code labels, etc.): SPSS portable format (.por); delimited text and command (‘setup’) file (SPSS, Stata, SAS, etc.); • *Image data:* TIFF (.tif) for preservation and JPEG2000 (.jp2) for dissemination; various other are “acceptable” such as: GIF (.gif), PNG (.png), PDF (.pdf); • *Video data:* MPEG-4 (.mp4), motion JPEG2000 (.mj2), OGG video (.ogv, .ogg).

Naming of files	For the naming of data files established good practices will be followed. In general the name of a file should be sufficiently descriptive so that what it contains can be assumed irrespective of where the file is stored. On the other hand, the number of characters used for this objective should be kept to a minimum. Good practices with regard to what a file name should or should not contain are as follows: • No special characters (such as @, !, #, +, &, %, =, <>, and others), • No abbreviations or codes that are not commonly understood, • No spaces, instead underscores (e.g. survey_data), • Use periods only before the file-name extension, • Include the version number of the material (v01, v02,...), except where it is the definitely final version, • Follow the ISO 8601 standard for the date (YYYYMMDD).

5. Data Protection

This section addresses requirements of data protection, especially regarding protection of and access to personal data. Personal data that may be included in research content intended to be published will be anonymized.

DMP Element	*Description*
Data security and access	During the project research data will be kept on password protected organizational servers and computers and access to the data will be restricted to the project partners. Who is allowed legitimate access to the research data will be defined and controlled by the responsible SimpliCITY partners. In general access will only be allowed staff working on the project. Both digital data and paper records (e.g. informed consent sheets) will be stored and kept securely by each partner so that no unauthorized access can occur. For transferring research data between project partners secure file transfer protocols will be used so that file encryption will not be necessary. When data underpinning scientific publications will be made available through an open access repository this will be anonymized data.
Protection of personal data	Regarding the protection of personal data the project partners will comply with the General Data Protection Regulation (Regulation [EU] 2016/679), short GDPR.
Anonymization of personal data	SimpliCITY will apply the “pseudonymisation” approach which the GDPR suggests as an appropriate safeguard when processing data for scientific research, given also appropriate technical and organizational measures for data security are in place (GDPR Article 4: Definitions, Paragraph 5; and Article 89). Basically the approach is to remove from research content intended to be published all direct identifiers as well as potentially critical indirect identifiers and keep these (and the informed consent forms) securely separated from the information that will be published.
Anonymization of research data intended to be published	Personal data that may be included in collected research data will be anonymized if it is intended to publish the research data. We briefly describe for the main research methods partners may use how to anonymize and not disclose personal data, except with written permission of the research participants.

Data collected on the SimpliCITY Platform	Data collected on the SimpliCITY Platform is quantitative data such as numbers of log-ins, use of functionalities, interaction with different application features, among others. Users will have to register and provide personal information (e.g. e-mail address, mobile phone number) so that they can be informed about the progress of activities in which they participate. The personal information must be kept separate from the interaction data, protected thoroughly and not disclosed to third parties. The data management plan will be expanded throughout the development of the SimpliCITY Platform based on the actual data models of the platform and its activities. These data models will be evaluated with the project lead in order to comply with data protection regulations.
Online questionnaire survey	In online surveys personal data which could allow identifying a respondent (name, e-mail address, etc.) will not be asked for. If respondents provide such information in free-text comment fields of the questionnaire it will not be included in the research data.
Workshops	In workshops groups of citizens discuss a number of questions. Issues, ideas and expectations are written on cards, grouped and presented. The researchers produce an overview and summary of the results. Anonymization of the content is not required.
Focus groups	Moderated discussion in focus groups is documented in a protocol or detailed summary in which statements of participants are anonymized using a coding scheme. The coding scheme, including the names of the participants, will not be shared but securely stored separate from the protocol/summary.
Individual interviews	Individual interviews may be difficult to anonymize so that interviewees cannot be identified. Therefore, interviewees will be provided with the interview protocol or detailed summary and asked if the information is correct and how it can finally be shared, if the interviewee can be named, if statements can be quoted or not, etc.
Audio/video recordings of focus groups or individual interviews	Recordings will be done primarily to ease the transcription or summarization of relevant content. Anonymization of recordings as such is difficult, hence recordings would be published only based on written permission by each participant.

6. Ethical Aspects

This section addresses the ethical conduct of the project research in general and the importance of informed consent in particular. Informed consent plays a core role regarding both responsible research and legal regulations, i.e. the General Data Protection Regulation (GDPR). We also address ethical aspects of “nudging” methods which will be investigated in SimpliCITY; a more detailed evaluation of these aspects is included as Appendix I.

DMP Element	*Description*
Ethical conduct of research	Regarding rules for the ethical conduct of research we refer to “The European Code of Conduct for Research Integrity” of the All European Academies (ALLEA 2017), and the more detailed RESPECT Code of Practice for Socio-Economic Research (2004). The RESPECT guidelines are meant to aid responsible decision-making and to protect researchers from unprofessional or unethical demands (RESPECT 2004; see also Dench et al. 2004; Huws 2004).
Informed consent	The key point regarding legal regulations (i.e. the GDPR) and potential ethical issues is informed consent by the research participants. The SimpliCITY project partners are aware that for all collection of research data which may contain personal data informed consent of the participants is necessary. This applies to direct interaction with participants (e.g. interviews) as well as interaction using online tools. For both the project will use standard informed consent forms.
SimpliCITY „nudging“ methods	Nudges aim to steer people towards decisions or behaviours which are deemed preferable for the wellbeing of the individuals and society (e.g. cycling instead of using the car to improve health conditions as well as reduce CO2 emissions). SimpliCITY explores the potential of nudging methods to increase the use of city services in areas such as sustainable mobility and consumption of local products.
Transparency regarding aims and means	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. In SimpliCITY none of these methods will be employed. The foreseen methods such as online challenges or competitions are transparent regarding the aims (e.g. increase cycling of citizens instead of using the care) and means (e.g. a competition to promote that behaviour).

Ethical evaluation in practical use of methods	Nevertheless, the methods can be subsumed under nudging because the aim is to steer citizens towards particular decisions and behaviours. While we see all intended methods as not problematic in ethical terms, the research will still assess if any of the methods and specific techniques pose an issue when applied in practice. If this would be the case, an appropriate solution or alternative approach will be suggested.
Application on the SimpliCITY Platform	The mentioned methods will not be trialled directly on any of the city information services involved in the project but on the SimpliCITY Platform. Activities on this platform (e.g. a competition promoting cycling) can be clearly separated from the city information services (e.g. a city map of cycling routes) and of course physical services (e.g. the actual cycling routes maintained by the city). But these areas are related as activities provided on the SimpliCITY Platform are intended to increase the use of the city services.
Clear responsibilities regarding services and methods	This constellation requires being as clear as possible regarding who is responsible for which services (public services vs. services provided by the project) and the nudging methods with which the use of services is being promoted in the project. The responsibility regarding the selection of the methods and the design of pilots using them is with the General Assembly of the formal project members, deciding on proposals of the Executive Board of the project. The responsibility for the implementation and operation of the methods on the SimpliCITY Platform is with the project partner Polycular. This responsibility also includes the platform functionalities for informed consent and protection of personal data.
	Appendix I provides more background on nudges in the context of public policies and services and the evaluation in ethical terms of the nudging methods foreseen in SimpliCITY.

7. Data Use and Publication

This section describes how collected research data will be used, licensed and shared.

DMP Element	*Description*
Use of the collected research data	The collected research data will be used for • development of the regional research pilots in which different citizen engagement methods will be tested, • scientific analyses to evaluate the effectiveness of the methods that will be employed, • scientific publications of the research results, • recommendations for managers of city services interested to use the methods studied, • suggestions for developers of platforms which provide functionality for the methods. For the scientific analyses the collected data will be aggregated and analysed with statistical and other methods of data analysis and visualization.
Publication of research articles and data	The project partners intend to publish the SimpliCITY research results in scientific journals and proceedings of relevant conferences where results will be presented. Research articles are foreseen to be published open access and/or be made available via an accessible repository, conforming to the agreement with the publishers (e.g. final publication, preprint or earlier version). The data underpinning the scientific publications will be made available through an accessible repository when the research articles are being published. Published research content and data will not include any personal data of research participants such as users of the SimpliCITY Platform, participants of surveys or other data collection activities. Research data most likely to be published are quantitative data collected on the SimpliCITY Platform in the context of the pilots, and quantitative or qualitative data collected in the preparation of the pilots and for the interpretation of pilot results, e.g. experiences of managers of public services and citizens who participated in the pilots.

Copyrights / licenses	Where pre-existing content/data from project partners or third parties will be re-used the copyrights and conditions set by licenses of the providers will be respected and followed. For research content/data generated in SimpliCITY and shared with third parties via an accessible repository the project partners consider to apply the Creative Commons Attribution ShareAlike (CC BY-SA) license. This license gives users the right to copy and redistribute the material in any medium or format as well as adapt and build upon it for any purpose. But users must give appropriate credit to SimpliCITY, provide a link to the Creative Commons license, and indicate if changes were made to the material. If users remix, transform, or build upon the material, they must distribute their contributions under the same license as the original. Moreover, user may not apply legal terms or technological measures that legally restrict others from doing anything the CC BY-SA license permits.

8. Data Documentation

Data documentation with metadata and other means supports finding, understanding and using data beyond the project, including by researchers external to the project consortium.

DMP Element	*Description*
Metadata for finding and accessing data and other material	Selected research data will be archived in an open access repository and thereby made available also for users external to the project consortium. For the research data appropriate discovery metadata and other information will be provided. The SimpliCITY project considers using the Zenodo repository (www.zenodo.org) that allows providing rich discovery metadata. The fields of the Zenodo metadata scheme are listed below, including brief information on the content. As datasets, publications and perhaps other project content will be deposited we use the general term material: • Type of deposit (e.g. dataset, research paper or other material) • Title of the deposit • Identifier: DOI (Digital Object Identifier) • Publication date • Version • Language (main language of the material) • Creators (the authors of the material) • Contributors (others who contributed as e.g. data collector, manager or editor) • Description (of the deposited material) • Additional notes (e.g. on the project context) • Keywords (free text keywords) • Subjects (controlled vocabulary terms) • Related/alternate identifiers (related other SimpliCITY material with a DOI) • References (relevant literature, legislation, etc.) • Access right (Open Access to the material) • License (e.g. Creative Commons Attribution ShareAlike) • Grant (JPI Urban Europe, 870739) • Community (the collection of SimpliCITY materials in Zenodo) In general all or most element fields of the Zenodo metadata schema as appropriate for the different types of deposited

	material will be used. Note: Zenodo metadata is generally licensed under the Creative Commons Zero (CC0) license. A tabular overview that describes in greater detail the metadata fields and the information that can be provided is included in Appendix III.
Further information supporting the understanding of the data	As part of the metadata (e.g. in the fields Description, Additional notes and References) and/or in a document deposited with the data additional information will be provided. The information will support that the data can be understood and re-used correctly, i.e. enable secondary users making informed use of the data. This will be information about: • Research purpose and context of the SimpliCITY project, • Research design, assumptions and methods of studies, • Research templates and guidance (e.g. template for semi-structured interviews or focus group workshops), • Types, formats and other details of the research content (e.g. definition of terms, abbreviations used), • Information about the anonymization, aggregation, editing and other procedures applied on the data. In addition, publications and other research outputs which explain or draw on the data (e.g. summaries of findings) may be included in the data documentation.

9. Data Archiving and Access

This section describes which data will be selected for long-term archiving and access.

DMP Element	*Description*
Retention of project data in general	Regarding the retention of the collected research data the project partners will follow the rules of the Grant Agreement as well as internal rules of their organization, e.g. how and for which period project documents have to be retained.
Appraisal and archiving of research data	Data which underpin research publications will be deposited, together with copies of the publications, for long-term archiving in the open access repository Zenodo. If there remain research data not directly related to a publication, the project partners will evaluate if it could be of any value for themselves and for other researchers beyond the project. For the data appraisal criteria and good practices as described by data curation experts will be followed (Tjalsma & Rombouts 2010; Whyte & Wilson 2010). The main criteria for data archiving include legal requirements to retain the data beyond its immediate use, if the data are unique, non-replicable or otherwise significant in scientific or other terms.
Size of the data	The size of the SimpliCITY research data is expected to be rather small, perhaps some hundred Megabytes (MB). Therefore the size will play no role in the question if data will be retained and archived. Regarding the archiving of data, Zenodo would allow up to 50 Gigabytes (GB) per dataset upload.
Long-term data preservation and access	Zenodo provides long-term data storage, preservation and access free of charge. The repository is being provided and operated by the scientific research centre CERN - European Organization for Nuclear Research.
Data preservation period	Zenodo offers the longest data preservation and access period which is expected to be “the next 20 years at least” (cf. Zenodo: General Policies). Other repositories usually mention a period of at least 10 years, which corresponds to the expectation of research funders that data underpinning research publications should be accessible for at least 10 years after publication.

Provision of DOIs and DOI versioning	Zenodo provides a unique and persistent DataCite DOI (Digital Object Identifier) for each published data record and file (e.g. dataset, research paper, supplemental material). Furthermore Zenodo supports versioning of DOIs at the file level so that updated material can be deposited and made available with a new DOI. This makes it easy for researchers to find, use and cite the latest version of materials (see Zenodo: Frequently Asked Questions: DOI versioning).
Support of finding the research data	Zenodo metadata records are indexed and searchable on the repository website immediately after publication. The metadata is also sent to DataCite servers during DOI registration and indexed and searchable with the DataCite system. Furthermore Zenodo metadata is being harvested by a number of search portals, e.g. BASE (Bielefeld Academic Search Engine), OpenAIRE and others, and can be searched via their systems. In practice, anybody can use the DataCite DOI of a SimpliCITY record or file found in a project publication or external publication and use a Web search engine to find and access it in Zenodo.
	Several other benefits of using Zenodo for archiving SimpliCITY research data and publications are described in Appendix II.

10. Responsibilities and Resources

This section addresses the responsibilities and costs of partners regarding the implementation and maintenance of the Data Management & Ethics Plan.

DMP Element	*Description*
Responsibilities in general	Each partner is obliged to respect and follow the rules of the Grant Agreement and of the Consortium Agreement. Support by the project Coordinator or another partner in following the rules does not transfer these obligations to the supporting partner.
Responsibility for the project research data	The responsibilities for the research data collected in the project are set by the present data management plan. Each project partner is responsible for the data they have collected, i.e. to protect it against potential loss (e.g. backup) and not authorized access. Partners should not disclose collected personal data of research participants to persons external to the project consortium. In order to have a common backup mechanism the partners will provide a copy of collected research data to the project coordinator.
Costs of data collection and maintenance	Costs for the collection and maintenance of research data in the framework of the project are covered by the project budget. Data which underpin research publications will be deposited together with the publications in the open access repository Zenodo. Zenodo provides long-term data storage, preservation and access free of charge. Therefore additional costs of project partners for these purposes beyond the project are not considered.
Maintenance of the DM & Ethics Plan	The SimpliCITY Data Management & Ethics Plan is a “living document” that will be updated, if necessary, by the project Coordinator in consultation with all other project partners. Updates might be needed due to changes in consortium policies, research methodology or other significant developments which affect the plan. The plan will be updated at least in project month 30 when the final version of the plan, including how it has been implemented until then, will have to be delivered.
Contact for the DM & Ethics Plan	Petra Stabauer, SimpliCITY Coordinator, Salzburg Research, petra.stabauer@salzburgresearch.at

Appendix I: Evaluation of nudging in SimpliCITY

Use of nudging in SimpliCITY

SimpliCITY explores the potential of nudges to increase the use of city services in areas such as sustainable mobility and consumption of local products. Nudges aim to steer people towards decisions and behaviours which are deemed preferable for the wellbeing of the individuals and society, for example, cycling instead of using the car to improve health conditions as well as reduce CO2 emissions.

In the literature nudging is debated as potentially unethical 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; Sunstein 2015).

In SimpliCITY none of these methods will be employed. The foreseen methods such as online challenges, competitions and other game-like methods are transparent regarding the aims and means that are being employed. These methods can be generally subsumed under the nudging method of social comparison because participants can compare their results to those of others.

While we see the nudging methods intended in SimpliCITY as not problematic in ethical terms, the research will still assess if any of the methods and specific techniques pose an issue when applied in practice. If this would be the case, an appropriate solution or alternative approach will be suggested.

Distinguishing between different types of nudges

Nudges use different techniques to steer the decision-making of people in a particular direction or affect behaviours directly. Characteristics of these techniques provide the basis to distinguish different types of nudges and to evaluate if these are appropriate in ethical terms.

In the discussion of nudges researchers and practitioners often refer to two distinctions which characterize the techniques that are being employed:

- if the techniques address “System 1” (automatic) or “System 2” (reflective) cognitive processes, and
- if the techniques work in a Transparent or Non-transparent way.

We briefly explain the distinctions “System 1” / “System 2” and Transparent / Non-transparent, and then use a matrix of these distinctions to discuss the different types of nudges. Thereafter we explain where the methods are positioned which will be trialled in SimpliCITY to increase the use of city services.

System 1 (automatic) versus System 2 (reflective)

The two systems theory of cognitive processes has been developed by Kahneman (2003, 2011). According to this theory the human brain works in two different ways:

- "*System 1":* processes information fast, uncontrolled and effortless in a quasi-automatic way,
- "*System 2":* processes information slow, controlled and effortful in a reflective way.

It is assumed that people make most judgements and choices of daily life quasi-automatically, i.e. without really making a reflected conscious decision. Automatic here means based on cognitive biases, heuristics and mental shortcuts, while reflective involves following rules of logical thinking, weighing the costs and benefits of various options, or other ways to arrive at a well-considered decision.

Transparent versus Non-transparent

The distinction refers to the intention as well as the means employed in a nudge:

- *Transparent:* the intention is clear and people are made aware or can easily identify the means employed to influence their decision-making or behaviour,
- *Non-transparent:* the intention is not disclosed and the means by which a certain decision or behaviour change is pursued remain hidden.

Obviously nudges with non-transparent conditions combined with triggering System 1 (automatic) cognitive processes are highly manipulative, while addressing System 2 (reflective) transparently regarding the intention and means appears as a legitimate way of trying to persuade citizens to take a particular decision or change a behaviour.

Matrix of types of nudges

Hansen & Jespersen (2013) combined the two distinctions in a matrix that allows grouping and evaluating different types of nudges. Table 1 presents the matrix, in which we included techniques that are often used for certain types of nudges, and examples from the literature (e.g. Elberg-Nielsen et al. 2016; Hansen & Jespersen 2013: 20-23; Stanak & Winkler 2015).

An important general aspect is that nudges addressing "System 1" are intended to influence behaviours directly while "System 2" nudges concern decision-making.

"System 1" – transparent nudges typically come in the form of a technical manipulation and are warning people (e.g. car alarms for seat belts), while *"System 1" – non-transparent nudges* aim to change people's behaviour by changing the environment of choices (e.g. re-ordering the food in a canteen so that the healthier options are presented first).

"System 2" – transparent nudges are clear regarding the objective and means, where the latter typically is informing people (e.g. nutritional labelling of food products). *"System 2" – non-transparent nudges* address people's reflective system but are not fully clear about the means that are employed to influence the decision-making (e.g. most people will not know about psychological effects of a default opt-in).

Table 1: Matrix of types of nudges, adapted from Hansen & Jensen (2013).

	System 1 (automatic) ***Nudge affects behaviour directly***	***System 2 (reflective)*** ***Nudge affects choice directly***
Transparent (by design)	**Transparent influence of behaviour** Techniques: Typically in the form of a technical manipulation Examples: Car alarms for seat belts Provide larger household recycling than waste bins Change printer defaults from one-side to double-sided printing	**Transparent facilitation of choice** Techniques: Provide information, education and guidance Examples: Nutritional labelling of food products Information that most people pay their taxes in time (social norm) Comparison of own energy consumption to those of other people (social comparison)
Non-transparent	**Non-transparent manipulation of behaviour** Techniques: Change the environment (physical arrangements and/or objects) in which people make choices Examples: Narrow the side-lines on a road in order to get drivers to slow down Eliminate cues for smoking by keeping cigarettes and ashtrays out of sight Provide smaller plates in self-service restaurants to reduce food waste	**Manipulation of choice** Techniques: Various techniques, e.g. salience, framing, priming, default opt-in Examples: Making one option more salient than the alternative (salience) Framing one decision as involving a potential loss (activating people's loss aversion) Default opt-in, where one must actively opt-out to prevent enrolment in a programme

Evaluation of nudging methods intended in SimpliCITY

The nudging methods that will be trialled in SimpliCITY to increase the use of city services belong to the "System 2" (reflective) and transparent methods. These methods encourage people to take a well-informed decision and change behaviours, for example, through an educational campaign, labelling (e.g. nutritional information labels), or information about what others do or don't (social norms and comparison).

"System 2" and transparent methods can facilitate deliberate, reflective and reasoned decision-making by citizens. Therefore these methods are the least debated forms of nudging and generally seen as ethically appropriate ways of trying to persuade citizens to

take a particular decision and change behaviours (Hansen & Jespersen 2013; Hausman & Welch 2010; Ivanković & Engelen 2019; Lin et al. 2017). Also surveys on citizen's opinion about different nudges show that the public supports these methods with much higher approval rates than other proposed forms of nudging (Reisch & Sunstein 2016; Sunstein et al. 2018a/b).

The methods foreseen in SimpliCITY are online challenges, competitions and other game-like methods which promote "System 2" processes in a transparent way regarding the aims (e.g. increase cycling of citizens instead of using the care) and means (e.g. a competition to promote that behaviour). These methods can be generally subsumed under the nudging method of social comparison because participants can compare their results to those of others.

Social comparison has often been used in programmes aimed to reduce home energy and water consumption (e.g. Allcott & Rogers 2014; Ashby et al. 2012; Ayres et al. 2009; Datta et al. 2017; Ferraro & Price 2011; Nolan et al. 2008; Schultz et al. 2007). In such programmes people receive consumption reports, including comparison to others in the town or neighbourhood, and tips how to consume less. The approach can yield significant reductions especially if repeated reporting leads people to gradually adapt their behaviour, e.g. develop different energy use habits, use energy-efficient lightbulbs or appliances, etc., for example in the OPOWER energy efficiency programme (Allcott & Rogers 2014; Frey & Rogers 2014).

Important differences of the SimpliCITY approach to these programmes are that the methods employed aim to *increase* citizen's use of city services for sustainable mobility (bike mobility), local production & consumption, and digital social inclusion, and the platform that provides the functionalities for these methods allows *dynamic presentation* of citizen's participation online and on mobile devices.

Appendix II: Data archiving in Zenodo

SimpliCITY will use the open access repository Zenodo (www.zenodo.org) for long-term data storage, preservation and access of project results, including data which underpin research publications as well as copies of the publications. Furthermore data which is not directly related to research publications may be archived if it can be assumed to be of value for other researchers.

Zenodo offers a number of benefits which are presented in the following table (based on: Grootveld & Nowak 2016; OpenAIRE 2017; Zenodo: General Policies; Principles; Terms of Use):

Aspects	***Benefits of using the Zenodo repository***
International	The repository is being provided by the international scientific research centre CERN (European Organization for Nuclear Research), in close cooperation with OpenAIRE, which supports the open research data initiative of the European Commission.
Multi-domain	Allows deposits from all domains of research as well as educational and informational content.
DOIs	Registers and assigns a DataCite DOI (Digital Object Identifier) to every publicly available upload, making data records and deposited content easily and uniquely citable, e.g. when content is being reused.
DOI versioning	Supports DOI versioning at the file level which allows depositors to update published documents and datasets and users to cite the latest version.
Data types/formats	Accepts data, publications and other research output in all formats.
Data volume	Allows up to 50 Gigabytes (GB) per dataset and users can upload multiple datasets.
Preservation	Long-term preservation is secured as the deposited data records and files are stored in CERN's Data Center in the same storage system which is being used for the high energy physics data; CERN has an experimental programme defined for (at least) the next 20 years.
Costs	All material can be deposited and are preserved free of charge.
Metadata	Rich set of metadata elements aligned with the DataCite metadata schema, which is one of the broadest cross-domain standards available. Metadata is exported in different formats such as Dublin Core, MARCXML and the format required by OpenAIRE.

Metadata sharing	Makes the metadata available for harvesting based on OAI-PMH (Open Archives Initiative - Protocol for Metadata Harvesting) by aggregators and search portals, e.g. BASE (Bielefeld Academic Search Engine), OpenAIRE and others; also provides an API for programmatic access and retrieval.
Data organisation	Projects can create and curate a community collection for all project output.
Linking	Supports rich linking between material stored in the repository as well as external content with a stable identifier (“Related Identifiers”).
Licensing	Depositors are free to choose a license from a long list of options in the Zenodo deposit facility. SimpliCITY will apply the Creative Commons Attribution ShareAlike (CC BY-SA) license with the attribution: SimpliCITY Project (JPI Urban Europe).
Altmetrics	Presents altmetrics (alternative metrics) data for deposited content, e.g. blogs or tweets mentioning it with the DOI (the information is provided by Altmetric.com). Deposits in Zenodo have quite some impact with regard to traditional and new metrics (Peters et al. 2017).

Zenodo fulfils very well the requirements for making available the research output from the SimpliCITY project. As a repository supported by CERN we trust Zenodo to be the best way to ensure easy and long-term access for re-using SimpliCITY research data and documents.

Appendix III: Zenodo discovery metadata

This Appendix describes the metadata for SimpliCITY deposits in the Zenodo repository. A deposit can be a single file or a set of related files. In the following table we describe the metadata for single files. The description of the metadata fields is based on more detailed information Zenodo provides for data service developers and users (see Zenodo: Depositions). The Zenodo deposit system distinguishes between Basic and Optional information. Basic metadata fields have to be filled first, Optional information given in related fields thereafter. This allows depositors who do not wish to provide rich metadata depositing material quickly. The table below does not reproduce this scheme. Here the metadata fields are listed and described not following an input but presentation logic.

Attribute	**Description**
Upload (type):	The Zenodo controlled vocabulary distinguishes the following types of uploads: Dataset, Publication, Poster, Presentation, Image, Video/Audio, Software. For uploads of two types the vocabulary contains narrower terms: Image (e.g. Photo, Figure, Drawing) and Publication (e.g. Preprint, Journal article, Conference paper). If the deposit is a published paper, report, book or book chapter, detailed bibliographic metadata can be provided in the deposit record.
Title:	Title of the deposit (a title that succinctly conveys the nature and scope of the material).
DOI (pre-reserve):	A DOI for the deposit is automatically generated by Zenodo. It is registered with DataCite when the deposit is published. [Note: If a publisher has already assigned one (e.g. for a journal paper) that DOI should be inserted in the metadata field.] Pre-reserved DOIs can be used for relating deposit items (see Related identifiers), or if a publisher requests a DOI for deposited but not yet published research data. Since June 2017 Zenodo also supports versioning of DOIs.
Publication date:	Date of publication in ISO 8601 (yyyy-mm-dd); defaults to current date.
Version:	Can be used to specify the version of deposited items. The system accepts any string (for example, 1.1, 1.1.0, 2018.01). Zenodo recently added this field to the metadata schema to support the versioning of software deposits, but it is also useful if a new version of a report or dataset is deposited.
Language:	Here the (primary) language of the material will be specified in ISO 639-3 code, for example, eng for English. If the main language is unclear ISO 639-3 mul (Multiple Languages) can be used.
Creators:	The names of the creators (authors) of the material and their affiliation; also available identifiers (e.g. ORCID) can be added.

Contributors:	In addition to the author/s of the material given in the field “Creators”, here the names of other individuals who played a role in its creation will be identified. The controlled vocabulary of their roles includes, e.g. Researcher, Data Collector, Data Manager, Data Curator, Editor. For each contributor also the affiliation and an identifier (e.g. ORCID) can be added.
Description:	Description of the deposited material. For a publication an available abstract or other brief description can be used. The description of a dataset will provide information such as project context, method and time of data collection, region, number and demographics of participants.
Additional notes:	May be used for adding information about the material such as specific features, collection/production context, or other.
Keywords:	Appropriate free-text keywords for the deposited material.
Subjects:	In addition to the free text keywords, here relevant terms from controlled vocabulary (e.g. taxonomy or thesaurus) can be provided. Each of these terms must be uniquely identified. Both the term and the identifier (URL) must be provided.
Related/alternate identifiers:	In Zenodo the relation between the deposited material and one or more other content items (in Zenodo or elsewhere) can be specified, but the persistent identifier (e.g. DOI) of the related item must be provided. This functionality can be used for rich interlinking of content. The controlled vocabulary of relations includes, e.g., is previous version of this upload, is supplemented by this upload, is a supplement to this upload, is referenced by this upload, references this upload. The persistent identifier (link) for the related material is also included in the metadata Zenodo exports in a machine-readable form.
References:	Can be used to mention content (e.g. legislation, surveys, reports, articles) which provides further information on topics of the deposited material.
Access right:	Controlled vocabulary: Open Access, Embargoed Access, Restricted Access, Closed Access; and defaults to Open Access, which will be used for SimpliCITY deposits.
License:	The license selected from the controlled vocabulary; SimpliCITY will apply the Creative Commons Attribution ShareAlike (CC BY-SA) license with the attribution SimpliCITY Project (JPI Urban Europe). Note: Zenodo metadata is generally licensed under the Creative Commons Zero (CC0) license.
Grants:	JPI Urban Europe, 870739

Communities:	A community in Zenodo is a curated collection of content, for example, publications on a specific topic, papers of conference proceedings or material of a project. SimpliCITY will set up such a community in Zenodo, which will have a DOI that allows referencing the whole collection.

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