



---

# Nudging Repository

Version 2.0

Deliverable 2.2a

---

Project title:	<b>Dynamic Mobility Nudge: Shaping sustainable urban mobility behaviour with real-time, user generated and public open data</b>
Project acronym:	<b>DyMoN</b>
Project duration:	05/2021 – 04/2024
Project number:	886495
Work package/Task:	WP2
Project website:	<a href="http://www.dymon.eu">www.dymon.eu</a>
Authors:	Claudia Luger-Bazinger, David Leistner, Veronika Hornung-Prähauser, Guntram Geser, Salzburg Research Forschungsgesellschaft mbH  Martin Loidl, Dana Kaziyeva, University of Salzburg, Department of Geoinformatics

---

URBAN EUROPE



This project has received funding in the framework of the Joint Programming Initiative Urban Europe.

## Document Versions

Version	Date	Changes	Author/s
V1.0	26.08.2022	Final version of nudging repository	Claudia Luger-Bazinger
V1.1	14.10.2022	Changes in variable explanation of the repository	Claudia Luger-Bazinger
V2.0	27.01.2023	Final proofreading of repository	David Leistner

## Table of content

Administrative Information .....	4
Purpose of the document .....	5
1 Background.....	6
2 Design of the repository.....	7
3 Variables in the Nudging Repository.....	8
4 Use of the nudging repository.....	9
5 References.....	10

## Administrative Information

Basic information on the DyMoN project and the present deliverable:

---

<b>Project title</b>	Dynamic Mobility Nudge: Shaping sustainable urban mobility behaviour with real-time, user generated and public open data
<b>Project coordinator</b>	Salzburg Research Forschungsgesellschaft mbH (SRFG), Salzburg, Austria; project coordinator: Dr. Claudia Luger-Bazinger
<b>Project partners</b>	University of Salzburg, Department of Geoinformatics, Austria Trafficon – Traffic Consultants GmbH, Germany Uppsala University, Department of Civil and Industrial Engineering and Built Environment, Sweden Sustainability InnoCenter, Sweden Ecollective, Sweden
<b>Funding</b>	JPI Urban Europe: ERA-NET Cofund Urban Accessibility and Connectivity (ENUAC) Funding is being provided by the Austrian Research Promotion Agency (FFG) for the Austrian project partners, Energimyndigheten (Sweden) for the Swedish project partners, Bundesministerium für Bildung und Forschung (BMBF) for the German project partner.
<b>Project nr.</b>	886495
<b>Duration</b>	05/2021 – 04/2024
<b>Webpage</b>	<a href="http://www.dymon.eu">www.dymon.eu</a>
<b>Deliverable number</b>	D 2.2a
<b>Deliverable title</b>	Nudging repository
<b>Authors</b>	Claudia Luger-Bazinger, David Leistner, Guntram Geser, Veronika Hornung-Prähauser, Martin Loidl, Dana Kaziyeva
<b>Version &amp; status</b>	Version 2.0
<b>Date</b>	27.01.2023

---

## Purpose of the document

This document is part of task T2.3: “Nudging repository design and content”:

- Design of the repository database by (a) combining the set of most effective nudging methods for sustainable mobility (selected in T2.1) with situation-specific (‘if - then’) conditions, b) definition of situational and personal characteristics relevant for mobility behaviour (closely related to T3.3), and (c) development of the content of suitable digital nudges such as goal setting, reminders, social comparison, among others.

This document therefore contains a list of digital behaviour change techniques (i.e. nudges) that are suitable to be used as push notifications for a mobile application in order to motivate sustainable, active mobility (walking, bicycling, public transport). The nudging repository is the result of the literature review described in deliverable 2.1a. The nudging repository will be tested in the proof of concept phase (WP 4), in both Salzburg and Uppsala. The technical implementation of the nudging repository (i.e. ontologies with relevant context data) will be carried out by ZGIS in WP3.

# 1 Background

The nudging repository is rooted in the COM-B model (Michie et al., 2011) and the resulting behaviour change techniques taxonomy (Michie et al., 2013) (the reasoning behind the choice for this model of behaviour change is elaborated in deliverable 2.1a “Nudging Review”).

The COM-B model (Michie et al., 2011) proposes that a specific behaviour “will occur only when the person concerned has the capability and opportunity to engage in the behaviour and is more motivated to enact that behaviour than any other behaviour” (West & Michie, 2020). Therefore, the relevant elements of the COM-B model, as its acronym suggests, are capability, opportunity and motivation that are interacting to generate behaviour (see Figure 1). Capability is related to the individual person’s ability, both psychological and physical, to show the relevant behaviour. It describes psychological capability like knowledge, skill, memory or attention as well as physical capability like fitness level or not being hindered by an impairment. Opportunity describes factors that lie in the environment of the person which make a specific behaviour possible. It is related to both an individual’s social and physical opportunity. Opportunity is not necessarily in the person’s control, for example, living in an area with good public transport. Motivation relates to motivational processes as well as to habits, emotional responses or conscious decisions, it includes both automatic and reflective motivational processes.

The COM-B model was also included in a behaviour change wheel (BCW) that already referenced different types of interventions (e.g. training, restrictions) and policy categories (e.g. guidelines, regulation) (Michie et al., 2011). In addition, the Behaviour Change Technique Taxonomy v1 (BCTTv1) (Michie et al., 2013) has been developed, which can be described as a fusion of the COM-B model with the Theoretical Domains Framework (TDF) (Cane et al., 2012). The BCTTv1 is a collection of 93 different behaviour change techniques that are grouped into 16 categories. The behaviour change techniques are the ‘active ingredients’ of behaviour change interventions (Scott et al., 2020). The BCTTv1 can be used for coding interventions (e.g. in a review or meta-analysis), but more importantly to our case, it can also be used for designing effective interventions. Indeed, it has been shown that interventions that are based on behaviour change techniques are more effective than those which are not (Dombrowski et al., 2010; Michie et al., 2009).

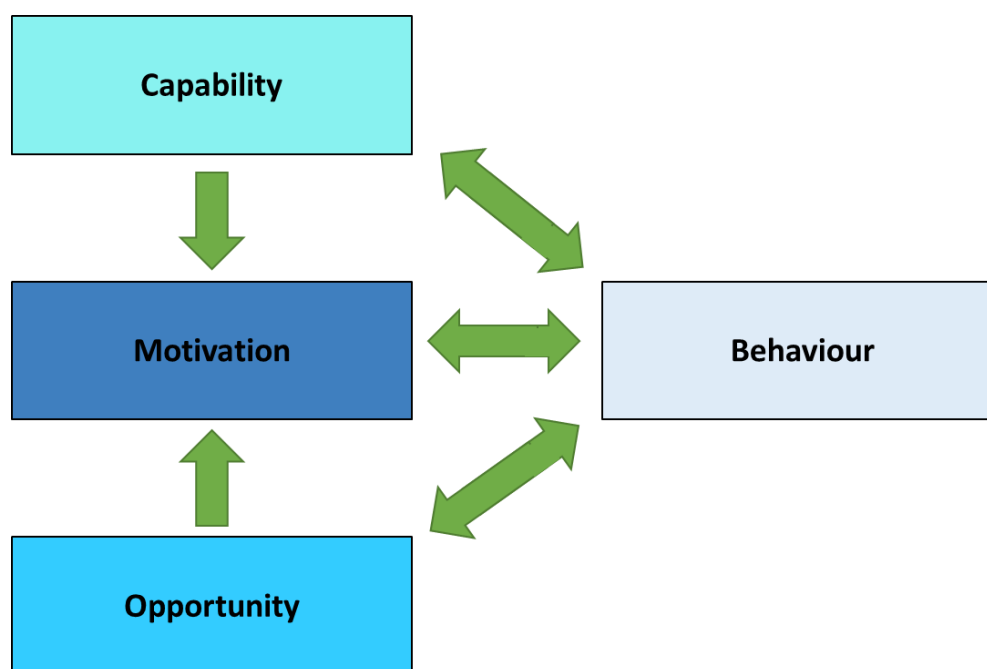


Figure 1. The COM-B Model (Michie et al., 2011).

The COM-B model serves as behaviour change model for the DyMoN project, and for designing the (digital) behaviour change interventions aimed to encourage less car use in favour of more sustainable mobility modes, specifically, walking, bicycling, public transport.

## 2 Design of the repository

For the design of the nudging repository, which is a set of possible digital, situation-aware behaviour change techniques (i.e. “nudges”) that are delivered via an app to citizens, the BCTTv1 was being used.

- The BCTTv1 is divided into different groups that cluster the behaviour change techniques further. For DyMoN, all groups were reviewed in order to examine their suitability for the project, and all groups are found within the nudging repository (16 groups in total).
- In each group, there are specific types of techniques (e.g. social comparison) that can be used. In DyMoN, each technique within each group was reviewed for its potential for use in the nudging repository. Keeping the focus on mobility behaviour and digital interventions, not all techniques that have been identified by Michie et al. are in the nudging repository (46 behaviour change techniques used in total).
- Each behaviour change technique (i.e. the “nudges”) was also categorized whether it targets capability, motivation or opportunity. As the nudges will be delivered in a digital format, in the form of notifications or features within an app, the possibilities are of

course limited. Most of the nudges in the nudging repository focus on motivation or capability, some of them on opportunity. However, the situation-awareness can be combined with these interventions as the additional element of opportunity.

- **Situation-awareness:** For all nudges, it was examined whether they would be most effective within a specific location or within specific conditions. For example, one nudges should encourage people to use their bicycle to get to work, even though it might be raining, appealing to a sense of community among those “bad weather bicyclists”. For this, it is necessary that the nudge only reaches a person when there is rainfall and the person is also able to bicycle to work as expressed by proximity to bicycle lanes and bikeability of the commute. This situation-awareness of the nudges adds an additional element to the interventions, mainly targeting the opportunity element.

### 3 Variables in the Nudging Repository

The nudging repository is a table consisting of the following variables:

- **Number:** Consecutive number of nudges
- **Mobility Mode:** Describes whether this digital nudge targets walking, bicycling or public transport.
- **Trip purpose:** Nudge is suitable for commuting or for trips in free-time or the weekend
- **Behaviour Change Group:** Group of behaviour change techniques, clustered according to the BCTTV1 (Michie et al., 2013).
- **Behaviour Change Technique:** Type of behaviour change technique
- **Description of technique:** Explanation on how the behaviour change techniques / nudges work
- **Text example:** Text example for digital nudge (can be used as e.g. notification or e-mail)
- **Situation-aware (*dichotomous*):** Describes whether this nudge can be linked to context data about a specific situation (e.g. weather or traffic conditions)
- **Situational factors:** If the nudge can be made “situation-aware” (i.e. linked to context data about a specific situation, see previous variable), this variables describes what kind of data and the specific conditions would entail, for example, warm temperatures, proximity to public transport infrastructure etc.
- **Timing:** Specified point in time when the nudge should be delivered (e.g. a notification should be sent out in the morning when people are getting ready for work).



- **General use (dichotomous):** While a situation-aware nudge might be more precise and effective as it takes into consideration the context of person, this variable describes nudges that can be also used without linking them to specific data.

## 4 Use of the nudging repository

The nudging repository serves as a resource of possible, digital nudges for motivating sustainable mobility. It can be used by researchers, city representatives or organizations that work with a mobile application that allows to send out push notifications to its users at its most basic level. The structure of the nudging repository is modular and supports filtering:

- Nudges can target different modes of transport, as described in the variable “Mode of transport”. Therefore, if one is interested in only targeting bicycling, the nudging repository can be filtered for that.
- Nudges can be selected according to different groups (i.e. clusters) of behaviour change techniques.
- Nudges can be selected according to different trip purposes (leisure or commuting).
- Nudges within the nudging repository can also be used if the relevant data is not available or not completely available (filter by “general use”). Then the nudges would be sent out by a timed schedule (e.g. in the morning) instead of depending on situational context.
- Nudges can also take the form of e-mails, for example during a specific activity period for fostering sustainable mobility such as bicycle week, instead of push notifications if that functionality is not available.
- If the nudges are used within an app as notifications, certain requirements might need to be regarded in order to fit seamlessly within the app, such as language, wording, use of emojis, character limits.

## 5 References

- Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7(1), 1–17. <https://doi.org/10.1186/1748-5908-7-37/TABLES/3>
- Dombrowski, S. U., Sniehotta, F. F., Avenell, A., Johnston, M., MacLennan, G., & Araújo-Soares, V. (2010). Identifying active ingredients in complex behavioural interventions for obese adults with obesity-related co-morbidities or additional risk factors for co-morbidities: a systematic review. *Health Psychology Review*, 6(1), 7–32. <https://doi.org/10.1080/17437199.2010.513298>
- Michie, S., Abraham, C., Whittington, C., McAteer, J., & Gupta, S. (2009). Effective Techniques in Healthy Eating and Physical Activity Interventions: A Meta-Regression. *Health Psychology*, 28(6), 690–701. <https://doi.org/10.1037/A0016136>
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46(1), 81–95. <https://doi.org/10.1007/S12160-013-9486-6>
- Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6(1), 1–12. <https://doi.org/10.1186/1748-5908-6-42>
- Scott, C., De Barra, M., Johnston, M., De Bruin, M., Scott, N., Matheson, C., Bond, C., & Watson, M. C. (2020). Using the behaviour change technique taxonomy v1 (BCTTv1) to identify the active ingredients of pharmacist interventions to improve non-hospitalised patient health outcomes. *BMJ Open*, 10(9), e036500. <https://doi.org/10.1136/BMJOPEN-2019-036500>
- West, R., & Michie, S. (2020). A brief introduction to the COM-B Model of behaviour and the PRIME Theory of motivation. *Qeios*. <https://doi.org/10.32388/WW04E6.2>