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## Webshop prototype for behaviour change interventions for sustainable logistics choices

Deliverable 3.4

Version 1.0

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## List of abbreviations

AI	Artificial intelligence
API	Application programming interface
BCT	Behaviour change technique
CO <sub>2</sub>	Carbon dioxide
D	Deliverable
DHL	Dalsey, Hillblom and Lynn
EU	European Union
GDPR	General Data Protection Regulation
GHG	Greenhouse gas
H0	Null hypothesis
H1	Alternative hypothesis
IT	Information technology
SME	Small and medium-sized enterprise
T	Task
UI	User interface
UX	User experience
V	Version

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## Administrative information

Basic information on the SuCoLo project and this deliverable:

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## Purpose of the document

This document presents the development and implementation of a webshop prototype aimed at encouraging sustainable delivery choices through digital behaviour change techniques (BCTs). More broadly, this prototype serves to fulfil the SuCoLo project's objectives, which seeks to promote sustainable logistics solutions in urban outskirts by leveraging psychological models of behaviour change and inclusive cargo-bike logistics. The prototype builds on prior research (e.g., D3.1 *Scientific publication of reviewed behaviour change techniques for sustainable logistics* and *Supplemental Report: Best practices catalogue of behaviour change techniques to encourage sustainable consumer delivery choices*) that reviewed and catalogued effective BCTs for influencing consumer behaviour toward green delivery options. These interventions include strategies like providing information about environmental impacts, social comparisons, material incentives, restructuring digital environments to "nudge" users toward sustainable choices, and more. In the same vein, co-creation activities with webshop owners and consumers were also incorporated to ensure the solutions are practical and widely adoptable. This webshop underwent several development iterations, and now several variations of it with different BCTs will be tested among an Austrian sample.

**You can access a copy of the UX and customer journey of the webshop prototypes utilised in this study here:**

<https://zenodo.org/records/15180498>

## Executive Summary

This deliverable outlines the process of creating the inventory of BCTs used for the purpose of the SuCoLo study, creating a repository of categorized BCTs to guide future implementations (T3.3 *Inventory of digital behaviour change strategies for sustainable logistics choices*). As well, the development of the experimental design used to test the effectiveness of these BCTs in the SuCoLo webshop prototype is delineated. This includes a between-subjects design with multiple treatment groups exposed to different BCTs and a control group. The research addresses key questions about how BCTs, consumer values, demographics, and other factors influence delivery choices. For example, hypotheses explore whether individuals with higher sustainability value orientations or those exposed to specific priming information are more likely to select sustainable cargo-bike delivery options. The prototype integrates these BCTs into its architecture using an agile development process, ensuring iterative refinement based on user feedback. The development roadmap includes detailed descriptions of user journeys, UI/UX designs, and lessons learned from each iteration. By combining innovative digital strategies with community-centred design that will be tested in the SuCoLo research pilot, this deliverable contributes a scalable solution for reducing greenhouse gas emissions in e-commerce logistics while promoting inclusivity in urban outskirts.

In a nutshell:

- To create a new inventory of BCTs for sustainable consumer delivery choices, the sequence of intervention design by Rubinstein (2018) was employed to apply behavioural science and its associated interventions into a private sector context.
- Shortlisted BCT ideas were ranked according to the APEASE criteria (West et al., 2019), which considered the BCT's acceptability, practicability, effectiveness and affordability to choose the top six BCTs that will be employed in the study.
- Following the COM-B Model (Michie et al., 2013; Michie, van Stralen & West, 2011), the six new BCTs that were developed target one's reflective motivation (M-Re), automatic motivation (M-Au), and psychological capability (C-Ps) by means of *educating, persuading, incentivising* and *environmental restructuring*.
- The agile development of the webshop prototype as a digital behavioural interventions tool on software FIGMA was conducted in three iterative steps following gradual input, e.g., prior co-creation activities and a pre-test. Concurrently, this webshop prototype was integrated into a survey on the software MAZE which logs the respondents' demographics, psychographics (e.g., online shopping behaviour, sustainability values) and nudge acceptance.
- The next step will be the testing of this digital behavioural intervention tool among an Austrian sample ( $N = >1.000$ ) as part of the SuCoLo Salzburg research pilot.



## 1. Background and motivation

The 15-minute city concept can be extended to urban outskirts by integrating e-commerce, sustainable goods delivery, and local pick-up options, compensating for the limited availability of fixed service facilities. However, these areas often face challenges such as high greenhouse gas emissions from car use and a lack of inclusivity. This project aims to develop a deep understanding of how to inspire sustainable online consumer behaviour and implement inclusive cargo-bike logistics to promote net-zero delivery and pick-up methods in urban outskirts. By leveraging psychological models of behaviour change, the project will create digital strategies to encourage citizens to make sustainable logistics choices when shopping online. Such behaviour change interventions (BCTs) can be implemented building on psychological models of behaviour change (Michie et al., 2013) for effectivity, which considers users' capabilities, opportunities and motivations for carrying out a certain behaviour. Additionally, the software requirements and preferences of both citizens and webshops warrant more research and exploration using a community-centred approach.

Furthermore, shopping on e-commerce sites has steadily increased (eMarketer, 2023), and without interventions, major cities could see a 36% increase in delivery vehicles by 2030 (World Economic Forum, 2020), leading to higher emissions and congestion. Furthermore, a greater number of delivery parcels has given rise to increased negative environmental externalities, namely air pollution, noise pollution, traffic congestion and greenhouse gas (GHG) emissions (Wernbacher et al., 2023a). In particular, the last-mile delivery segment, which involves moving parcels from local warehouses to final destinations, accounts for a large portion of delivery CO<sub>2</sub> emissions in Europe (Higgs et al., 2022). So far, the emphasis has primarily been on supply-side solutions, such as adopting cleaner vehicles (Ignat & Chankov, 2020; Viu-Roig & Alvarez-Palau, 2020), such as e-cargo bikes. E-cargo bikes in particular offer a practical alternative to traditional and electric cars and vans, with the potential to enhance the sustainability of urban logistics, especially for last-mile deliveries (Malik et al., 2023). This is due to the fact that cargo bikes are virtually noiseless, zero emissions, and are efficient to maneuver (Anderluh & Nolz, 2022). In recent times, the proportion of commercial delivery services via e-cargo bike has steadily increased, in line with the New EU Urban Mobility Framework, which denotes e-cargo bikes' utility in terms of moving goods in urban areas (European Commission, 2021). Furthermore, platform-based delivery services have contributed to the growth of bicycle courier work, where the rise of on-demand delivery platforms has created new opportunities for bicycle couriers to expand their operations and meet the growing demand for sustainable last-mile deliveries (Suslowicz & Brömmelstroet, 2024). Such courier initiatives have taken form as small enterprises or community-driven cooperatives that work together with local businesses, municipalities and other courier services to effectively work towards social and environmental goals, such as FULMO Kurierunion in Leipzig, Germany (<https://fulmo.cc/>). In doing so, overcoming large-scale obstacles can be done with small-scale, local solutions.

Although there is progress towards the use of clean courier vehicles, on the other side of the coin there is a growing recognition of the need for aligned-side approaches which motivate and encourage consumers to actively seize these environmentally friendly options (Lehner, Mont & Heiskanen, 2016). Amidst a trend towards greater sustainable consumerism, a greater number of buyers are willing to offer flexibility and accept longer wait times or additional costs for greener delivery options (Seven Senders, 2022). However, retailers to date have lacked with regard to equipping consumers with sustainable delivery choices (Buldeo Rai et al., 2021), which "contradict the growing sustainability awareness of many end customers" (Wernbacher

et al., 2023b:p.1). However, enterprises that emphasize such eco-attributes and have the potential to take advantage of this newfound consumer context and enhance their brand reputation (Becchetti, Salustri & Scaramozzino, 2020).

### 1.1. Encouraging sustainable consumer delivery choices

In an attempt to steer and nudge consumer behaviour, multiple behaviour change techniques (BCTs) with roots in psychology and behavioural economics, defined as “observable, replicable, and irreducible components of an intervention designed to alter or redirect causal processes that regulate behavior” (Michie et al., 2013:p.2) have been a topic of interest. Although BCTs to date have been mainly applied within the context of health interventions, BCTs and their corresponding taxonomy are conceived to be cross-disciplinary and utilised in different application domains (Michie et al., 2013). To date, BCTs to motivate and persuade consumers to choose green delivery options have been experimented with in studies (e.g., Buldeo Rai et al., 2021; Caspersen & Navrud, 2021; Nijssen et al., 2023); however, a bulk of such studies to date have only tested the same three types of BCTs. In our prior study, it was found to be the types (1) *Information about social and environmental consequences*, (2) *Social comparison*, and (3) *Material incentive* (Thelen, Hornung-Praehauser & Leistner, 2024). Furthermore, many prior studies conducted on this topic have only utilised a survey design, with a dearth of the studies using a simulator; doing so possibly overlooks the so-called *green gap*, “the discrepancy between what consumers say about their growing concern regarding the environment, on the one hand, and what they truly do to help sustain this environment” (ElHaffar, Durif & Dubé, 2020:p.1).

## 2. Current study

In order to find innovative BCTs that motivate and promote sustainable consumer delivery choices on online shops effectively, this research endeavours to go beyond existing studies by developing and incorporating novel BCT types which to our knowledge are not yet existent in the literature by: (1) offering a choice of the specific vehicle type (i.e., choosing between “*cargo bike delivery via a local courier service*” and “*standard delivery*”), (2) by utilising an experimental webshop prototype simulator which mimics a real-life shopping environment on a comparable local online retailer that sells regional products, and (3) by testing BCTs that can be readily adopted by and have the highest ease of use for local small and medium-sized businesses. Considering the eventual uptake of these BCTs by online retailers, it is acknowledged that over 50% of European SMEs conduct online sales (Eurostat, 2024), and that local, small online businesses do not always possess the expertise nor capability to develop and display complex BCTs that take a lot of backend coding (e.g., displaying of precise CO<sub>2</sub> calculations). In order to maximize the uptake of such BCTs by local online retailers, future BCTs to motivate sustainable consumer delivery choices should be straightforward and able to be adopted by local online shops that possess minimal IT expertise. Employing such an inclusive approach to local online retailers can also further promote the use of sustainable local and regional supply chains. All in all, by taking into account the aforementioned elements, developing BCTs in such a manner has the potential to accelerate the global triple transition, a “systemic approach that places the interlinkages and interconnections of the environmental, digital, and social aspects of development at the core” (OECD Development Centre, 2023:p.14). This is done by addressing the negative externalities brought on by e-commerce deliveries, while at the same time also nurturing sustainable local and economic development.

Hence, we intend to expand our research by concentrating on the following research questions:

1. How can behaviour change techniques that motivate and incentivize online consumers to choose cargo bike delivery be most optimally developed to the benefit of local online retailers, local cargo bike couriers and users?
2. How can a field test that simulates a real-life webshop environment be best developed to capture the effectiveness of behaviour change techniques?

## 2.1. Methods

First, a systematic literature review of previous relevant studies and a screening of online retailers were conducted to analyse currently implemented digital BCTs in studies and in practice and classifying them according to the Behaviour Change Technique Taxonomy of Michie et al. (2013). As learned in D3.1 *Scientific publication of reviewed behaviour change techniques for sustainable logistics* and *Supplemental Report: Best practices catalogue of behaviour change techniques to encourage sustainable consumer delivery choices*, the use of testing out a range of BCTs to encourage sustainable delivery choices on online shops has been explored in recent studies, and in a few cases, already been implemented on select webshops. Thus far, such BCTs/incentivisation methods have taken the form of predominately:

- **Information about social and environmental consequences**

*Description:* “Provide information (e.g. written, verbal, visual) about social and environmental consequences of performing the behaviour. Note: consequences can be for any target, not just the recipient(s) of the intervention” (Michie et al., 2013).

*Use case(s):* Displaying sustainability labels, green leaves, CO<sub>2</sub> calculations, better working conditions for delivery drivers, the number of trees saved, less freight traffic, less CO<sub>2</sub>, increased safety, particulate matter calculations.

- **Social comparison**

*Description:* “Draw attention to others’ performance to allow comparison with the person’s own performance Note: being in a group setting does not necessarily mean that social comparison is actually taking place” (Michie et al., 2013).

*Use case(s):* Displaying others’ delivery choices and others’ choices to share on social media.

- **Material incentive**

*Description:* “Inform that money, vouchers or other valued objects will be delivered if and only if there has been effort and/or progress in performing the behaviour” (Michie et al., 2013).

*Use case(s):* Offering discounts for the most sustainable delivery mode.

- **Restructuring the physical environment**

*Description:* “Change or advise to change the physical environment in order to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour (other than prompts/cues, rewards and punishments)” (Michie et al., 2013).

*Use case(s):* Setting the desired delivery mode as the digital default (i.e. “nudge”).

- **Identification of self as role model**

*Description:* “Inform that one’s own behaviour may be an example to others” (Michie et al., 2013).

*Use case(s):* Offering customers the chance to share their sustainable delivery selection onto their Facebook page.

- **Behaviour cost**

*Description:* “Arrange for withdrawal of something valued if and only if an unwanted behaviour is performed” (Michie et al., 2013).

*Use case(s):* Creating a cost surcharge for the undesired delivery option.

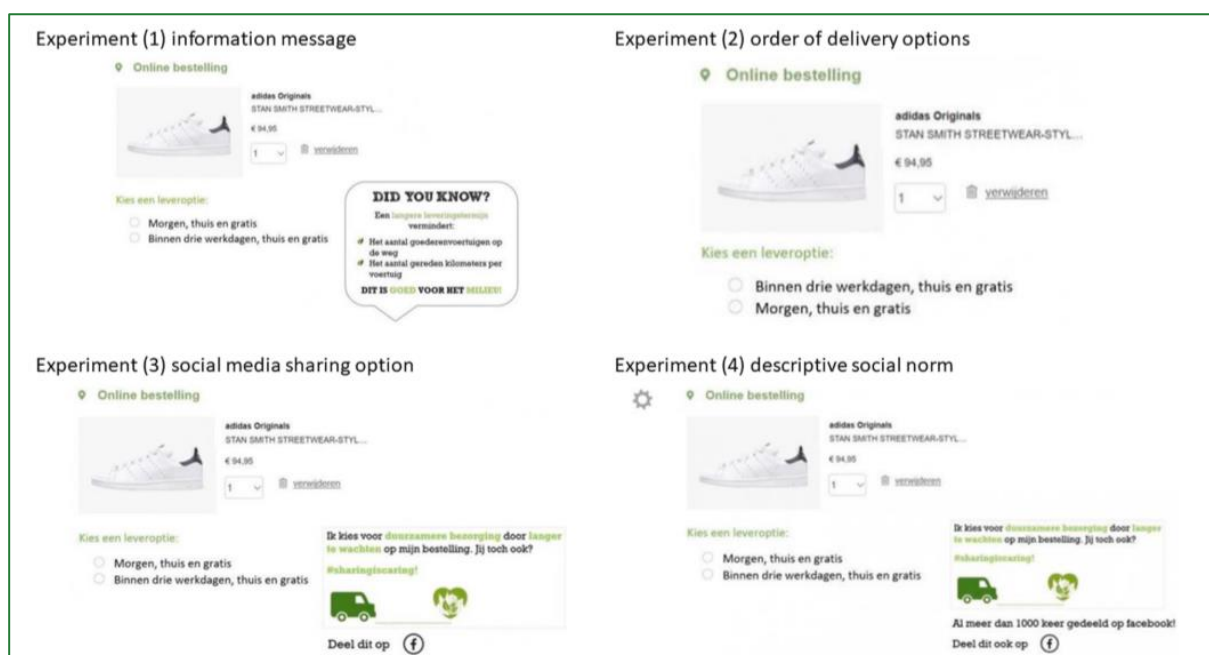


Figure 1 Example of customer-facing BCTs for sustainable consumer delivery choices during the check-out phase of an online retailer, demonstrated in a study by Buldeo Rai et al.:p. (2021:p.7)

This was complemented by a co-creation workshop with a panel of local online consumers and several interviews with owners of local online retailers and local bicycle couriers to assess their needs and preferences concerning BCT design and implementation. For more information concerning the initial co-creation activities with online consumers and webshop owners and their results, please consult *D3.2 Report on the open idea challenge and co-creation workshops*. After an internal design sprint, ideas for novel BCTs were developed according to the methodology of Rubinstein (2018) and ranked according to the APEASE criteria (West et al., 2019), which assesses BCTs based on their acceptability, predictability, effectiveness, affordability, side-effects and equity.

Thereafter, six novel behaviour change techniques for the context of the study will be implemented on the experimental webshop prototype simulator, which will be tested with prospective online shoppers based in Austria in the spring of 2025 ( $N = >1.000$ ). The online field test in a simulated webshop environment will involve respondents undertaking a task with

instructions (i.e., “choose *one or two products from the fictional store and complete the purchase as though you were making an actual purchase*”). Specifically, the simulator tests prospective online consumers’ choice of delivery option during the check-out phase of the customer journey, as they are confronted with two delivery options at checkout: *DHL standard delivery* or *local cargo bike courier delivery* (with the latter displaying an accompanying BCT alongside). Thereafter, a brief survey follows to gather insight on demographic and psychographic traits. Here, the total sample is assigned to one of six cases (five experimental groups with different displayed BCTs and one control group without a BCT) via random sampling. Thereafter, the sample’s delivery choices will be quantitatively analysed to measure the effectiveness of the tested BCTs according to different user groups. The webshop prototype was developed by SuCoLo partner VIABIRDS Technologies in close coordination with Salzburg Research and with input from the consortium partners. This close coordination amongst the consortium and co-creation with webshop owners who are “follower webshops” and closely involved in webshop co-creation activities ensure maximum effectiveness and uptake potential of the digital solutions procured in SuCoLo.

The research questions guiding the development of the webshop prototype and the research questions that the utilisation of the webshop prototype aim to answer are the following:

Table 1 Research questions guiding the development of the webshop prototype

Research Questions	
<b>RQ1</b>	How can behaviour change techniques that motivate and incentivize online consumers to choose cargo bike delivery be most optimally developed to the benefit of local online retailers, local cargo bike couriers and users?
<b>RQ2</b>	How can a field test that simulates a real-life webshop environment be best developed to capture the effectiveness of behaviour change techniques?

Table 2 Research questions the utilisation of the webshop prototype aims to answer

Research Questions	
<b>RQ1</b>	To what extent can Behaviour Change Techniques (BCTs) lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?
	<b>RQ1.1</b> To what extent can a green leaf BCT lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?
	<b>RQ1.2</b> To what extent can a default BCT lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?
	<b>RQ1.3</b> To what extent can a customer loyalty point BCT lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?

	<b>RQ1.4</b> To what extent can a priming BCT lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?
	<b>RQ1.5</b> To what extent can an urgency BCT lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?
	<b>RQ1.6</b> To what extent can a voucher BCT lead to people choosing sustainable cargo bike delivery over standard delivery in a webshop simulator?
<b>RQ2</b>	To what extent does one's sustainability values influence these choice processes?
<b>RQ3</b>	To what extent does one's gender, income, and level of urbanisation influence these choice processes?
<b>RQ4</b>	To what extent does one's acceptance of these BCTs influence these choice processes?
<b>RQ5</b>	To what extent does one's online shopping behaviour influence these choice processes?

## 2.2. Synthesis and preliminary results

Although still currently under way, our research employs a multifaceted approach by helping equip local online enterprises to stay competitive and market their sustainability attributes. At the same time, the use of local cargo bike courier services can be promoted, and sustainable consumerism can be nurtured by making online buyers cognizant of the eco-attributes of their delivery choices. In doing so, shorter, local supply chains are given greater attention and the negative externalities brought on by the increased use of e-commerce can be better mitigated. By aiming to tackle such a wider, systemic issue through a lens of local, user and community-driven solutions, our research aims to scale more sustainable last-mile delivery and logistics operations that can be readily adopted by local actors. In doing so, resilient business models that answer to contemporary social and market contexts can be fostered, all the while spurring local economic development. Preliminary results point towards the general acceptance and usability of the developed BCTs and the webshop prototype simulator, which was well-received among a sample in a pre-test of 20+ respondents.

## 3. Developing novel BCTs for sustainable consumer delivery choices

### 3.1. Sequence of intervention design

To inform the SuCoLo project's development of novel BCTs for sustainable consumer delivery choices, the steps of intervention design serve as a blueprint from the book *"Applying Behavioural Science to the Private Sector"*, Chapter *"The application of theory to intervention design"* by Rubinstein (2018).

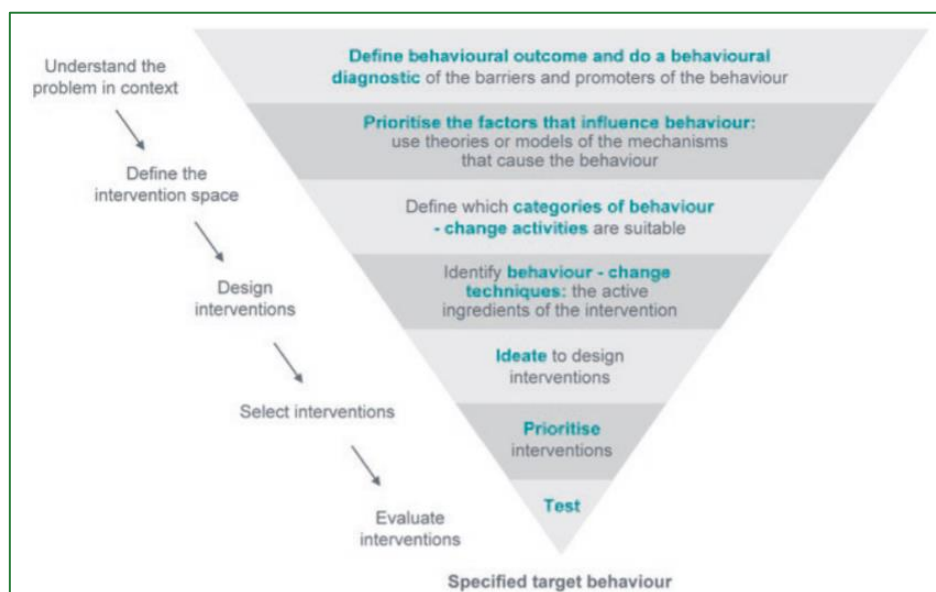


Figure 2 The five steps of intervention design (Rubinstein, 2018:p.54)

### Step 1) Define behavioural outcome and do a behavioural diagnostic of the barriers and promoters of the behaviour

*Behavioural outcome:* Online shoppers choosing the cargo bike delivery option every time when it is offered to them

- a) Whose behaviour? Online shoppers who shop online at least two times per year, aged 18+, in Austria

*Behavioural diagnostic of the barriers and promoters of the behaviour (COM-B model):*

- b) Barriers of the behaviour
  - a. High price (reflective motivation)
  - b. Lack of awareness/knowledge (reflective motivation & psychological capability)
  - c. Potential loss of convenience (reflective motivation)
  - d. Social influence/stigma/shared beliefs (automatic motivation)
- c) Promoters of the behaviour
  - a. Behaviour change techniques (BCTs), which are defined as “observable, replicable, and irreducible components of an intervention designed to alter or redirect causal processes that regulate behavior” (Michie et al., 2013:p.2).

### Step 2) Prioritize the factors that influence behaviour: use theories or models of the mechanisms that cause the behaviour

The COM-B model, which states that “capability, opportunity, and motivation interact to generate behaviour that in turn influences these components [...]. Capability is defined as the individual’s psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills. Motivation is defined as all those brain processes

that energize and direct behaviour, not just goals and conscious decision-making. It includes habitual processes, emotional responding, as well as analytical decision-making. Opportunity is defined as all the factors that lie outside the individual that make the behaviour possible or prompt it” (Michie, van Stralen & West, 2011:p.4).

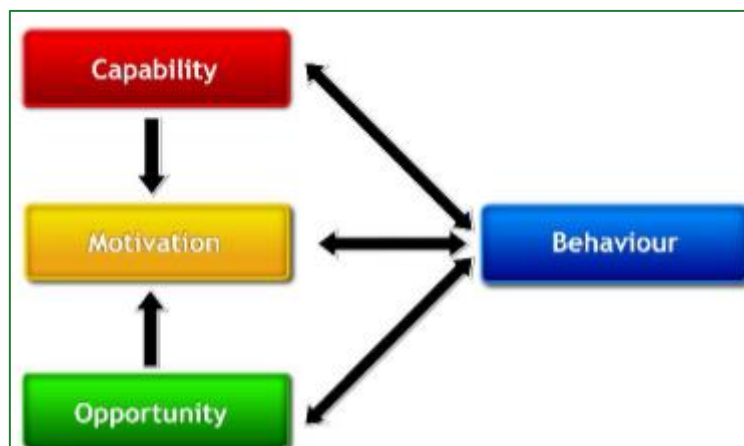


Figure 3 COM-B Model components (Michie, van Stralen & West, 2011:p.4)

and the accompanying Behaviour Change Taxonomy of Behaviour Change Interventions (Michie, van Stralen & West, 2011; Michie et al., 2013).

### Step 3) Define categories of behaviour change activities

- a. The categories of behaviour change activities are influenced by the implementing company's values or principles (i.e., regional online shops). In the end, the behaviour change activity groups “*education, persuasion, incentivization, environmental restructuring*” were most favoured for the purposes of the SuCoLo webshop prototype

Table 3 Definitions of interventions and policies, adapted from Michie, van Stralen & West (2011)

Label	Definition
<b>Education</b>	Increasing knowledge or understanding
<b>Persuasion</b>	Using communication to induce positive or negative feelings or stimulate action
<b>Incentivisation</b>	Creating expectation of reward
<b>Coercion</b>	Creating expectation of punishment or cost
<b>Training</b>	Imparting skills
<b>Restriction</b>	Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the



	opportunity to engage in competing behaviours)
<b>Environmental restructuring</b>	Changing the physical or social context
<b>Modelling</b>	Providing an example for people to aspire to or imitate
<b>Enablement</b>	Increasing means/reducing barriers to increase capability or opportunity

When looking at the four chosen BCT categories (*education, persuasion, incentivization and environmental restructuring*), it can be seen that they target the only three very distinct COM-B components of behaviour change (Michie, van Stralen & West, 2011):

Table 4 Methods of achieving behaviour change of COM-B components (Michie, van Stralen & West, 2011:p.8)

COM-B Component	Targeting via activities
<b>Psychological capability (C-Ps)</b>	Can be achieved through imparting knowledge or understanding, training emotional, cognitive and/or behavioural skills or through enabling interventions such as medication
<b>Reflective motivation (M-Re)</b>	Can be achieved through increasing knowledge and understanding, eliciting positive (or negative) feelings about behavioural target
<b>Automatic motivation (M-Au)</b>	Can be achieved through associative learning that elicit positive (or negative) feelings and impulses and counter-impulses relating to the behavioural target, imitative learning, habit formation or direct influences on automatic motivational processes (e.g., via medication)

Table 5 Links between the components of the COM-B model of behaviour and the intervention functions (Michie, van Stralen & West, 2011:p.8)

Model of behaviour: sources	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
C-Ph					√				√
C-Ps	√				√				√
M-Re	√	√	√	√					
M-Au		√	√	√			√	√	√
O-Ph						√	√		√
O-So						√	√		√

1. Physical capability can be achieved through physical skill development which is the focus of training or potentially through enabling interventions such as medication, surgery or prostheses.
2. Psychological capability can be achieved through imparting knowledge or understanding, training emotional, cognitive and/or behavioural skills or through enabling interventions such as medication.
3. Reflective motivation can be achieved through increasing knowledge and understanding, eliciting positive (or negative) feelings about behavioural target.
4. Automatic motivation can be achieved through associative learning that elicit positive (or negative) feelings and impulses and counter-impulses relating to the behavioural target, imitative learning, habit formation or direct influences on automatic motivational processes (e.g., via medication).
5. Physical and social opportunity can be achieved through environmental change.

The developed BCTs were logged and categorized in an excel file. This repository of BCTs to encourage and incentivise online consumers to choose green methods of delivery served as the basis for the BCTs which were inserted directly into the webshop prototype. The repository can be found below in the annex.

#### Step 4) Identify suitable behaviour change techniques and ideate to design interventions

After assessing which COM-B components and behavioural sources we wish to target, the results of an internal design sprint demonstrated the following BCTs that could be suitable to be implemented in the SuCoLo webshop prototype (which varied in level of complexity and exact description):

Table 6 Suitable BCT types and their basic display use case

BCT type	Basic display use case
Information about environmental consequences	<ol style="list-style-type: none"> <li>1) Absolute or relative CO2 emissions (incl. the wording “15-minute city”)</li> <li>2) “Eco-friendly” or “green” delivery option</li> <li>3) Green leaf</li> </ol>
Information about social consequences	<ol style="list-style-type: none"> <li>1) Improved worker conditions</li> <li>2) Support local businesses</li> </ol>
Information about emotional consequences	<ol style="list-style-type: none"> <li>1) “Imagine how good you feel when you choose the sustainable option”</li> </ol>
Social comparison	<ol style="list-style-type: none"> <li>1) “XX % of customers chose the cargo bike delivery option”</li> </ol>
Material reward / incentive	<ol style="list-style-type: none"> <li>1) Offering discount</li> <li>2) Offering voucher coupons (Gutschein)</li> <li>3) Collecting eco-points/customer loyalty points</li> </ol>

Restructuring the physical environment	1) Default (cargo bike delivery is already pre-selected) 2) The cargo bike delivery is displayed first, and then the other delivery options follow
Identification of self as role model	1) Clickable link to share choice for cargo bike delivery on social media (Facebook, Instagram, etc.)
Behaviour cost	1) Creating a cost surcharge for the unwanted delivery option
Future punishment	1) “In high demand” or “limited availability” next to delivery option
Anticipated regret	1) “Imagining you would again choose the unsustainable standard delivery instead of the more sustainable cargo bike delivery, how much regret would you feel about this decision?”
Goal setting	1) “Let’s work together on a more sustainable future! When shopping on this website I will choose the sustainable cargo bike delivery”
Commitment	1) “Let’s work together on a sustainable future! Please accept the following statement: <i>I will protect our environment by choosing the sustainable cargo bike delivery for my purchases.</i> ”
Prompts/cues	1) Priming in the homepage/landing page

### Step 5) Prioritise BCTs

Now, with many BCTs in mind and their application to foster sustainable consumer delivery choices (in this case, via cargo bikes) on online retailers, now it was time to choose the BCTs that will be implemented and tested in the webshop prototype. For this purpose, the APEASE criteria (West et al., 2019) was chosen to select the best intervention solutions for our purpose, which ranks behaviour change interventions based on *acceptability*, *practicability*, *effectiveness*, *affordability*, *side-effects* and *equity* (please note that the components *side effects* and *equity* were not utilised in our study due to lack of applicability). Specifically, the scoring team specifically had the following priorities in mind when selecting the BCTs:

- To not harm the profitability of online retailers and to mitigate cart abandonment to the fullest extent possible
- To reduce consumer cognitive overload as much as possible
- To prioritise BCTs that are easily implementable and affordable for local start-ups and SMEs that lack technical knowhow and backend coding, and thus more easily scaled
- To take into account the sentiment concerning the most effective BCTs from prior research activities (e.g., online consumer workshop, practitioner interviews, scientific review of BCTs in existing studies)
- To avoid developing misleading, vague or unfounded “green claims”, in line with e.g., the EU’s proposal for a Green Claims Directive (European Commission, 2023)

Table 7 The APEASE criteria for assessing interventions, intervention components and ideas (West et al., 2019:p.15)

<b>APEASE criteria</b>	<b>Description</b>
<b>Acceptability</b>	How far is it acceptable to key stakeholders? This includes the target group, potential funders, practitioners delivering the interventions and relevant community and commercial groups.
<b>Practicability</b>	Can it be implemented at scale within the intended context, material and human resources? What would need to be done to ensure that the resources and personnel were in place, and is the intervention sustainable?
<b>Effectiveness</b>	How effective is the intervention in achieving the policy objective(s)? How far will it reach the intended target group and how large an effect will it have on those who are reached?
<b>Affordability</b>	How far can it be afforded when delivered at the scale intended? Can the necessary budget be found for it? Will it provide a good return on investment?
<b>Side-effects</b>	What are the chances that it will lead to unintended adverse or beneficial outcomes?
<b>Equity</b>	How far will it increase or decrease differences between advantaged and disadvantaged sectors of society?

Table 8 Logging BCTs according to the attributes of the APEASE criteria

<b>BCT</b>	<b>Acceptability (0 to 10)</b>	<b>Practicability (0 to 10)</b>	<b>Effectiveness (0 to 10)</b>	<b>Affordability (0 to 10)</b>	<b>Sum</b>
<b>Green leaf</b>	10	10	10	10	40
<b>Urgency</b>	8	10	8	10	36
<b>Priming</b>	9	10	8	8	35
<b>Customer loyalty points</b>	8	8	8	7	31
<b>Default</b>	6	8	9	8	31
<b>Voucher</b>	7	8	8	7	30
<b>Social comparison</b>	6	6	6	7	25
<b>Discount</b>	5	5	7	5	22
<b>Social role model</b>	6	6	5	5	22
<b>Working conditions</b>	4	5	6	6	21
<b>Information about emotional consequences,</b>	2	4	6	5	17

<b>“imagine how good you feel”</b>					
<b>Goal setting</b>	2	4	5	5	16
<b>Anticipated regret</b>	2	4	4	5	15
<b>Commitment</b>	2	2	4	5	13

## 4. Platform design process - Agile development roadmap

The development of the SuCoLo webshop prototype is aligned in an agile process with a new release with every iteration.

Table 9 Release plan

Iteration	Features / Purpose
28 August 2024 – V1	<p><b>Purpose</b></p> <p>To develop the basic architecture and set-up of the webshop prototype, to serve as the basis for SuCoLo co-creation activities &amp; first interim feedback.</p> <p><b>Web design style &amp; Features</b></p> <p><i>Level of complexity and functionalities:</i> low – for now, a small, basic version to get started</p> <p><i>Design style for target customer:</i> generic style for a marketplace regional products (non-food and durable food products in glasses/ no fresh, refrigerated food!), design should to appeal to a wide range of customers; <u>Characteristics of customer type</u>: minimum age 18 – 60 years; not specifically sustainably minded;</p> <p>Style example:</p> <ol style="list-style-type: none"> <li>(1) <a href="#">Example here (TemplateMonster)</a></li> <li>(2) <a href="#">Example here (TemplateMonster)</a></li> </ol> <p><i>Language version:</i> English (main preference): German, Italian and/or Swedish – needed in the long run (tbd)</p> <p><i>Model web shops</i> (keyword: local online shops with (mostly) regional products):</p> <ul style="list-style-type: none"> <li>• FannyFresh, Salzburg: <a href="#">here</a></li> <li>• PUR Sudtirol, Merano: <a href="#">here</a></li> </ul>

- Locally Happy, Leipzig: [here](#)
- Bauernladen.at: [here](#)
- Farmy: [here](#)

*Product catalogue & search function*

*Number of products for start:* 5 (please expect that in the future that we envisage 50+ products in the final developmental phase of the webshop prototype)

*Product type:*

- 1 gift basket, e.g., [here](#)
- 1 jar of jam, e.g., [here](#)
- 1 pair of slippers, e.g., [here](#)
- 1 jar of crème, e.g., [here](#)
- 1 basket of fresh vegetables and fruit, e.g., [here](#)

*Product type categories:* create architecture to categorize different products by product category in a side pane

*Product pictures:*

- Attribution-free pictures from Unsplash, Pexels, etc. – please no AI pictures

**Navigation menus (static/ active content)**

**Landing page – Menu:** Home (information about market and projects)

*Customer journey sequence:* (1) product catalogue/overview, (2) product and short description with pictures, (3) confirm your shopping basket, (4) payment and delivery menu  
5) END page and integration of active, external weblink to LIME-SURVEY questionnaire tool

- *Payment and delivery section of the customer journey*

**Delivery options:**

- Standard home delivery (DHL) – €3,00
- Cargo bike delivery (local courier) – €3,00

**BCT:**

- 1 green leaf next to the cargo bike delivery option (COM-B classification: *Information about social and environmental consequences*)
- *Shopping basket:* make it possible that the cost of the product choices is summed together

	<p><b>Integration of features enabling “priming”, need for external links (Blog post, social media, etc.) – to be discussed in the on-site design sprint on 01.10.24.</b></p>
<p>30 October 2024 – V2</p>	<p><b>Purpose</b></p> <p>New iteration after feedback from the co-creation workshop with external participants and internal SuCoLo design sprint</p> <p><b>Web design style &amp; Features improvements</b></p> <ul style="list-style-type: none"> <li>• Please change all texts in webshop to German</li> <li>• Higher colour contrast of text vs. background. Please make all text either black with a light background or white text with a very dark background.</li> <li>• Bigger text for the subheadings on the landing page, i.e., <i>Shopping cart, Sales, Groceries, etc.</i></li> <li>• Payment and delivery menu: please make sure that the total price is not including the 3 euro delivery price, before it is selected. After it is selected, then please have it update the shopping cart price.</li> </ul> <p><i>Product catalogue &amp; search function</i></p> <p><i>Number of products for start: 20</i></p> <p><i>Product type: mix of non-perishable food items and non-food items, emulating products from the local stores mentioned in V1 (please delete fresh food, e.g., corn and apples)</i></p> <p><b>Navigation menus (static/ active content)</b></p> <p><b>Landing page – Menu:</b></p> <ul style="list-style-type: none"> <li>• Landing page: replace the pictures of fresh food with standard webshop graphics (please use your judgement). Replace the text “<i>fresh and healthy organic food</i>” with “<i>locally-produced and handcrafted creations</i>”</li> <li>• Landing page: replace the box “<i>Summer sale – 75% off with only fruit and vegetable</i>” with “<i>75% off local marmelade</i>”. Replace picture with glass jar(s).</li> <li>• Landing page: on “follow us on Instagram”, please replace with pictures of typical non-perishable food and non-food items that you would find at the regional shops mentioned in V1.</li> </ul> <p><b>Product listing page:</b></p> <ul style="list-style-type: none"> <li>• In “sale of the month” banner, replace the pictures of fresh fruits and vegetables with pictures of typical non-perishable</li> </ul>

	<p>food and non-food items that you would find at the regional shops mentioned in V1</p> <p><b>Versioning:</b></p> <ul style="list-style-type: none"> <li>• After these above changes, please duplicate the webshop (thus, having two webshop types) for the pre-testing phase</li> </ul> <p><b>BCT:</b></p> <ul style="list-style-type: none"> <li>• Type 1 – 1 green leaf next to the cargo bike delivery option (COM-B classification: <i>Information about social and environmental consequences</i>)</li> <li>• Text 2 – “In high demand” text next to the cargo bike delivery option (COM-B classification: <i>Future punishment</i>)</li> </ul>
<p>22 January 2024 – V3</p>	<p><b>Purpose:</b></p> <p>New iteration after feedback from the internal pre-test with 17 SuCoLo project personnel and students</p> <ul style="list-style-type: none"> <li>• In the side panel, replace the text “Popular Tag” with “Beliebte Kategorien”, and make sure these “tags” do not overlap on top of each other</li> </ul> <p>In the checkout section, please replace “Lastenfahrrad” with “Lastenrad”</p> <p><b>Types:</b></p> <p>After these above changes, please duplicate the webshop (more info) to have one webshop prototype per BCT. Please have the following versions (using the graphic files as a blueprint):</p> <ol style="list-style-type: none"> <li>1) FIGMA prototype as is without BCT</li> <li>2) FIGMA prototype with green leaf BCT (file: “Green__leaf_nudge.png”)</li> <li>3) FIGMA prototype with voucher BCT (file: “Voucher.png”)</li> <li>4) FIGMA prototype with customer loyalty points BCT (Eco-points.png”)</li> <li>5) FIGMA prototype with urgency BCT (“Urgency.png”)</li> <li>6) FIGMA prototype with priming BCT       <ol style="list-style-type: none"> <li>a. Instructions: On the landing page, please replace the large picture “Handfertigte Meisterstucke” with the file “Priming_v1.png”. This is the BCT. At the checkout section, please use no BCT. Please only change the picture on the landing page with this version. However, the call to action (i.e., “Jetzt einkaufen”) and its link stay overlaid on the new graphic.</li> </ol> </li> <li>7) FIGMA prototype with default BCT (file: “Default_nudge.png”)</li> </ol>



- a. Instructions: please make it so that “Lieferung durch Lastenrad” is pre-selected, with the 3 euro cost already summed

The figure shows two versions of a shopping cart interface. Both have a 'Warenkorb' title and a 'Zwischensumme: € 0'. The left version shows three delivery options: 'Standardlieferung nach Hause (DHL) - €3,00', 'Lieferung durch Lastenfahrrädern (lokaler Kurier) - €3,00', and 'Umweltfreundliche Lieferoption' which is highlighted with a green box. The right version shows the same options, but 'Lieferung durch Lastenfahrrädern (lokaler Kurier) - €3,00' is selected with a radio button. A green notification box says 'Sichern Sie sich einen 3€ Gutschein für Ihren nächsten Einkauf!'.

Figure 4 V3 BCT “Green leaf” and “voucher” (nr. 2 and 3)

The figure shows two versions of a shopping cart interface. Both have a 'Warenkorb' title and a 'Zwischensumme: € 0'. The left version shows three delivery options: 'Standardlieferung nach Hause (DHL) - €3,00', 'Lieferung durch Lastenfahrrädern (lokaler Kurier) - €3,00' (selected with a radio button), and another option. The right version shows the same options, but 'Lieferung durch Lastenfahrrädern (lokaler Kurier) - €3,00' is selected. A green notification box says 'Begrenzte Verfügbarkeit!'.

Figure 5 V3 BCT “Default” and “Urgency” (nr. 7 and 5)

The figure shows a shopping cart interface with a 'Warenkorb' title and a 'Zwischensumme: € 0'. It shows two delivery options: 'Standardlieferung nach Hause (DHL) - €3,00' and 'Lieferung durch Lastenfahrrädern (lokaler Kurier) - €3,00'. A green notification box says 'Sammeln Sie 30 Treuepunkte!'. Below the cart, another green notification box says 'Sammeln Sie für jeden Einkauf Treuepunkte 150 Punkte = 3€ Gutschein'.

Figure 6 V3 BCT “Customer loyalty points” (nr. 4)



Figure 7 V3 BCT "priming" (nr. 6)

After the 7 prototype versions are complete, please integrate them into the existing questionnaire on MAZE that was used for the pre-test, with 7 final MAZE versions with each BCT type.

## 4.1. Iteration 1 – V1

### 4.1.1. User journey

The user journey sequence is as follows: (1) homepage/landing page, (2) product listing page, (3) individual product description page, (4) shopping cart page incl. delivery options. Here, the BCT *green leaf* was inserted into the checkout page.

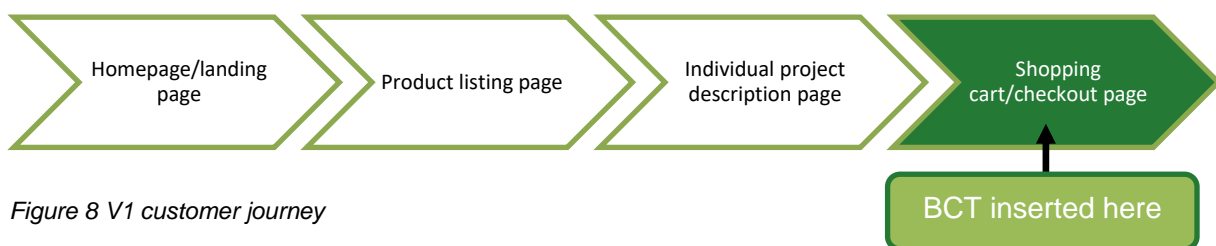


Figure 8 V1 customer journey

## 4.1.2. UI and UX

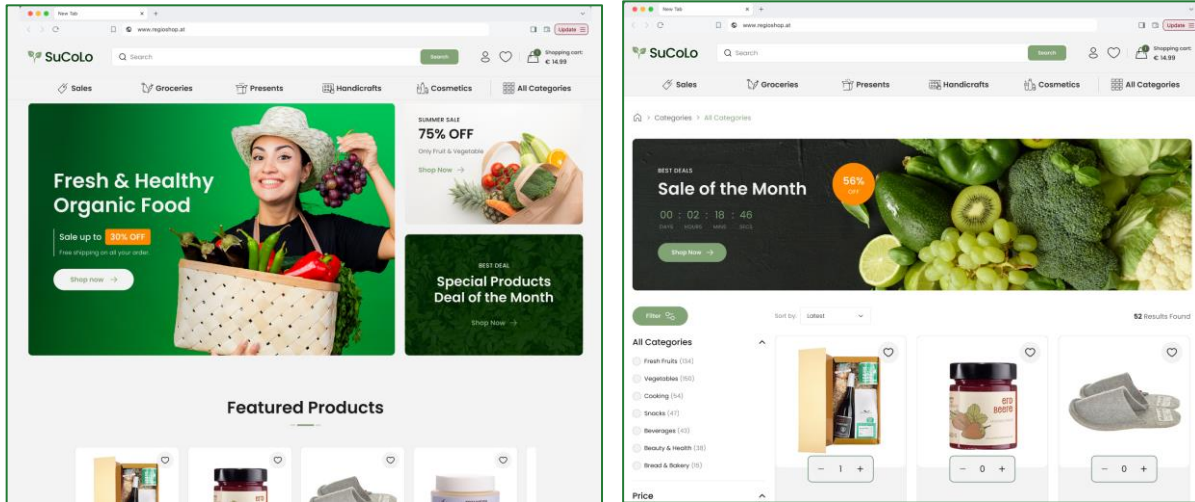


Figure 9 V1 Homepage/landing page and product listing page

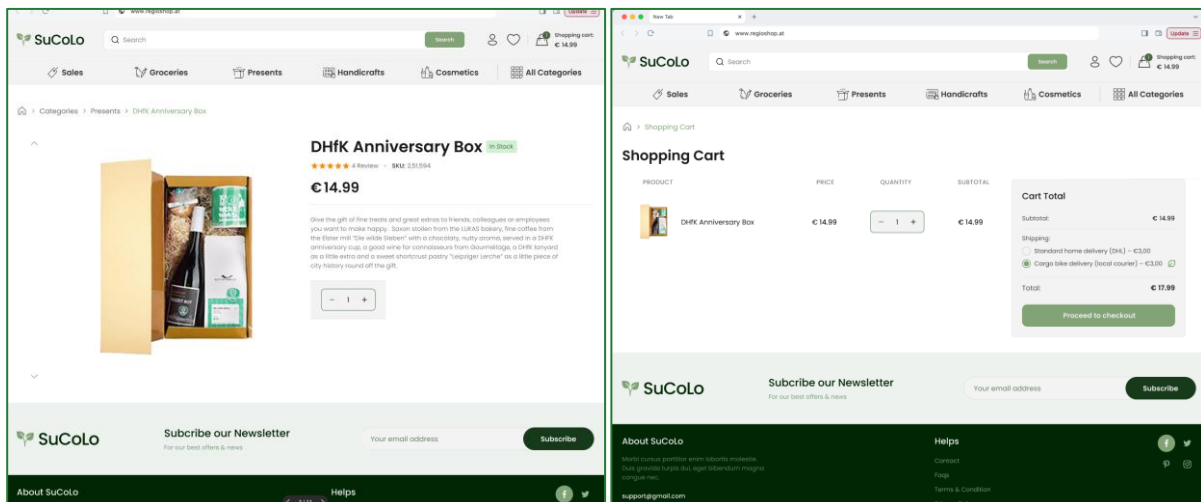


Figure 10 Individual product description page and checkout page

### 4.1.3. Utilized behaviour change interventions

This version employed a green leaf next to the delivery option (COM-B classification *Information about social and environmental consequences*).



Figure 11 V1 BCT 1 “green leaf”

### 4.1.4. Lessons learned

We gathered feedback on the webshop prototype V1 through a stakeholder workshop with online consumers and a structured interview with a local webshop. The online consumer workshop included participants from various age groups (Gen Z, Millennials, and Boomers) to ensure a broad demographic range (ages 18–80). Participants were asked to provide comments and feedback on the webshop’s UI/UX design and employed BCTs. Based on their input, we have implemented the following changes for iteration 2:

1. **Improved Contrast:** Several participants highlighted the need for higher contrast between images and text to enhance readability and accessibility. This improvement will be incorporated into the next iteration.
2. **Increased Text and Icon Sizes:** Participants recommended increasing the text size and enlarging the shopping cart icon in the upper-right corner, as some had difficulty locating it. These adjustments will be included in the next version.
3. **Revised Shipping Cost Display:** In the first iteration, the shopping cart automatically added a €3 shipping cost to the total before a delivery method was selected. For iteration 2, this has been modified so that the €3 fee will only be applied once a delivery method is chosen.
4. **Login/Account Option:** Participants noted the absence of a Login/Account option/icon. While this will be included in iteration 2, it will be implemented as a non-

clickable feature that the customer cannot interact with; nonetheless, it serves to make the webshop appear more realistic.

5. **Updated Homepage Imagery:** Feedback suggested replacing the homepage image with products that are more practical for a webshop that offers cargo bike delivery. For instance, showcasing a sale on jam instead of fresh fruit will create a more realistic impression.
6. **Deal Timer:** Participants also proposed adding a deal timer or urgency mechanisms to make the webshop feel more dynamic and authentic. This feature is under consideration and will be discussed further.

Additionally, the participants had the idea of asking for subjective effectivity of the BCT and adjusting the presentation accordingly. This is beyond the scope of the study, as the users will only complete on user journey through the webshop; however, we will ask for subjective effectiveness in the questionnaire that follows the webshop. These updates aim to address participant feedback and enhance the overall usability and realism of the webshop prototype for the next iteration.

## 4.2. Iteration 2 – V2

### 4.2.1. User journey

The user journey sequence stays the same from iteration one and is as follows: (1) homepage/landing page, (2) product listing page, (3) individual product description page, (4) shopping cart page incl. delivery options. Here, the BCT *green leaf* was inserted into the checkout page.

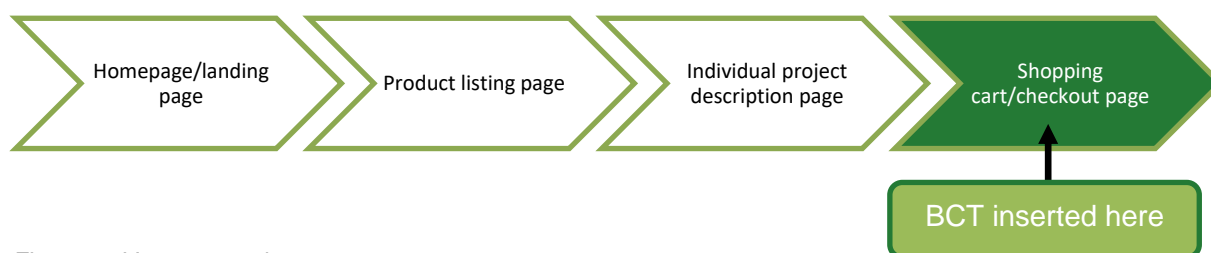


Figure 12 V2 customer journey

This version of the webshop prototype was also integrated into the software MAZE and its associated questionnaire that all respondents will have to go through in sequential order. Firstly, there was a welcome page that explained the SuCoLo project and the context of the study, a description of data usage according to GDPR and consent, and instructions for how the survey will go. The instructions also included what is needed to complete the checkout on the webshop prototype. Then, the customer is directed to the webshop prototype and completes their purchase. Thereafter, they are directed to answer a few questions concerning their demographic information, shopping behaviour, sustainability values and nudge acceptance. Then, the full survey is complete.

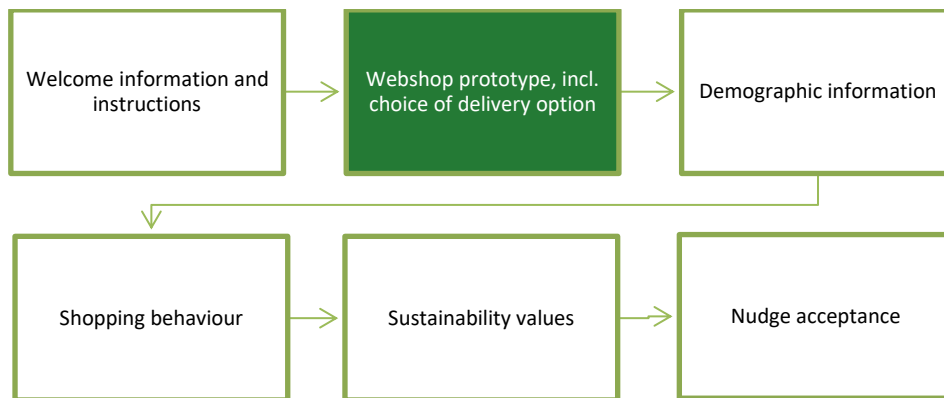


Figure 13 Sequence of the webshop prototype in the MAZE survey design

## 4.2.2. UI and UX

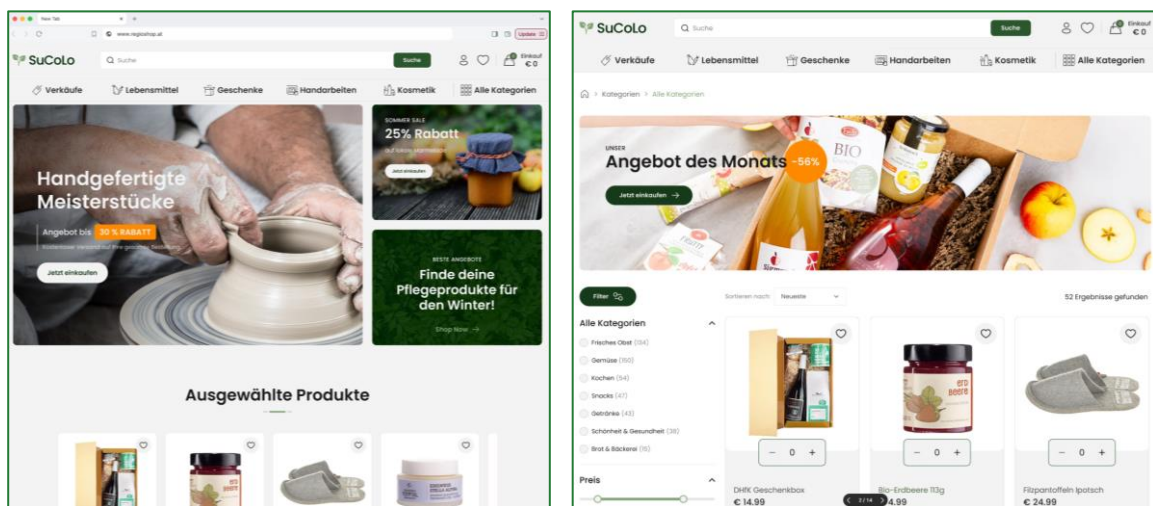


Figure 14 Homepage/landing page and product listing page

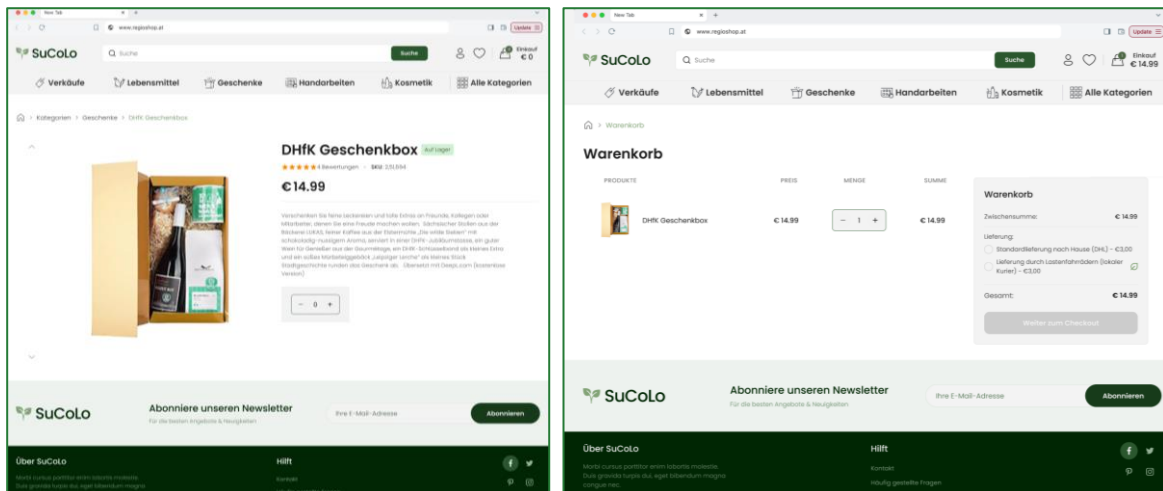


Figure 15 Individual product description page and checkout page

### 4.2.3. Utilized behaviour change interventions

This version employed a green leaf next to the cargo bike delivery option in Type 1 (COM-B classification *Information about social and environmental consequences*). In Type 2, the BCT employed was the text “in high demand” next to the cargo bike delivery option (COM-B classification: *Future punishment*).

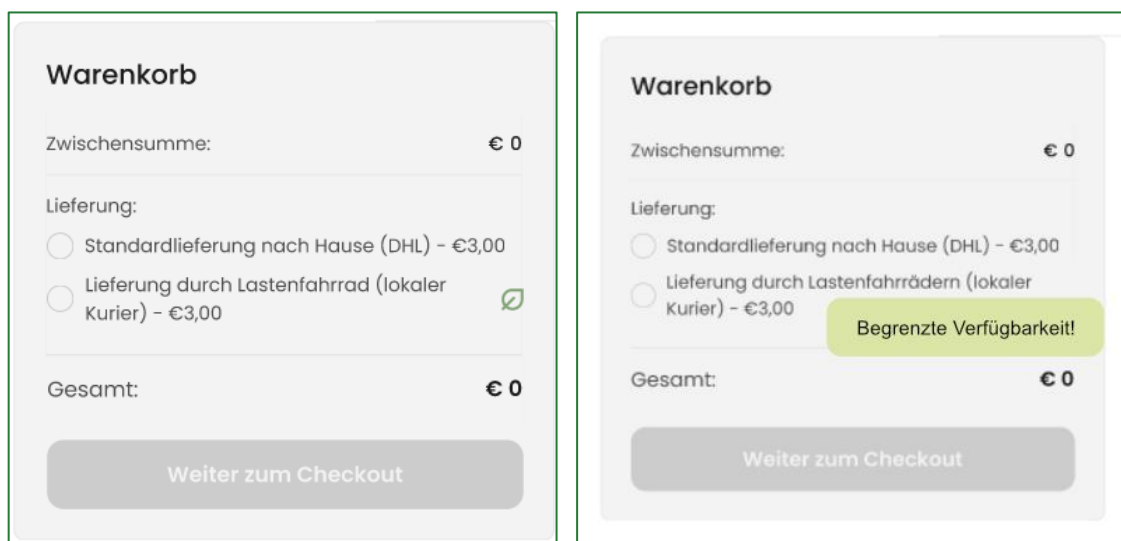


Figure 16 V2 BCT “green leaf” and “urgency”

### 4.2.4. Lessons learned

We gathered feedback on the webshop prototype V2 through a pre-test with around 20 master’s students during a lecture for a course entitled “*Sustainable consumer behaviour*” at the FNHW University of Applied Sciences. This pre-test also incorporated the MAZE questionnaire which also gauged the respondents’ demographic characteristics, sustainability values and more. Furthermore, the participants were asked to complete to provide comments

and feedback on the webshop's UI/UX design and employed BCTs. Based on their input, we have implemented the following changes for iteration 2:

- Changed terminology, e.g., replacing the word “Lastenfahrrad” with “Lastenrad” and replacing the text “Popular Tag with “Beliebte Kategorien”
- Addition of the question “Welche Liefermethode haben Sie gewählt?” in the MAZE survey to properly code which form of delivery they chose (not possible on FIGMA software)

## 4.3. Iteration 3 – V3

### 4.3.1. User journey

The user journey sequence stays the same from iteration one and is as follows: (1) homepage/landing page, (2) product listing page, (3) individual product description page, (4) shopping cart page incl. delivery options. Here, 6 BCTs will be tested.

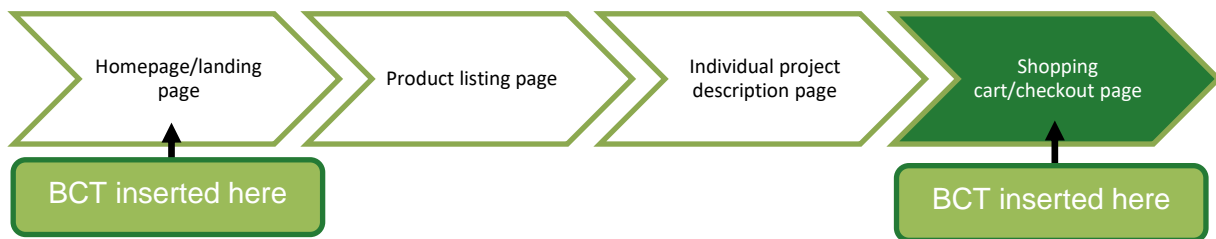


Figure 17 V3 customer journey

### 4.3.2. UI and UX

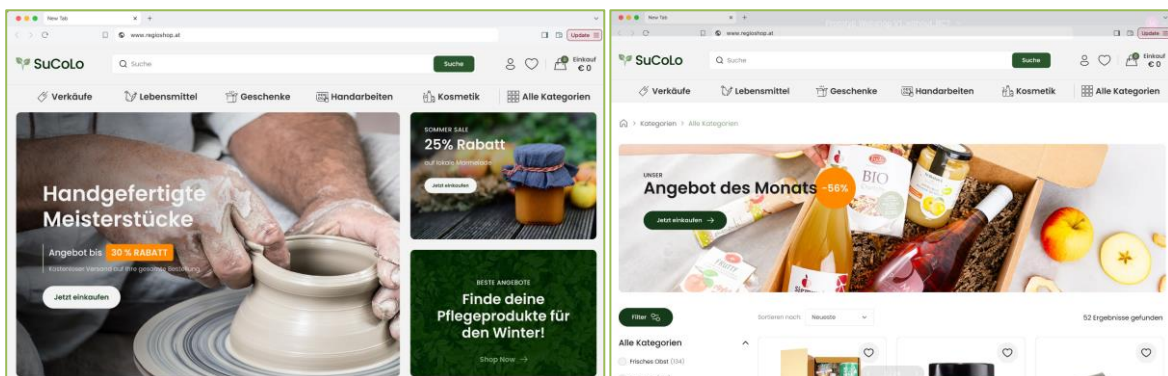


Figure 18 Homepage/landing page and product listing page



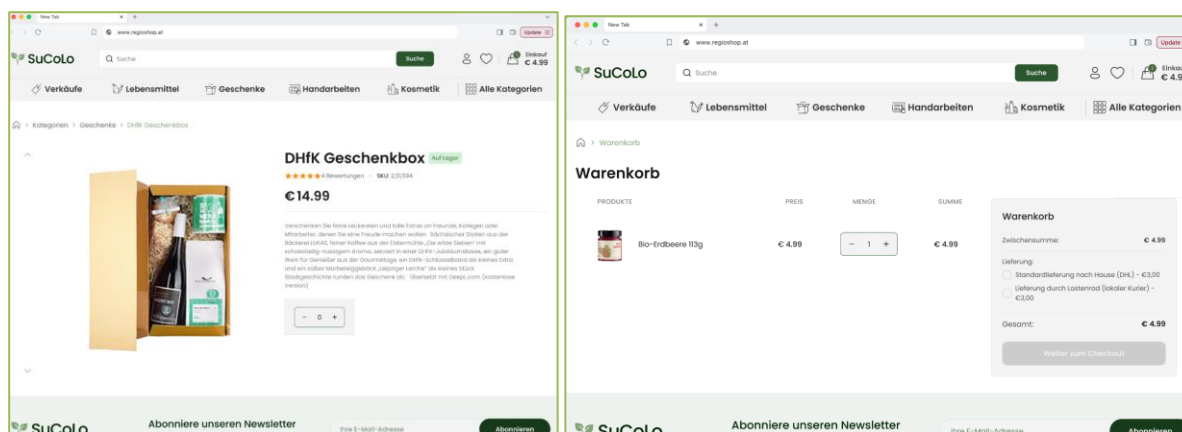


Figure 19 Individual product description page and checkout page

### 4.3.3. Utilized behaviour change interventions

This version employs six BCTs. Five of the BCTs (*green leaf with green claim*, *voucher*, *customer loyalty points*, *urgency* and *default*) were placed in the checkout page of the webshop prototype, next to the cargo bike delivery option. The remaining BCT (*priming*) was placed in the landing page of the website. There was also a control group which had no BCT. These groups of behaviour change techniques will be implemented in the SuCoLo research pilot in the spring of 2025.

BCT	Intervention type	COM-B Classification	COM-B Component
<b>Green leaf with green claim</b>	Education	Information about social and environmental consequences	Psychological Capability (C-Ps)
<b>Voucher</b>	Incentivisation	Material incentive	Motivation reflective (M-re)
<b>Customer loyalty points</b>	Incentivisation	Material incentive	Motivation reflective (M-re)
<b>Urgency</b>	Persuasion	Future punishment	Motivation reflective (M-re)
<b>Priming</b>	Education	Prompts/cues	Psychological Capability (C-Ps)
<b>Default</b>	Environmental restructuring	Restructuring the physical environment	Motivation automatic (M-au)

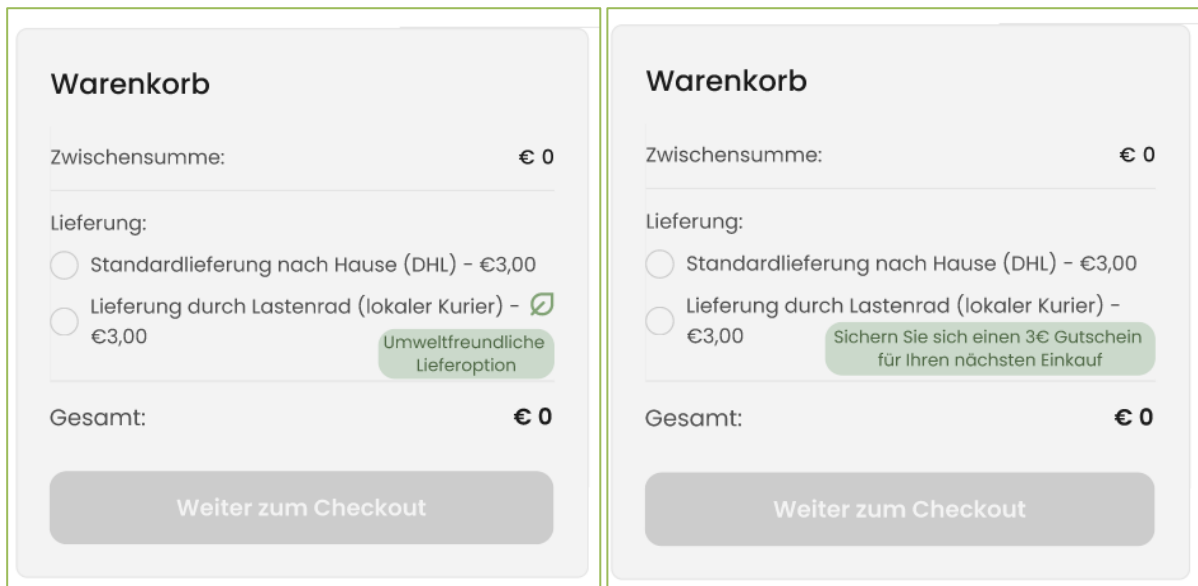


Figure 20 V3 BCTs "green leaf with green claim" and "voucher"

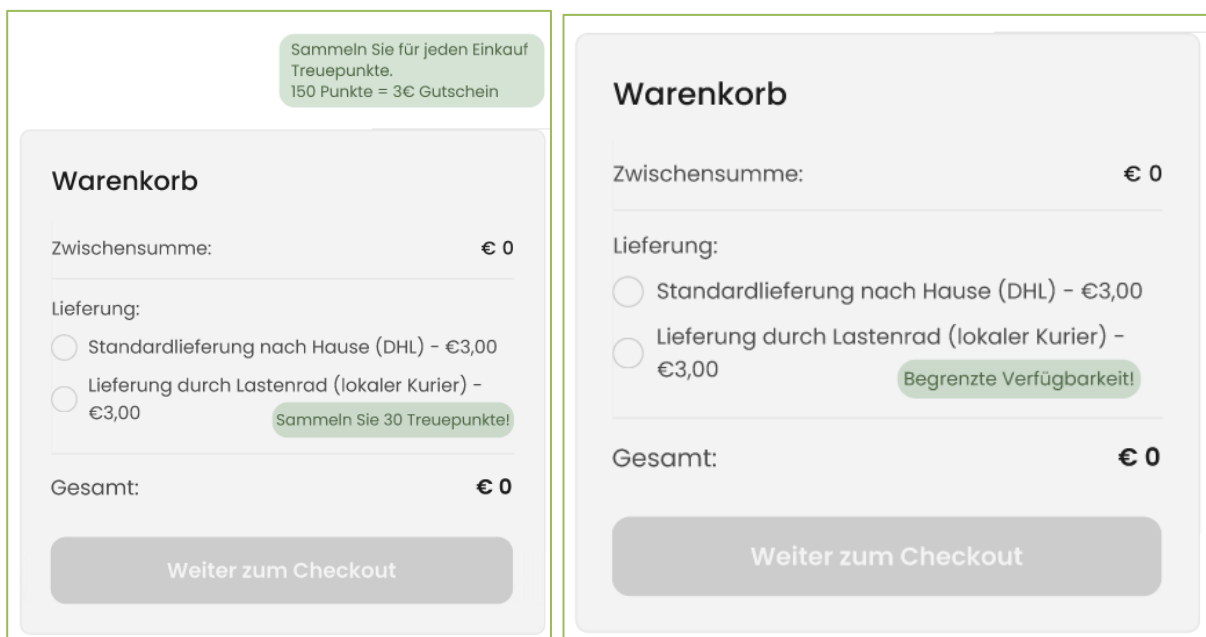


Figure 21 V3 BCTs "customer loyalty points" and "urgency"

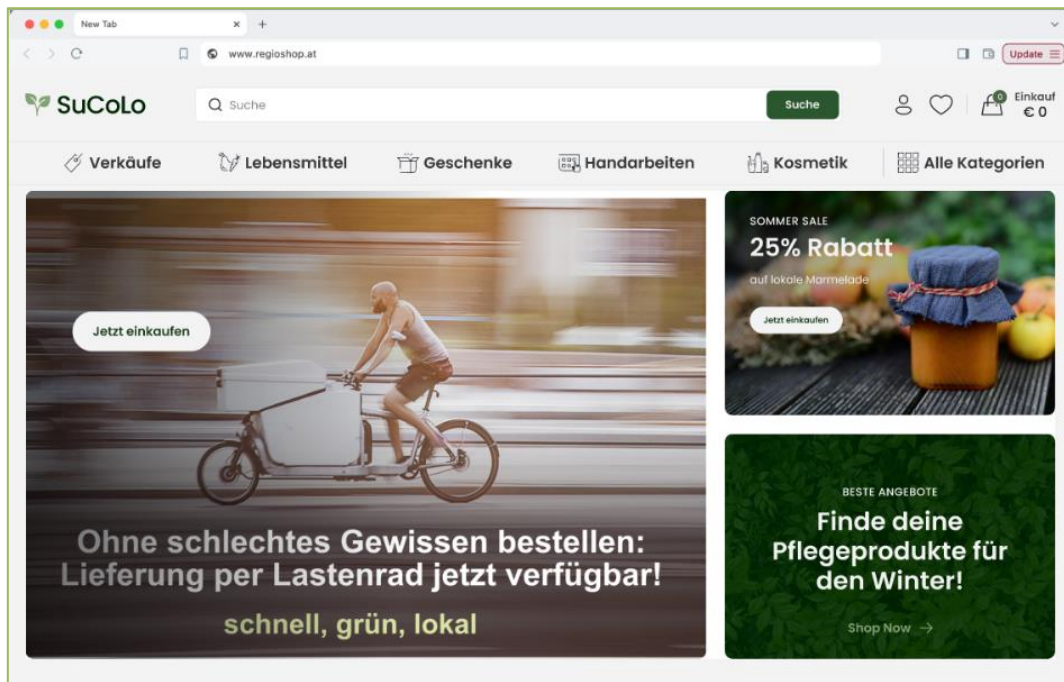


Figure 22 V3 BCT "priming"



Figure 23 V3 BCT "default"

## 5. Conclusion and next steps

The development of the webshop prototype represents a significant step toward fostering behavior change in consumer logistics decision-making, with sustainability at its core. By integrating behavioral science principles into a digital platform, this prototype demonstrates the potential to influence user choices toward greener logistics solutions (in the context of SuCoLo, cargo bike delivery). The project highlights the critical role of user-centric design, data-driven insights, and innovative interventions in addressing environmental challenges within the logistics sector. Through this initiative, we have successfully laid the groundwork for a tool that not only raises awareness about sustainable options but also empowers users to make informed decisions. The prototype showcases key functionalities such as motivation and persuasion strategies and incentives for sustainable behavior. These features align with the overarching goal of reducing carbon emissions and promoting eco-friendly practices across supply chains. While the prototype is a meaningful step, further work is required to refine its capabilities and ensure its effectiveness in real-world applications. This includes rigorous testing with diverse user groups, enhancing scalability, and possibly adding or tweaking further gamification elements to deepen user engagement. Collaboration with stakeholders—ranging from logistics providers to policymakers—will also be essential in tailoring the platform into a plug-in for online shops to meet industry needs and regulatory standards.

### Next Steps:

- 1. User testing and feedback collection (T4.2 *Run and evaluate pilots in communities of local neighborhoods*)**  
Conduct comprehensive usability testing with target audiences to gather insights on user experience, functionality, and effectiveness of the different BCT types. This will help identify areas for improvement and validate the effectiveness of the developed behavior change techniques.
- 2. Stakeholder engagement in SuCoLo learning circles (T5.2 *Support adoption and scaling in follower cities*)**  
Liaise with industry stakeholders in a world café setting to explore integration opportunities within existing online retail environments and to discuss the future potential and scaling of the webshop prototype.
- 3. Scalability planning (T4.3 *Adoption of follower cities*)**  
Following workshops with SuCoLo follower cities, strategies will be developed for scaling the webshop prototype across different markets and regions while addressing logistical complexities unique to each context. This feedback will be incorporated into SuCoLo's adoption plans for follower cities.

By advancing these next steps, this prototype can contribute to driving a meaningful change in logistics practices.

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## Annex I: BCT taxonomy: 93 hierarchically-clustered techniques

### Goals and planning

Table 10 Annex I Goals and planning (Source: Michie et al., 2013)

Label	Definition
<b>(1) Goal setting (behaviour)</b>	Definition of a goal in terms of the behaviour to be achieved (goal setting is recommended if there is evidence that goals set as part of the intervention; if the goal is unspecified or is a behavioural outcome use <i>goal setting outcome</i> , or if the goal defines a specific context, frequency or duration of the behaviour, action planning should be used).
<b>(2) Problem solving</b>	Analysis, or prompt the person to analyse, factors influencing the behaviour and generate or select strategies that include overcoming barriers and/or increasing facilitators.
<b>(3) Goal setting (outcome)</b>	Set or agree on a goal defined in terms of a positive outcome of the behaviour that is strived for.
<b>(4) Action planning</b>	Prompt detailed planning of the performance of the behaviour (must include (at least one) either context, frequency, duration of intensity). The context can be environmental (physical or social) or internal (physical, emotional or cognitive => includes <i>implementation intentions</i> ); Evidence of action planning does not automatically imply goal setting, only code latter is sufficient evidence
<b>(5) Review behaviour goal(s)</b>	Review behaviour goal(s) jointly with the person and consider modifying goal(s) or behaviour change strategy in terms of the achievement. This may lead to re-setting the same goal, a small change in that goal or setting a new goal instead of (or in addition to) the first, or no change; If the goal is specified in terms of behaviour, code <i>Review behaviour goal(s)</i> , if the goal is unspecified, code <i>Review outcome goal(s)</i> and if discrepancy is created consider <i>Discrepancy</i> between current behaviour and goal.
<b>(6) Discrepancy between current behaviour and goal</b>	Draw attention to discrepancies between a person's current behaviour (in terms of the form, frequency, duration, or intensity) and the person's previously set outcome goals, behavioural goals or action plans (goes beyond self-monitoring of behaviour); If discomfort is created only code <i>Incompatible beliefs</i> and not Discrepancy between current behaviour and goal; if goals are modified, also code <i>Review behaviour goal(s)</i> and/or, <i>Review outcome goal(s)</i> ; if feedback is provided, also code, <i>Feedback on behaviour</i> .
<b>(7) Review outcome goal(s)</b>	Review outcome goal(s) jointly with the person and consider modifying goal(s) in light of achievement. This may lead to resetting the same goal, a small change in that goal or setting a new goal instead of, or in addition to the first; If the goal is specified in terms of behaviour, code <i>Review behaviour goal(s)</i> , if goal unspecified, code <i>Review outcome goal(s)</i> ; if discrepancy is. created consider also <i>Discrepancy</i>



<b>(8) Behavioural contract</b>	Create a written specification of the behaviour to be performed, agreed on by the person, and witnessed by another person; also, code <i>Goal setting (behaviour)</i>
<b>(9) Commitment</b>	Ask a person to affirm or reaffirm statements indicating commitment to change the behaviour; If it is also defined in terms of behaviour to be achieved also code <i>Goal setting (behaviour)</i>

## Feedback and monitoring

Table 11 Annex I Feedback and monitoring (Source: Michie et al., 2013)

Label	Definition
<b>(1) Monitoring of behaviour by others without feedback</b>	Observe or record behaviour with the person's knowledge as part of a behaviour change strategy; Note: if monitoring is part of a data collection procedure rather than a strategy aimed at changing behaviour, do not code; if feedback given, code only, <i>Feedback on behaviour</i> , and not, <i>monitoring of behaviour by others without feedback</i> ; if monitoring outcome(s) code, <i>Monitoring outcome(s) of behaviour by others without feedback</i> ; if self-monitoring behaviour, code, <i>Self-monitoring of behaviour</i>
<b>(2) Feedback on behaviour</b>	Monitor and provide informative or evaluative feedback on performance of the behaviour (e.g. form, frequency, duration, intensity) Note: if Biofeedback, code only, <i>Biofeedback</i> and not, <i>Feedback on behaviour</i> ; if feedback is on outcome(s) of behaviour, code, <i>Feedback on outcome(s) of behaviour</i> ; if there is no clear evidence that feedback was given, code, <i>Monitoring of behaviour by others without feedback</i> ; if feedback on behaviour is evaluative e.g. praise, also code, <i>Social reward</i>
<b>(3) Self-monitoring of behaviour</b>	Establish a method for the person to monitor and record their behaviour(s) as part of a behaviour change strategy Note: if monitoring is part of a data collection procedure rather than a strategy aimed at changing behaviour, do not code; if monitoring of outcome of behaviour, code <i>Self-monitoring of outcome(s) of behaviour</i> ; if monitoring is by someone else (without feedback), code <i>Monitoring of behaviour by others without feedback</i>
<b>(4) Self-monitoring of outcome(s) of behaviour</b>	Establish a method for the person to monitor and record the outcome(s) of their behaviour as part of a behaviour change strategy Note: if monitoring is part of a data collection procedure rather than a strategy aimed at changing behaviour, do not code; if monitoring behaviour, code, <i>Self-monitoring of behaviour</i> ; if monitoring is by someone else (without feedback), code, <i>Monitoring outcome(s) of behaviour by others without feedback</i>
<b>(5) Monitoring outcome(s) of behaviour by others without feedback</b>	Observe or record outcomes of behaviour with the person's knowledge as part of a behaviour change strategy; Note: if monitoring is part of a data collection procedure rather than a strategy aimed at changing behaviour, do not code; if feedback given, code only, <i>Feedback on outcome(s) of behaviour</i> ; if monitoring behaviour code, <i>Monitoring of behaviour by others without feedback</i> ; if self-monitoring outcome(s), code, <i>Self-monitoring of outcome(s) of behaviour</i>

<b>(6) Biofeedback</b>	Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behaviour change strategy; Note: if Biofeedback, code only, <i>Biofeedback</i> and not, <i>Feedback on behaviour</i> or, <i>Feedback on outcome(s) of behaviour</i>
<b>(7) Feedback on outcome(s) of behaviour</b>	Monitor and provide feedback on the outcome of performance of the behaviour; Note: if Biofeedback, code only, <i>Biofeedback</i> and not <i>Feedback on outcome(s) of behaviour</i> ; if feedback is on behaviour code <i>Feedback on behaviour</i> ; if there is no clear evidence that feedback was given code <i>monitoring outcome(s) of behaviour by others without feedback</i> ; if feedback on behaviour is evaluative e.g. praise, also code <i>Social reward</i>

## Social support

Table 12 Annex I Social support (Source: Michie et al., 2013)

Label	Definition
<b>(1) Social support (unspecified)</b>	Advise on, arrange or provide social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) or non-contingent praise or reward for performance of the behaviour. It includes encouragement and counselling, but only when it is directed at the behaviour; Note: attending a group class and/or mention of 'follow-up' does not necessarily apply this BCT, support must be explicitly mentioned; if practical, code <i>Social support (practical)</i> ; if emotional, code <i>Social support (emotional)</i> (includes ' <i>Motivational interviewing</i> ' and ' <i>Cognitive Behavioural Therapy</i> ')
<b>(2) Social support practical</b>	Advise on, arrange, or provide practical help (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behaviour; Note: if emotional, code <i>Social support (emotional)</i> ; if general or unspecified, code, <i>Social support (unspecified)</i> If only restructuring the physical environment or adding objects to the environment, code <i>Restructuring the physical environment</i> or <i>Adding objects to the environment</i> , attending a group or class and/or mention of 'follow-up' does not necessarily apply this BCT, support must be explicitly mentioned.
<b>(3) Social support (emotional)</b>	Advise on, arrange, or provide emotional social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behaviour; Note: if practical, code, <i>Social support (practical)</i> ; if unspecified, code <i>Social support (unspecified)</i>

## Shaping knowledge

Table 13 Annex I Shaping knowledge (Source: Michie et al., 2013)

Label	Definition
<b>(1) Instruction on how to</b>	Advise or agree on how to perform the behaviour (includes 'Skills training'); Note: when the person attends classes such as exercise or

<b>perform a behaviour</b>	cookery, code <i>Instruction on how to perform the behaviour, Behavioural practice/rehearsal</i> and <i>Demonstration of the behaviour</i>
<b>(2) Information about antecedents</b>	Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behaviour
<b>(3) Re-attribution</b>	Elicit perceived causes of behaviour and suggest alternative explanations (e.g. external or internal and stable or unstable)
<b>(4) Behavioural experiments</b>	Advise on how to identify and test hypotheses about the behaviour, its causes and consequences, by collecting and interpreting data

## Natural consequences

Table 14 Annex I Natural consequences (Source: Michie et al., 2013)

Label	Definition
<b>(1) Information about health consequences</b>	Provide information (e.g. written, verbal, visual) about health consequences of performing the behaviour; Note: consequences can be for any target, not just the recipient(s) of the intervention; emphasising importance of consequences is not sufficient; if information about emotional consequences, code <i>Information about emotional consequences</i> ; if about social, environmental or unspecific consequences code <i>Information about social and environmental consequences</i>
<b>(2) Salience of consequences</b>	Use methods specifically designed to emphasise the consequences of performing the behaviour with the aim of making them more memorable (goes beyond information about consequences); Note: if information about consequences, also code <i>Information about health consequences, Information about emotional consequences</i> or <i>Information about social and environmental consequences</i>
<b>(3) Information about social and environmental consequences</b>	Provide information (e.g. written, verbal, visual) about social and environmental consequences of performing the behaviour; Note: consequences can be for any target, not just the recipient(s) of the intervention; if information about health consequences, code <i>Information about health consequences</i> ; if about emotional consequences code <i>Information about emotional consequences</i> ; if unspecific, code <i>Information about social and environmental consequences</i>
<b>(4) Monitoring of emotional consequences</b>	Prompt assessment of feelings after attempts at performing the behaviour
<b>(5) Anticipated regret</b>	Induce or raise awareness of expectations of future regret about performance of the unwanted behaviour; Note: not including <i>Information about emotional consequences</i> ; if suggests adoption of a perspective or new perspective in order to change cognitions also code <i>Framing/reframing</i>

<b>(6) Information about emotional consequences</b>	Provide information (e.g. written, verbal, visual) about emotional consequences of performing the behaviour; Note: consequences can be related to emotional health disorders (e.g. depression, anxiety) and/or states of mind (e.g. low mood, stress); not including <i>Anticipated regret</i> ; consequences can be for any target, not just the recipient(s) of the intervention; if information about health consequences code <i>Information about health consequences</i> ; if about social, environmental or unspecified code <i>Information about social and environmental consequences</i>
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## Comparison of behaviour

Table 15 Annex I Comparison of behaviour (Source: Michie et al., 2013)

Label	Definition
<b>(1) Demonstration of the behaviour</b>	Provide an observable sample of the performance of the behaviour, directly in person or indirectly e.g. via film, pictures, for the person to aspire to or imitate (includes 'Modelling'); Note: if advised to practice, also code <i>Behavioural practice and rehearsal</i> ; If provided with instructions on how to perform, also code <i>Instruction on how to perform the behaviour</i>
<b>(2) Social comparison</b>	Draw attention to others' performance to allow comparison with the person's own performance; Note: being in a group setting does not necessarily mean that social comparison is actually taking place
<b>(3) Information about others' approval</b>	Provide information about what other people think about the behaviour. The information clarifies whether others will like, approve or disapprove of what the person is doing or will do

## Association

Table 16 Annex I Association (Source: Michie et al., 2013)

Label	Definition
<b>(1) Prompts/ cues</b>	Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behaviour. The prompt or cue would normally occur at the time or place of performance; Note: when a stimulus is linked to a specific action in an if-then plan including one or more of frequency, duration or intensity also code <i>Action planning</i>
<b>(2) Cue signalling reward</b>	Identify an environmental stimulus that reliably predicts that reward will follow the behaviour (includes 'Discriminative cue')
<b>(3) Reduce prompts/ cues</b>	Withdraw gradually prompts to perform the behaviour (includes 'Fading')

<b>(4) Remove access to the reward</b>	Advise or arrange for the person to be separated from situations in which unwanted behaviour can be rewarded in order to reduce the behaviour (includes 'Time out')
<b>(5) Remove aversive stimulus</b>	Advise or arrange for the removal of an aversive stimulus to facilitate behaviour change (includes 'Escape learning')
<b>(6) Satiation</b>	Advise or arrange repeated exposure to a stimulus that reduces or extinguishes a drive for the unwanted behaviour
<b>(7) Exposure</b>	Provide systematic confrontation with a feared stimulus to reduce the response to a later encounter
<b>(8) Associative learning</b>	Present a neutral stimulus jointly with a stimulus that already elicits the behaviour repeatedly until the neutral stimulus elicits that behaviour (includes 'Classical/Pavlovian Conditioning'); Note: when a BCT involves reward or punishment, code one or more of: <i>Material reward (behaviour)</i> ; <i>Nonspecific reward</i> ; <i>Social reward</i> , <i>Self-reward</i> ; <i>Reward (outcome)</i>

## Repetition and substitution

Table 17 Annex I Repetition and substitution (Source: Michie et al., 2013)

Label	Definition
<b>(1) Behavioural practice/rehearsal</b>	Prompt practice or rehearsal of the performance of the behaviour one or more times in a context or at a time when the performance may not be necessary, in order to increase habit and skill Note: if aiming to associate performance with the context, also code <i>Habit formation</i>
<b>(2) Behaviour substitution</b>	Prompt substitution of the unwanted behaviour with a wanted or neutral behaviour; Note: if this occurs regularly, also code <i>Habit reversal</i>
<b>(3) Habit formation</b>	Prompt rehearsal and repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour; Note: also code <i>Behavioural practice/rehearsal</i>
<b>(4) Habit reversal</b>	Prompt rehearsal and repetition of an alternative behaviour to replace an unwanted habitual behaviour; Note: also code <i>Behaviour substitution</i>
<b>(5) Overcorrection</b>	Ask to repeat the wanted behaviour in an exaggerated way following an unwanted behaviour
<b>(6) Generalisation of target behaviour</b>	Advise to perform the wanted behaviour, which is already performed in a particular situation, in another situation
<b>(7) Graded tasks</b>	Set easy-to-perform tasks, making them increasingly difficult, but achievable, until behaviour is performed

## Comparison of outcomes

Table 18 Annex I Comparison of outcomes (Source: Michie et al., 2013)

Label	Definition
<b>(1) Credible source</b>	Present verbal or visual communication from a credible source in favour of or against the behaviour; Note: code this BCT if source generally agreed on as credible e.g., health professionals, celebrities or words used to indicate expertise or leader in field and if the communication has the aim of persuading; if information about health consequences, also code <i>Information about health consequences</i> , if about emotional consequences, also code <i>Information about emotional consequences</i> ; if about social, environmental or unspecified consequences also code <i>Information about social and environmental consequences</i>
<b>(2) Pros and cons</b>	Advise the person to identify and compare reasons for wanting (pros) and not wanting to (cons) change the behaviour (includes 'Decisional balance'); Note: if providing information about health consequences, also code <i>Information about health consequences</i> ; if providing information about emotional consequences, also code <i>Information about emotional consequences</i> ; if providing information about social, environmental or unspecified consequences also code <i>Information about social and environmental consequences</i>
<b>(3) Comparative imagining of future outcomes</b>	Prompt or advise the imagining and comparing of future outcomes of changed versus unchanged behaviour

## Reward and threat

Table 19 Annex I Reward and threat (Source: Michie et al., 2013)

Label	Definition
<b>(1) Material incentive (behaviour)</b>	Inform that money, vouchers or other valued objects will be delivered if and only if there has been effort and/or progress in performing the behaviour (includes 'Positive reinforcement'); Note: if incentive is social, code <i>Social incentive</i> if unspecified code <i>Non-specific incentive</i> , and not <i>Material incentive (behaviour)</i> ; if incentive is for outcome, code <i>Incentive (outcome)</i> . If reward is delivered also code one of: <i>Material reward (behaviour)</i> ; <i>Non-specific reward</i> ; <i>Social reward</i> ; <i>Self-reward</i> ; <i>Reward (outcome)</i>
<b>(2) Material reward (behaviour)</b>	Arrange for the delivery of money, vouchers or other valued objects if and only if there has been effort and/or progress in performing the behaviour (includes 'Positive reinforcement'); Note: If reward is social, code <i>Social reward</i> , if unspecified code <i>Nonspecific reward</i> , and not <i>Material reward (behaviour)</i> ; if reward is for outcome, code <i>Reward (outcome)</i> . If informed of reward in advance of rewarded behaviour, also code one of: <i>Material</i>

	<i>incentive (behaviour); Social incentive; Non-specific incentive; Self-incentive; Incentive (outcome)</i>
<b>(3) Non-specific reward</b>	Arrange delivery of a reward if and only if there has been effort and/or progress in performing the behaviour (includes 'Positive reinforcement'); Note: if reward is material, code <i>Material reward (behaviour)</i> , if social, code <i>Social reward</i> , and not <i>Nonspecific reward</i> ; if reward is for outcome code <i>Reward (outcome)</i> . If informed of reward in advance of rewarded behaviour, also code one of: <i>Material incentive (behaviour); Social incentive; Non-specific incentive; Self-incentive; Incentive (outcome)</i>
<b>(4) Social reward</b>	Arrange verbal or non-verbal reward if and only if there has been effort and/or progress in performing the behaviour (includes 'Positive reinforcement'); Note: if reward is material, code <i>Material reward (behaviour)</i> , if unspecified code <i>Non-specific reward</i> , and not <i>Social reward</i> ; if reward is for outcome code <i>Reward (outcome)</i> . If informed of reward in advance of rewarded behaviour, also code one of: <i>Material incentive (behaviour); Social incentive; Non-specific incentive; Self-incentive; Incentive (outcome)</i>
<b>(5) Social incentive</b>	Inform that a verbal or non-verbal reward will be delivered if and only if there has been effort and/or progress in performing the behaviour (includes 'Positive reinforcement'); Note: if incentive is material, code <i>Material incentive (behaviour)</i> , if unspecified code <i>Non-specific incentive</i> , and not <i>Social incentive</i> ; if incentive is for outcome code <i>Incentive (outcome)</i> . If reward is delivered also code one of: <i>Material reward (behaviour); Non-specific reward; Social reward, Self-reward; Reward (outcome)</i>
<b>(6) Non-specific incentive</b>	Inform that a reward will be delivered if and only if there has been effort and/or progress in performing the behaviour (includes 'Positive reinforcement'); Note: if incentive is material, code <i>Material incentive (behaviour)</i> , if social, code <i>Social incentive</i> and not <i>Non-specific incentive</i> ; if incentive is for outcome code <i>Incentive (outcome)</i> . If reward is delivered also code one of: <i>Material reward (behaviour); Non-specific reward; Social reward, Self-reward; Reward (outcome)</i>
<b>(7) Self-incentive</b>	Plan to reward self in future if and only if there has been effort and/or progress in performing the behaviour; Note: if self-reward is material, also code <i>Material incentive (behaviour)</i> , if social, also code <i>Social incentive</i> , if unspecified, also code <i>Non-specific incentive</i> ; if incentive is for outcome code <i>Incentive (outcome)</i> . If reward is delivered also code one of: <i>Material reward (behaviour); Non-specific reward; Social reward, Self-reward; Reward (outcome)</i>
<b>(8) Incentive (outcome)</b>	Inform that a reward will be delivered if and only if there has been effort and/or progress in achieving the behavioural outcome (includes 'Positive reinforcement'); Note: this includes social, material, self- and non-specific incentives for outcome; if incentive is for the behaviour code <i>Social incentive, Material incentive (behaviour), Non-specific incentive</i> or <i>Self-incentive</i> and not <i>Incentive (outcome)</i> . If reward is delivered also code one of: <i>Material reward (behaviour); Non-specific reward; Social reward, Self-reward; Reward (outcome)</i>

<b>(9) Self-reward</b>	Prompt self-praise or self-reward if and only if there has been effort and/or progress in performing the behaviour; Note: if self-reward is material, also code <i>Material reward (behaviour)</i> , if social, also code <i>Social reward</i> , if unspecified, also code <i>Non-specific reward</i> ; if reward is for outcome code <i>Reward (outcome)</i> . If informed of reward in advance of rewarded behaviour, also code one of: <i>Material incentive (behaviour)</i> ; <i>Social incentive</i> ; <i>Non-specific incentive</i> ; <i>Self-incentive</i> ; <i>Incentive (outcome)</i>
<b>(10) Reward (outcome)</b>	Arrange for the delivery of a reward if and only if there has been effort and/or progress in achieving the behavioural outcome (includes 'Positive reinforcement'); Note: this includes social, material, self- and non-specific rewards for outcome; if reward is for the behaviour code <i>Social reward</i> , <i>Material reward (behaviour)</i> , <i>Non-specific reward</i> or <i>Self-reward</i> and not <i>Reward (outcome)</i> . If informed of reward in advance of rewarded behaviour, also code one of: <i>Material incentive (behaviour)</i> ; <i>Social incentive</i> ; <i>Non-specific incentive</i> ; <i>Self-incentive</i> ; <i>Incentive (outcome)</i>
<b>(11) Future punishment</b>	Inform that future punishment or removal of reward will be a consequence of performance of an unwanted behaviour (may include fear arousal) (includes 'Threat')

## Regulation

Table 20 Annex I Regulation (Source: Michie et al., 2013)

Label	Definition
<b>(1) Pharmacological support</b>	Provide, or encourage the use of or adherence to, drugs to facilitate behaviour change; Note: if pharmacological support to reduce negative emotions (i.e. anxiety) then also code <i>Reduce negative emotions</i>
<b>(2) Reduce negative emotions</b>	Advise on ways of reducing negative emotions to facilitate performance of the behaviour (includes 'Stress Management') Note: if includes analysing the behavioural problem, also code <i>Problem solving</i>
<b>(3) Conserving mental resources</b>	Advise on ways of minimising demands on mental resources to facilitate behaviour change
<b>(4) Paradoxical instructions</b>	Advise to engage in some form of the unwanted behaviour with the aim of reducing motivation to engage in that behaviour

## Antecedents

Table 21 Annex I Antecedents (Source: Michie et al., 2013)

Label	Definition
<b>(1) Restructuring</b>	Change, or advise to change the physical environment in order to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour (other than prompts/cues, rewards and punishments); Note: this



<b>the physical environment</b>	may also involve <i>Avoidance/reducing exposure to cues for the behaviour</i> , if restructuring of the social environment code <i>Restructuring the social environment</i> ; if only adding objects to the environment, code <i>Adding objects to the environment</i>
<b>(2) Restructuring the social environment</b>	Change, or advise to change the social environment in order to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour (other than prompts/cues, rewards and punishments); Note: this may also involve <i>Avoidance/reducing exposure to cues for the behaviour</i> , if also restructuring of the physical environment also code <i>Restructuring the physical environment</i>
<b>(3) Avoidance/reducing exposure to cues for the behaviour</b>	Advise on how to avoid exposure to specific social and contextual/physical cues for the behaviour, including changing daily or weekly routines; Note: this may also involve <i>Restructuring the physical environment</i> and/or <i>Restructuring the social environment</i> ; if the BCT includes analysing the behavioural problem, only code <i>Problem solving</i>
<b>(4) Distraction</b>	Advise or arrange to use an alternative focus for attention to avoid triggers for unwanted behaviour
<b>(5) Adding objects to the environment</b>	Add objects to the environment in order to facilitate performance of the behaviour; Note: Provision of information (e.g. written, verbal, visual) in a booklet or leaflet is insufficient. If this is accompanied by social support, also code <i>Social support (practical)</i> ; if the environment is changed beyond the addition of objects, also code <i>Restructuring the physical environment</i>
<b>(6) Body changes</b>	Alter body structure, functioning or support directly to facilitate behaviour change

## Identity

Table 22 Annex I Identity (Source: Michie et al., 2013)

Label	Definition
<b>(1) Identification of self as role model</b>	Inform that one's own behaviour may be an example to others
<b>(2) Framing/reframing</b>	Suggest the deliberate adoption of a perspective or new perspective on behaviour (e.g. its purpose) in order to change cognitions or emotions about performing the behaviour (includes 'Cognitive structuring'); If information about consequences then code <i>Information about health consequences</i> , <i>Information about emotional consequences</i> or <i>Information about social and environmental consequences</i> instead of <i>Framing/reframing</i>
<b>(3) Incompatible beliefs</b>	Draw attention to discrepancies between current or past behaviour and self-image, in order to create discomfort (includes 'Cognitive dissonance')

<b>(4) Valued self-identify</b>	Advise the person to write or complete rating scales about a cherished value or personal strength as a means of affirming the person's identity as part of a behaviour change strategy (includes 'Self-affirmation')
<b>(5) Identity associated with change behaviour</b>	Advise the person to construct a new self-identity as someone who 'used to engage with the unwanted behaviour'

## Scheduled consequences

Table 23 Annex I Scheduled consequences (Source: Michie et al., 2013)

Label	Definition
<b>(1) Behaviour cost</b>	Arrange for withdrawal of something valued if and only if an unwanted behaviour is performed (includes 'Response cost'); Note if withdrawal of contingent reward code, <i>Remove reward</i>
<b>(2) Punishment</b>	Arrange for aversive consequence contingent on the performance of the unwanted behaviour
<b>(3) Remove reward</b>	Arrange for discontinuation of contingent reward following performance of the unwanted behaviour (includes 'Extinction')
<b>(4) Reward approximation</b>	Arrange for reward following any approximation to the target behaviour, gradually rewarding only performance closer to the wanted behaviour (includes 'Shaping')
<b>(5) Rewarding completion</b>	Build up behaviour by arranging reward following final component of the behaviour; gradually add the components of the behaviour that occur earlier in the behavioural sequence (includes 'Backward chaining'); Note: also code one of <i>Material reward (behaviour)</i> ; <i>Non-specific reward</i> ; <i>Social reward</i> , <i>Self-reward</i> ; <i>Reward (outcome)</i>
<b>(6) Situation-specific reward</b>	Arrange for reward following the behaviour in one situation but not in another (includes 'Discrimination training'); Note: also code one of <i>Material reward (behaviour)</i> ; <i>Non-specific reward</i> ; <i>Social reward</i> , <i>Self-reward</i> ; <i>Reward (outcome)</i>
<b>(7) Reward incompatible behaviour</b>	Arrange reward for responding in a manner that is incompatible with a previous response to that situation (includes 'Counter-conditioning'); Note: also code one of <i>Material reward (behaviour)</i> ; <i>Non-specific reward</i> ; <i>Social reward</i> , <i>Self-reward</i> ; <i>Reward (outcome)</i>
<b>(8) Reward alternative behaviour</b>	Arrange reward for performance of an alternative to the unwanted behaviour (includes 'Differential reinforcement'); Note: also code one of <i>Material reward (behaviour)</i> ; <i>Non-specific reward</i> ; <i>Social reward</i> , <i>Self-reward</i> ; <i>Reward (outcome)</i> ; consider also coding <i>Problem solving</i>

<b>(9) Reduce reward frequency</b>	Arrange for rewards to be made contingent on increasing duration or frequency of the behaviour (includes 'Thinning'); Note: also code one of <i>Material reward (behaviour)</i> ; <i>Non-specific reward</i> ; <i>Social reward</i> , <i>Self-reward</i> ; <i>Reward (outcome)</i>
<b>(10) Remove punishment</b>	Arrange for removal of an unpleasant consequence contingent on performance of the wanted behaviour (includes 'Negative reinforcement')

## Self-belief

Table 24 Annex I Self-belief (Source: Michie et al., 2013)

Label	Definition
<b>(1) Verbal persuasion about capability</b>	Tell the person that they can successfully perform the wanted behaviour, arguing against self-doubts and asserting that they can and will succeed
<b>(2) Mental rehearsal of successful performance</b>	Advise to practise imagining performing the behaviour successfully in relevant contexts
<b>(3) Focus on past success</b>	Advise to think about or list previous successes in performing the behaviour (or parts of it)
<b>(4) Self-talk</b>	Prompt positive self-talk (aloud or silently) before and during the behaviour

## Covert learning

Table 25 Annex I Covert learning (Source: Michie et al., 2013)

Label	Definition
<b>(1) Imaginary punishment</b>	Advise to imagine performing the unwanted behaviour in a real-life situation followed by imagining an unpleasant consequence (includes 'Covert sensitisation')
<b>(2) Imaginary reward</b>	Advise to imagine performing the wanted behaviour in a real-life situation followed by imagining a pleasant consequence (includes 'Covert conditioning')
<b>(3) Vicarious consequences</b>	Prompt observation of the consequences (including rewards and punishments) for others when they perform the behaviour; Note: if observation of health consequences, also code <i>Information about health consequences</i> ; if of emotional consequences, also code <i>Information about emotional consequences</i> , if of social, environmental or unspecified consequences, also code <i>Information about social and environmental consequences</i>

