



GUIDELINES FOR CO-CREATION OF CODEZERO SOLUTIONS

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Authors:

Philippe Lebeau (VUB), Kathleen Cauwelier (VUB), Heleen Buldeo Rai (VUB)



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List of abbreviations and acronyms

Acronym	Meaning
CINEA	European Climate, Infrastructure and Environment Executive Agency
DD	Double Diamond
TNO	TNO
TOI	Transportøkonomisk Institutt
TRT	TRT Trasporti e Territorio Srl
VUB	Vrije Universiteit Brussel
WP	Work package

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Abstract

The CodeZERO project aims at developing and testing new sustainable last-mile delivery and return solutions for e-commerce. Central to this effort is a co-creation approach, facilitated through a series of three co-design workshops in Oslo, Utrecht, Antwerp, and Milan. Despite the benefits of co-design, its application in urban freight transport remains limited.

To address this, the project proposes in this deliverable the development of a co-design process, which incorporates four core principles: sharing power, prioritizing relationships, using participatory means, and building capability. The process is organised around an adaptation of the Double Diamond framework, commonly used in design thinking. For each step, a library of participatory tools is proposed to ensure stakeholder engagement. Based on these collected inputs, the deliverable results in a detailed programme that can be replicated for the three design workshops across the four CodeZERO cities.

Executive Summary

CodeZERO is a three-year Horizon Europe research project aiming to co-create sustainable and zero-emission last-mile delivery and return solutions for e-commerce that align with consumers' preferences while being sustainable for retailers, logistics operators and local authorities.

The co-creation process of CodeZERO will be organized around a series of three co-design workshops in Oslo, Utrecht, Antwerp and Milan involving consumers, retailers, transport operators and local authorities. To prepare these workshops, Task 4.1 developed a co-design process to be replicated in the different cities. This deliverable reports on this first task of WP4.

The report starts by exploring the concept of co-design in the context of stakeholder engagement. It identifies co-design as one step of the co-creation process that is focused on solving a problem with a team of co-designers. Four key principles are at the core of the co-design process: **sharing power, prioritizing on relationships, using participatory means, building capability**. These principles make sure the group of participants to the co-design exercise can follow a democratic process leading towards innovative and meaningful solutions. Despite its benefits, the application of co-design to propose solutions in last mile urban freight transport is extremely limited. This deliverable proposes therefore a new approach to integrate stakeholders in the transition of the last mile.

Given that the focus of the co-design process is on solving a problem, the approach starts by developing the tools proposed by design-thinking. Among the different frameworks available, the Double Diamond was found to be used already in several co-design processes especially within the health sector. The Double Diamond organizes the process in four phases: **discover** (diverging), **define** (converging), **develop** (diverging) and **deliver** (converging). We adapted the framework further to make sure the principles of co-design are well integrated. The two loops of divergent and convergent thinking are particularly useful for the participants to go across deep reasoning while ensuring a generative design. The Double Diamond will be preceded by an additional initial phase dedicated to **building the right conditions** for the team to co-design together.

Once the structure of the co-design process is established, the possible tools to be used to guarantee a participative approach across the five different phases are identified. Based on this non exhaustive library of mechanisms, a detailed agenda for the animation of the three workshops to be replicated in the four pilot cities is proposed. Given that the facilitation is more than following an agenda, the local facilitators hosting the workshop in each of the CodeZERO cities will be trained in a dedicated workshop prior to running the co-design workshops.

This deliverable is to be approved by the European Commission

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1 Introduction

1.1 About CodeZERO

CodeZERO is a three-year Horizon Europe research project aiming to co-create **sustainable and zero-emission last-mile delivery and return solutions for e-commerce** that align with **consumers'** preferences while being sustainable for **retailers, logistics operators** and **local authorities**. Additionally, the project is focused on providing clear, consumer-friendly communication and developing tools for local authorities to promote eco-friendly behaviour.

CodeZERO is articulated in four phases:

- An **ANALYSIS** phase which provides (1) an analysis of existing delivery and return options and an understanding of how they are shaped by the needs and constraints of all involved stakeholders; (2) an in-depth intersectional analysis of various groups of on-line consumers to understand what are the features of delivery and return options making them attractive, with the aim to identify mechanisms to incentivize behaviour changes; and (3) develops an assessment framework to measure the impacts in the environmental, economic and social domains of new solutions.
- A **DESIGN** phase, in which CodeZERO engages in a co-design process involving retailers, transport operators, consumers and local authorities in developing (1) guidelines for retailers to raise awareness among customers; (2) a set of zero-emission and sustainable delivery and return options for retailers and transport operators; and (3) a toolset for local authorities to accelerate the transition towards sustainable solutions in last mile consignments in e-commerce.
- A **TEST** phase running four pilots in four different European cities in Italy, Netherlands, Belgium, and Norway to test a set of sustainable solutions identified in the previous phase with the aim to prove their feasibility, to fine-tune their design and to assess their impacts from the perspective of all stakeholders.
- A **CONSOLIDATION** phase where (1) CodeZERO outcomes are fine-tuned based on the lessons learned from real life applications, (2) requirements for up-scaling of solutions at European level are discussed (3) recommendations are formulated and (4) directions for future research are outlined.

Engagement with consumers and retailers' associations, industry stakeholders, cities and researchers contributes to shaping project results.

Running from June 2024 to May 2027, CodeZERO is organized along eight WPs:

- WP1 Analysis of current delivery models
- WP2 Analysis of consumers' behaviour
- WP3 CodeZERO assessment framework
- WP4 Design of CodeZERO solutions
- WP5 Testing solutions: CodeZERO living labs
- WP6 Conclusions and recommendations
- WP7 Dissemination, communication and exploitation
- WP8 Project management.

1.2 Aim of this document

This deliverable reports on Task 4.1 of CodeZERO project which aims at preparing the co-design process that takes place in WP4. It provides an overview of the contents, techniques and stakeholder engagement tools to run a series of three co-design workshops in Oslo, Utrecht, Antwerp and Milan.

To develop a library of mechanisms enabling the co-design in the context of the last mile deliveries, an extensive literature review on previously adopted stakeholder engagement tools and co-design processes in similar areas (e.g. city logistics) is performed. As the co-design approach will follow the four steps of the **Double Diamond Design model**, i.e. **Discover**, **Definition**, **Creation**, and **Evaluation**, for each step the most appropriate tools are identified.

The format of co-design workshops is then specified in terms of duration, number and type of participants involved, consumers' groups represented, and equipment needed. Guidelines on how to perform each workshop are prepared and dedicated capacity building on-line webinars will be organised to train consortium partners for successfully conducting the workshops in their countries.

1.3 Structure of the deliverable

Section 2 focuses the concept of co-design by describing the important aspects of such a process and giving a short review of co-design in the last mile.

In section 3, the co-design framework used in CodeZERO is described by showing the appropriateness of the Double Diamond approach to structure the process and by listening the different available tools to engage with stakeholder at each step of the framework.

Finally, section 4 is dedicated to the concrete organization of the three workshops to be run in each of the four pilot cities of CodeZERO.

2 What is co-design?

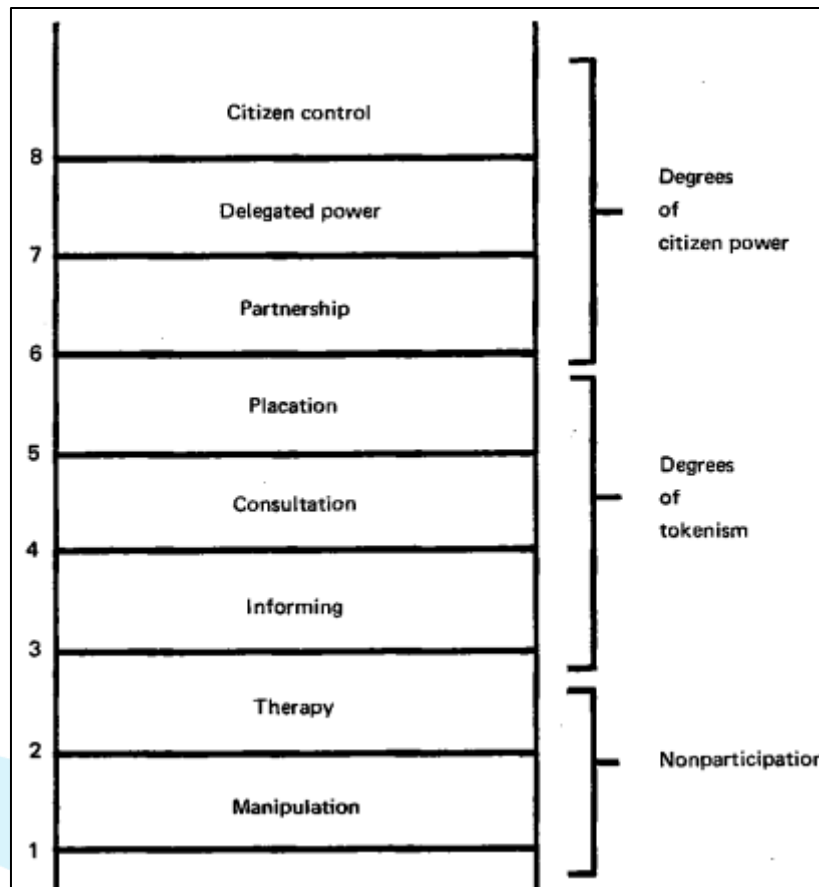
2.1 Stakeholder engagement process

The term **‘co-design’** can be assimilated to several other keywords such as **‘citizen science’**, **‘co-creation’**, **‘stakeholders’ engagement’** or **‘public participation’**. It is important to differentiate these terms to understand well the scope of this deliverable.

‘Public participation’ or **‘stakeholder engagement’** might have the largest scope. In policy making, it allows to collect feedback on policy scenarios and consider the needs of the public. It was defined by Schroeter et al. (2016) as “a set of processes that include representatives of different social groups organized by a third party with the purpose of initiating a discourse and cooperative counselling process aimed at informing collectively-binding decisions”.

‘Co-creation’ is already more focused. Pappers et al. (2020) describes it as a specific form of public participation involving stakeholders with the aim of solving issues with a community of actors. The focus of co-creation is therefore on issues affecting the members of the community and the actors of the co-creation process are solving issues of shared concerns (Wippoo et al., 2021). To do so, they follow different steps mainly: the identification of the problem, the design of possible solutions, their evaluation and finally their implementation. Co-creation is therefore a form of public participation with a higher level of involvement of stakeholders. Pappers et al. (2020) situate it on the highest rungs of Arnstein’s ladder of participation as depicted in Figure 1 (Arnstein, 1969). Actors become then owners of the changes designed in the participation process.

Figure 1: Arnstein’s ladder of participation as depicted in Arnstein (1969)



Designing solutions is one of the key steps achieved by the stakeholders involved in the co-creation process. **'Co-design'** can therefore be considered as a subset of a co-creation exercise where the focus lies on building the solution to a given problem. As recalled by McKercher (2020), "co-design is an approach to designing **with**, not for, people". It is defined by Blomkamp (2018) as a decision-led process, involving creative and participatory principles and tools to engage different kinds of people and knowledge in public problem solving". Bradwell & Marr (2008) shows that co-creation is "the effort to combine the views, input and skills of people with many different perspectives to address a specific problem". As co-designing is a step of co-creation, they share a lot in common. The actors involved and the principles are similar and essential to make the process successful. However, co-design is focused on the step of solving a problem.

2.2 The principles

Co-design is not only a matter of gathering stakeholders around a solution to a problem. To make the process successful, McKercher (2020) recommends considering **four key principles**: the need to **share power, prioritize relationships, use participatory means** and **build capacity**.

Given that an important objective of co-creation is to take into account the ideas of the people with lived experiences (Banbury et al., 2021; Kochanowska & Gagliardi, 2022; Tanay et al., 2022), there is the need to guarantee the space so their voice can be heard. Hence, **sharing power** is important to make sure the decisions are not taken based on the opinions of the people having usually most influence. Otherwise, co-designing is pointless, and the process might generate a solution not very different from the business as usual. The process acknowledges that everyone has expert knowledge and experience. To share power, trust is key. To build trust, social connections are essential. By setting a **priority on relationships** in the co-designing process, deeper exchanges will be ensured and, as a result, better outputs out of the co-creation exercise. When setting the scene of the co-design process, clarifying the boundaries and the rules of the group is essential to build a safe place for every member. It will allow to manage the expectations and ensure everyone's commitment to the process (Wippoo et al., 2021) and help maintaining openness, realism and honesty. Once this basis is built, the process of co-designing needs to stimulate participants to be active and create these relationships by **using participatory means**. All participants need to be encouraged to teach and learn at the same time during the co-creation process. Co-designing allows then to **build capability** in participants for the group to own the results of the co-design exercise.

2.3 The benefits

The above-mentioned principles clearly show that co-designing is more than a sequence of steps to follow with a group of actors. It is a movement aiming for a more democratic, fair and inclusive decision making (Wippoo et al., 2021). It contributes to shaping decisions that are more meaningful and relevant to the stakeholders supporting the change in organizations. Moreover, involving stakeholders in the design of decisions will empower them and stimulate their collaborations afterwards thanks to the trust built throughout the process. But as most often mentioned, the collaborative approach stimulates the motivation of members of the co-design team and allows them to generate more innovative, effective and equitable ideas.

Table 1 shows how the social movement behind co-design moves away from the more classical approaches (McKercher, 2020).

Table 1: Co-design as a social movement (McKercher, 2020)

From (Classical approach)	To (Innovative approach)
Making decisions for people with lived experience	Making decisions with people with lived experience
Valuing professional expertise above all	Valuing professional and lived experience equally
Seeing marginalised people as a burden	Seeing marginalised people as resilient, creative and capable
Colonising, heteronormative and ableist systems	Compassionate systems that see and respond to dimensions of difference
Believing that resources are scarce to make change	Seeing an abundance of experience, ideas and energy for change
Focusing on ‘consumer’ councils and committees	Embedding participation in everyday practice
Rushing to solutions	Slowing down to listen, connect and learn

Obviously, the co-designing approach has some drawbacks as well. In particular, the intensity of stakeholder engagement brings challenges. Time constraints might explain the limited application of co-design in the last mile as shown in section 2.5. The recruitment of participants is also more difficult as we can see in section 2.4.

2.4 The participants

The co-design process can be time intensive (Janjevic et al., 2019). As a result, most of the time, the number of people with lived experience involved in such a process is limited. For example, Johnson et al. (2024) organized a co-design process across several workshops where they managed to engage with 12 participants at the first workshop. At the second workshop they were however reduced to three. But the number of participants can go up to 40-60 people as in Ambrose-Oji et al. (2024). Still, McKercher (2020) recommends a maximum of 20 people in the co-design team to prioritize trust, intimacy and social interactions. If needed, other people can be involved in the co-design process at some key steps to support the work of the co-design team.

A co-design team is composed ideally of three groups of actors people with lived experience, provocateurs and professionals (McKercher, 2020):

- **People with lived experience** are the first concerned about the problem that the co-design process wants to explore. They are interested also to share their thoughts and learnings. People with lived experience can represent their experience of a social justice issue, not the experience of others
- **Professionals** are best integrated in the co-design teams when they come from diverse positions (workers, managers, academics, politicians). They should ideally be able to connect with people with lived experience, be open to learn and share with them, are able to listen without fact checking. They should also be able to influence and create change beyond the co-

design team. Most importantly, a direct decision maker should be included in the co-design team.

- **Provocateurs** are outsiders who are curious about the problem. They do not bring experience or expertise. They bring stories, they challenge the professionals in their assumptions, they are critical and creative thinkers. Yet they leave room to people with lived experience.

All actors' experiences are valorised in a co-design process as expertise. Their detailed knowledge on the issues investigated in the co-designing process is considered key to create insights into possible solutions (Wippoo et al., 2021). Co-designing is therefore open to all people affected by the problem to be explored. If they are affected by the problem, the point of view of children as well can be considered as expertise.

Getting the participants into a co-design process can be challenging. The process should therefore be accessible to the actors. It should occur at a place and time convenient to them so their voices can be heard. It should be organized in an environment that allows the right conditions to build relationships, owning the problem and ideate on the solutions, for example in or close to a place that connects them all. Meeting online is also a possibility to reach some additional actors. Using several channels helps to involve some specific groups. Yet, physical events are usually recommended as building relationships and trust is usually easier when people can exchange and create interpersonal links (Wippoo et al., 2021). In any case, the process should be kept compact to avoid fatigue and losing people along the way.

Beyond the practicalities, the process should also be accessible to a diversity of actors who are sharing concerns to be addressed in the co-designing exercise. The format of the process should therefore ensure inclusivity which is key in the co-design process as the goal of the approach is to propose solutions that are benefiting the different communities (Banbury et al., 2021; Kochanowska & Gagliardi, 2022; Tanay et al., 2022).

To guarantee that the co-design process ensures inclusivity, integrate the expertise of all co-designers and respect the four key principles of co-designing, a last role needs to be presented. Next to the co-design team, **a facilitator** is key to guide the co-design team into the process. It is defined by Crespel & Nève Hanquet (2018) as the person who makes easier the process of co-producing in a group while paying attention on the one hand to the interior behaviour of participants and on the other hand to the key questions to stimulate the collective intelligence. A special attention to inclusivity is therefore required to the facilitators so that the format can ensure engagement of the most vulnerable participants. Having a co-facilitator, or a support team next to the facilitator, often helps in reducing the blind spots of the facilitator (McKercher, 2020). If failing in doing that, people who are not part of the dominant group might feel set apart and drop the group.

2.5 A review of co-designing in the context of the last mile

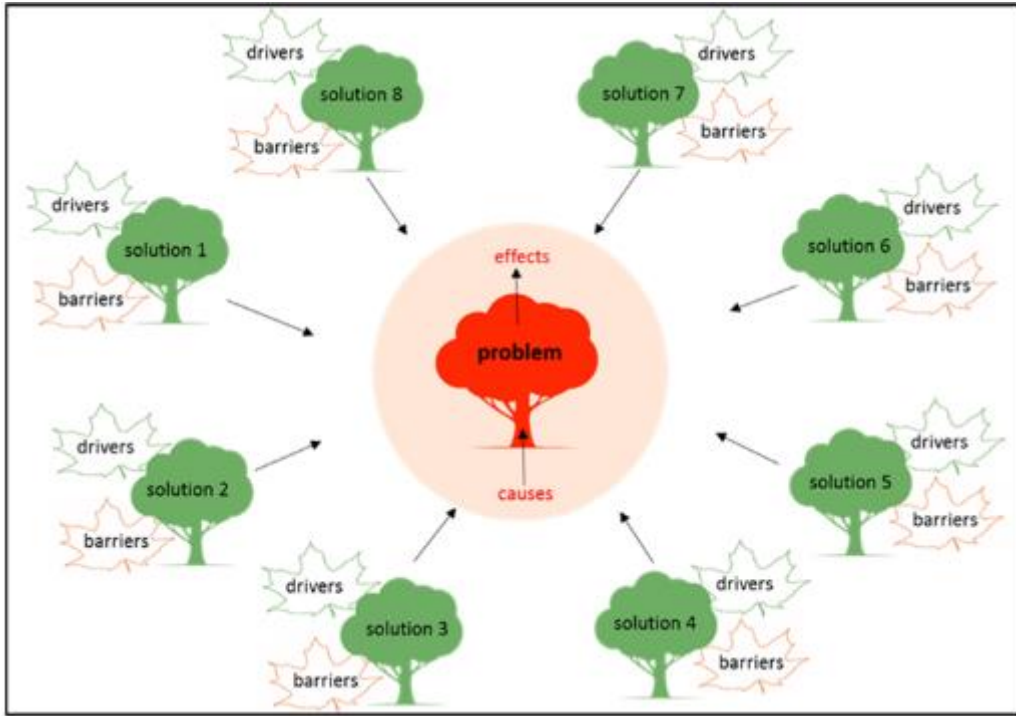
To facilitate the implementation of sustainable solutions in the last mile, an important focus is on the engagement of stakeholders as it can be observed in the review by Le Pira et al. (2024). The integration of their needs in the decision-making process is important to guarantee their support for the implementation of the selected solution (Lebeau et al., 2018). In city logistics, the stakeholder groups that are most regularly considered are logistics service providers, shippers and receivers. The needs of local authorities and citizens are integrated to a lower extent, although the scope is even larger where indirect actors are also considered, especially given the many externalities generated by the last mile in urban areas (Ballantyne et al., 2013). The diversity of actors in urban freight transport brings therefore additional complexity, increasing the need for stakeholder engagement in order to facilitate change.

The focus on stakeholders' engagement allowed the development of several approaches to integrate them in decision making. Examples include the Multi-Actor Multi Criteria Analysis (Macharis et al., 2014), Freight Quality Partnerships (Lindholm, 2014), Freight Living Labs (Nesterova & Quak, 2016). Using co-creation to involve stakeholders is however limited to the last mile. Obviously, the keyword "co-creation" appears several times, but it is mostly used as synonym of stakeholder engagement. For example, Janjevic et al. (2019) propose an integrated framework considering the three stages of decision making: intelligence, design and choice. Although the design phase is calling for a co-creation of solutions, the application of the framework is closer to the more traditional approaches used in workshops aimed at engaging stakeholders: participants are limited to experts and solutions are already proposed to help starting the discussions. These deviations from the co-creation principles are also observed in Charoniti et al., (2024). In this paper, co-creation labs are focused on proposed solutions where participants are invited to share their suggestions. Co-creation aims however at answering a problem that participants solve by themselves. These deviations from the principles of co-creation are also pointed out by Paddeu & Aditjandra (2020) which highlighted that the role of stakeholders in the engagement approach was too often limited to the evaluation of alternatives designed by experts.

Such deviations are also often observed in mobility research where co-creation is more often used (Pappers et al., 2020). The different shortcomings in the application of co-creation might be explained by the constraints the approach faces in terms of resources. As stressed by Janjevic et al. (2019), co-creation is time intensive. This is a point of attention highlighted in the key lessons learned from four different European projects using co-creation in the field of mobility research (Wippoo et al., 2021). Co-creation requires more time than traditional planning and consultation processes. Churchman et al. (2023) recognize this challenge as well, specifically for the freight sector.

As a result, examples of co-creation in the last mile are extremely limited. An approach closest to the principles of co-creation described above is proposed by Paddeu & Aditjandra (2020). To guarantee diversity while taking into account the time constraints of the process, they engaged in a workshop with ten stakeholders including policy makers, logistics professionals, experts, retailers and citizens. The objective of the workshop was to identify the needs and expectations of stakeholders for more sustainable urban freight transport in Bristol. To reach that objective, a participatory approach was used to ensure a consultative and democratic process. To approach the problem with participatory means and balancing power across stakeholders, they used the Problem tree and Solutions forest model as depicted in Figure 2. The authors stressed indeed that this model gives the same weight/importance to all stakeholders taking part in the process. The visualization also supports suggestions by stakeholders, with the approach starting from the actors proposing their own solutions to shared problems. The authors stressed that this aspect brings additional value to the solutions that emerged from the process. Participants considered the approach to be "engaging" and "easy to use". More importantly, the democratic collaborative process avoided that solutions would provide a personal advantage to a specific actor. By building connections and building capability in the co-design team, the implementation of the solutions will be facilitated thanks to this working group.

Figure 2: The “problem tree and solutions forest” model (source: Paddeu & Aditjandra (2020))



Paddeu & Aditjandra (2020) position this kind of approach as a step forward in supporting the decision and policy making process. In a following paper, Paddeu et al. (2024) concluded with a future research agenda in terms of stakeholder engagement methods. The co-design workshops planned in CodeZERO seems to be particularly relevant to answer the following avenue: “engagement with end-consumers to develop the wider carbon literacy needed to both influence consumer behaviour and make the actions of public and private bodies transparent and explicable”.

3 Co-designing in CodeZERO

Given the limited evidence on co-design in the last mile proposed by the literature, this section aims to open perspectives on co-design and build the framework to be used in the CodeZERO project. It starts from the basics of design and extend to co-design.

3.1 Design thinking

Design thinking is considered as a new approach to innovation and problem solving. Given that tensions and a lack of clarity around the concept of design thinking was observed, Micheli et al. (2019) conducted a review of the literature to better understand the key attributes of design thinking as well as the tools and methods used in that process. Among the most cited references in the field, Brown (2008) comes back in almost half of the reviewed papers. He is known to have introduced design thinking to the field of management and popularized it in a TED conference in 2009. Martin (2009) is also regularly cited. He promotes design thinking as an approach that can blend rationality and analysis with intuition and synthesis. Finally, Simon (1996) is often referred to his definition of design as “the transformation of existing conditions into preferred ones”. Overall, Micheli et al. (2019) observes ten attributes to design thinking and gave for each of them an example of a quote from the literature to describe them (Table 2).

Table 2: The 10 attributes to design thinking according to Micheli et al. (2019)

Attribute	Descriptive quote
Creativity and Innovation:	Design thinking “is an approach that addresses product, process, and business model innovation”.
User-centeredness and involvement	You have to know your customers not as statistics but as human beings.
Problem solving	If design methods and tools are well suited to addressing wicked design problems, then it would be logical to assume that these methods and tools could be useful for wicked problems outside the traditional design domain. It is this element of design practice that, when separated from the tangible and applied to intangible, is often termed Design Thinking.
Iteration and experimentation	Design thinking is characterized by trial-and-error learning through iterative forms, prototyping, and trials that test a range of possible solutions with end-users and other project stakeholders.
Interdisciplinary collaboration	Collaboration is perhaps the most overlooked experience that is essential to design thinking. [...] Cross-disciplinary collaborative teams are more likely to create innovative solutions than focused groups of like-minded people since varying opinions and sources of expertise can lead to valuable insight.
Ability to visualize	The act of moving from abstract thinking to visualizing ideas and then thinking on top of those visualizations is at the heart of design for innovation.
Gestalt view	Designers would think about the system as a whole and thereby envisage the consequences of their actions.
Abductive reasoning	Abductive reasoning is “in opposition to deductive (from the general to the specific) and inductive (from the specific to the general) reasoning... [it is a]

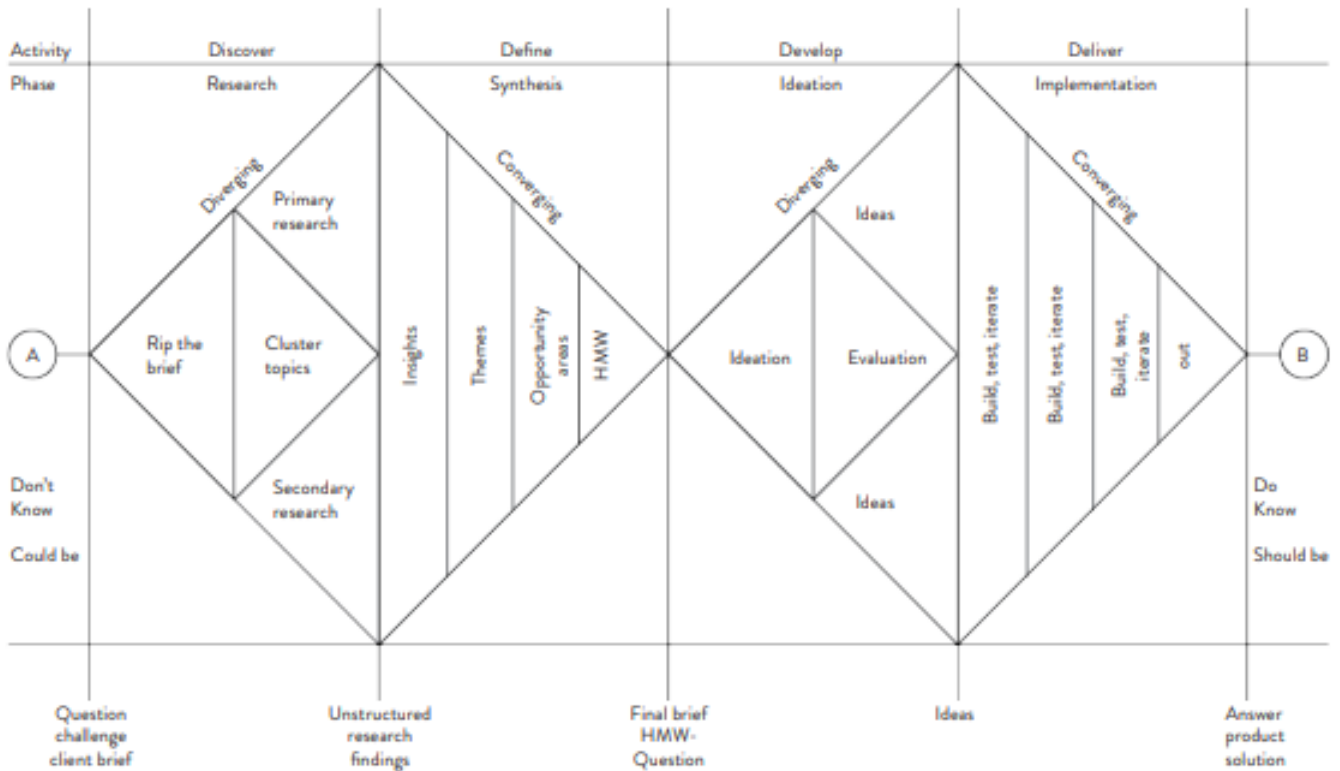
Attribute	Descriptive quote
	“logical leap of the mind” or an “inference to the best explanation” to imagine a heuristic for understanding the mystery.
Tolerance of ambiguity and failure	Facilitating the design thinking process involves helping teams develop a greater tolerance for, and ways of working through, this ambiguity.
Blending analysis and intuition	Design thinking balances exploitation and exploration, reliability and validity, analysis and intuition, and declarative logic and modal logic.
Design tools and methods	Both scholarly and practitioner literature have exhibited widespread interest in the application of design methods for promoting innovation, often referred to as the use of “design thinking”.

Several frameworks have been proposed to integrate these attributes in a single process. Plattner (2013) proposed the design thinking model – also known as the Stanford’s “d.school model” – where the process is organized iteratively around five stages: Empathize, Define, Ideate, Prototype and Test. IBM developed the Enterprise Design thinking model (Kwon et al., 2021). It is also an iteration around three steps: observing, reflecting and making. The Design Sprint method proposes a process in a few days to build and test a prototype with a small team (Knapp et al., 2016). The Double Diamond is another popular framework that structure two loops of diverging and converging thinking (Design Council, 2015).

In CodeZERO, the **Double Diamond framework** is preferred. The process integrates many of the features that are essential in a design thinking process. As stressed by Shen et al. (2024), the Double Diamond allows to engage the participants and frame the problems, to operate abstractly across several levels, to use visualization and prototypes for communication and assessment and to apply diverse approaches to solve a problem. Robert et al. (2022) stresses in particular the benefits of the framework in explaining and visualizing the design process. It is worth nothing also that Double Diamond framework has often been used to structure co-design processes as we will see in the next section.

The Double Diamond (DD) was proposed by the British Design Council to integrate at the core of the process the interactions between divergent and convergent thinking. As summarized by Cropley (2006), divergent features ensure generation of novelty while convergent features allow evaluation of the novelty. Divergent thinking allows to open the thinking process and collect ideas. Convergent thinking builds on these ideas to reduce the scope of possibilities to end up on one final result. Figure 3 visualises this double process of opening and closing the scope twice thanks to two diamonds. Each diamond is divided between the diverging phase first and the converging phase afterwards, resulting in a total of four main phases proposed by the DD framework. **Discover** is the first stage where the problem space is explored with divergent thinking. Once the scope of the problem is set, the second stage **Define** will use convergent thinking to frame the problem and find the focus that we want to tackle in the design thinking process. The third stage **Develop** will open again the space to ideate answers to the problem we defined at the end of stage two. The last stage **Deliver** aims at testing the ideas. Prototyping can typically take place at this stage to evaluate and refine ideas in an iterative way. Parts that do not work are rejected, parts that work are improved (Banbury et al., 2021). As a result, the first diamond is focused on “designing the right thing” while the second diamond is focused on “designing the thing right” (Gustafsson, 2019).

Figure 3: The Double Diamond according to Gustafsson (2019)



3.2 Co-designing with the Double Diamond

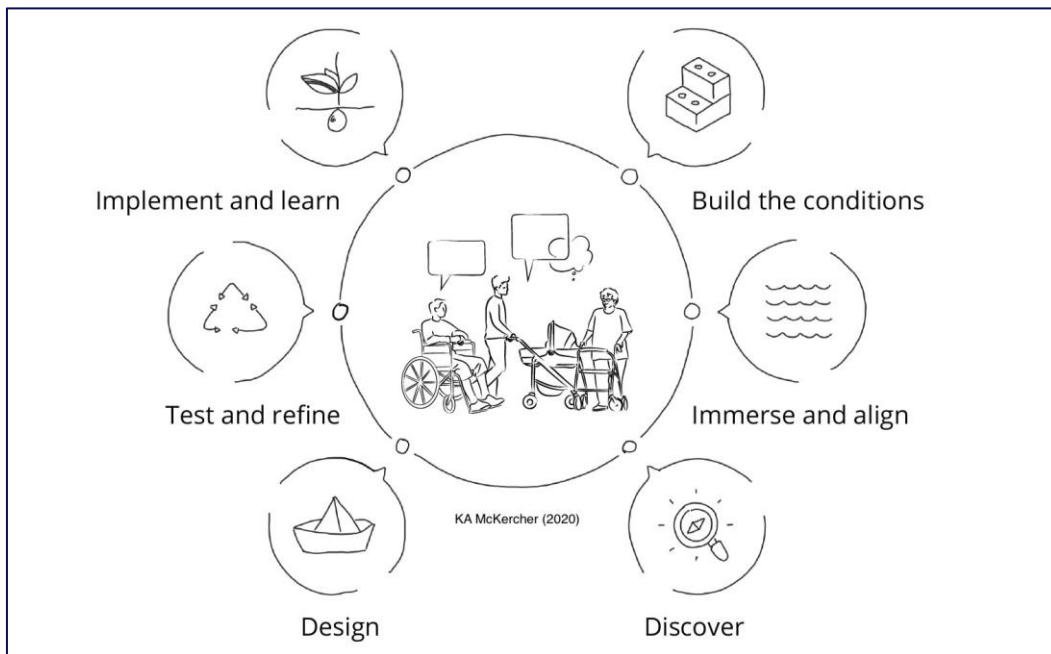
Micheli et al. (2019) did not refer once to co-designing in their review of design thinking. The principles of co-designing allow however to push further some of the attributes of design thinking. User-centeredness and involvement can be better considered in a process where people with lived experiences can voice their needs in a context where their opinions are valorised as experts (Johnson et al., 2024). The diversity of actors involved in a co-design process support therefore also the attribute Interdisciplinary collaboration of design thinking. Also, the fact that actors involved in the process are the ones that will be affected by the decision-making process supports the Gestalt view of the designing process. It ensures that the consequences of the decisions are well considered. The ability to visualize is one of the important benefits of the DD which support an inclusive communication and thereby a balance of power across participants (Banbury et al., 2021). Finally, iteration and experimentation will be facilitated in a co-design process as the stakeholders are engaged in the process from the beginning. Co-designing could be therefore considered as a more advanced form of design thinking.

Given the narrow links between design thinking and co-design, frameworks proposed in design thinking can easily be transferred to co-designing as long as they follow the principles of co-designing. The DD model seems in that respect quite successful as it has already been used several times as a framework of a co-design process for health and social care (Johnson et al., 2024). According to the authors, the contribution of that model in a co-design process is to bring structure and clarity in complex issues to the co-designers. The contributions from co-designers provided unique insights and shared positive experiences. They stressed in that regard, the need to share power across participants in a way that every co-designer can speak (Robert et al., 2022). As a result, the application of the DD has been identified as successful in improving patient care to clinical practice (Istanboulian et al., 2023).

Still, two important limitations come back in the different co-design experiments with the DD. The first phase was reported to be lengthy and expensive. Banbury et al. (2021) found also that the process can take more time than expected. Time constraints might fail in catching important inputs. Another limitation was the limited number of co-designers involved. The small number of participants might have therefore missed some input in the design thinking process. These constraints have already been identified in previous sections showing the importance of the first steps when engaging the stakeholders in the co-design process.

These limitations are perhaps explained by a too quick transfer of the DD proposed first as a framework for design thinking and not for co-designing. The principles of co-designing are indeed not integrated in the structure of the DD framework. McKercher (2020) is perhaps offering a solution to these limitations through the co-design process she proposes. It follows the six steps pictured in Figure 4 and can be linked with the DD framework. It starts with an initial phase that is missing in the DD: building the conditions. The second and third steps in Figure 4 can be associated to the first diamond (Discover and Define), while the last three steps can be associated to the second diamond (Develop and Deliver). We propose therefore to add to the DD an initial stage where we set the scene for the co-design process. According McKercher (2020), building the conditions allows to build a genuine and safe involvement of people with lived experience.

Figure 4: The co-design process according McKercher (2020)



3.3 The tools

To activate co-designers along the design thinking process, different tools and methods are used to stimulate their participation. In this section, we aim at sharing these different tools listed in the literature according to the different steps of the Double Diamond framework. The inventory will support the final format selected for running the workshops in the CodeZERO project as described in the next section.

Still, we stress that the inventory proposed below is not exhaustive. We share here a basic portfolio with some popular tools. For more tools, a lot of resources are proposed by Seeds for Change (2020), the citizen mobility kit of the project Cities4People (Cities4people, 2017), Gray et al. (2010), McKercher (2020) and Design Sprint (2024). We encourage the readers interested in this section to be also creative and think beyond the tools proposed. The Thiagi games show indeed how games can generate multiple

tools to approach the different stages of the DD. Ultimately, the most important in the approach selected is to have engaging activities that allow the co-designing team to interact and progress in the process. The facilitators should therefore first adapt the activities to the group they are supervising.

3.3.1 Set the scene

As mentioned in the previous section, it is essential to ensure the right environment is established before starting a co-design exercise. To this aim, a first step prior the four phases of the DD is added. The focus should be on **relationship building** (Ambrose-Oji et al., 2024). Banbury et al. (2021) propose therefore to start the co-design experiment by agreeing on a set of ground rules and confidentiality. It will contribute to building a safe place and ensure power sharing among the members of the co-design team. Once the frame is in place, a strong co-design team can be built. Through personal exchanges, bounds and trust in the team can be created, which is critical for members engaging and contributing to the co-design. Ambrose-Oji et al. (2024) recognize indeed that initiating that mindset is one of the hardest steps of the process but equally critical as it allows the actors to be more relaxed about sharing details in the following steps.

There are plenty of tools that contribute to build a right environment for the co-design process. Seeds for Change (2020) is an excellent compilation of such tools. Some “icebreakers” tools to kick off the session are presented in the following. Icebreaking is typically the first activity proposed to the group even before presenting the objective and agenda of the day.

- **Personal introduction:** this is perhaps the most popular way to start meetings. A round table where everyone briefly presents themselves can be organised to know better with whom people share the room. More guidelines can be given by asking for example to explain in one sentence why they came to the meeting or their expectations of the meeting. It can get more personal by asking everyone to share how they feel in that moment. It can also get more original by asking everyone to share their favourite vegetable or something good that happened to them in the last month.
- **People map:** this exercise is a more visual personal introduction. People place themselves in the room according to a canvas. For example, when asking the question “how far are you coming from?”, people who live nearby can position at the centre of the room and the more you live further away, the more you move away from the centre. The canvas does not have to be geographical. People could position themselves based on many other questions such as “rank yourself by alphabetical order”.
- **People bingo:** this exercise stimulates bilateral connections. Everyone has a list of 10 to 20 statements such as “I have a dog” or “I play piano”. The objective is to meet a minimum of four different persons who tick the same statement among those of the list.
- **People names:** remembering the names of people is an important step to create bonds. The icebreaker can be dedicated to an exercise making sure everyone gets enough time to remember the names of everyone. The first person would give his/her name and say something he/she likes. The second person would repeat the name of the first person and his/her like. The third person would repeat the name of the first person and his/her like, the name of the second person and his/her like and then his/her name and like, and so on.
- **Pair presentation:** this exercise ensures everyone connects deeply to at least one person. By pair, people exchange during 5-10 minutes to get to know each other. Afterwards, people present in front of the group the person they exchanged with.

Once the initial connections are established, it is useful for the group to clearly define the rules that are important to respect for safe interactions. It allows to support the creation of a safe place, align expectations and guarantee respect between members of the co-design team. In the form of a round

table or an open brainstorming, the different needs of the team are collected and listed in a group charter that will be kept visible on the side. The facilitator needs to safeguard any behaviour that deviates from that charter.

3.3.2 Discover

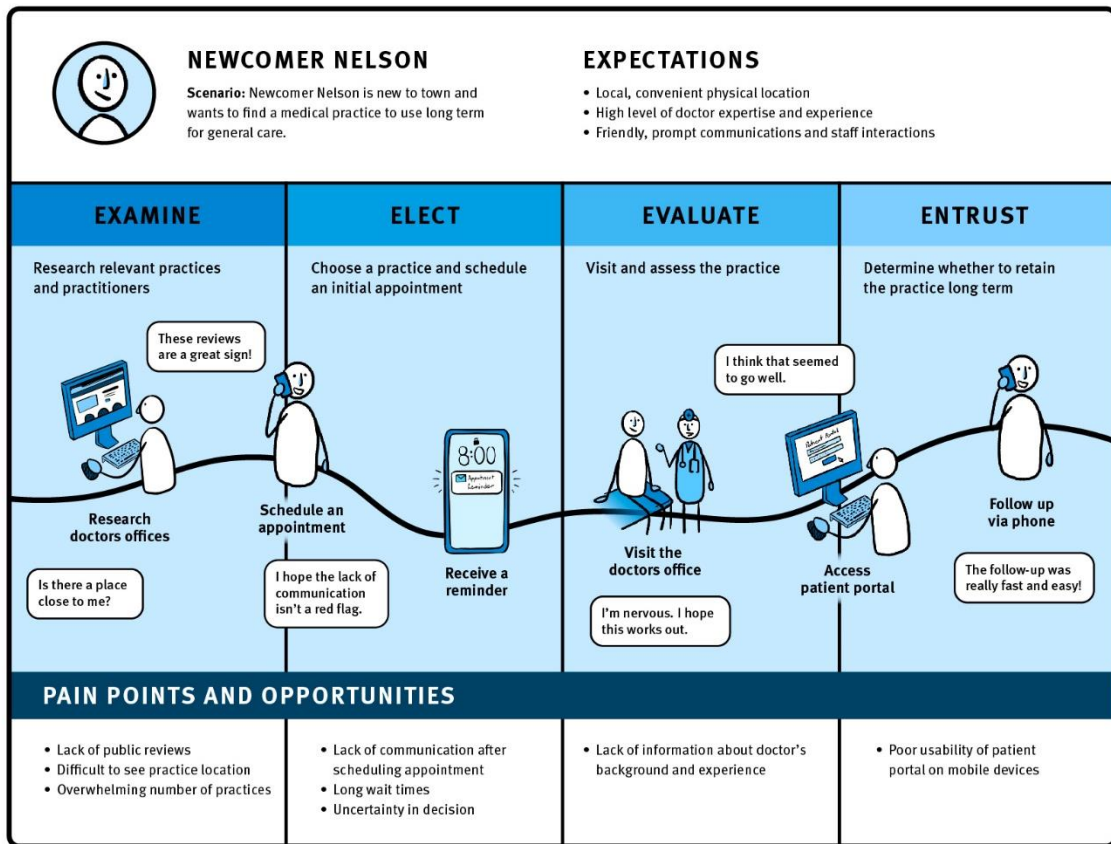
Johnson et al. (2024) describe the first phase of the Double Diamond as a gathering of insights and an exploration of the identified concept. That step is about exploring the problem, opportunity or needs to be addressed by the exercise. Doing so, it builds a bank of knowledge to inform the rest of the design process (Design Council, 2015). It is important to understand the priority areas to be tackled in the co-design experiment (Ambrose-Oji et al., 2024).

Studying the user is a key approach to uncover new concepts. Several methods are proposed in that respect. They are related often to design ethnography (Conte & Davidson, 2020) and User-Experience research methods (Wolcott & McLaughlin, 2024).

1. **User diaries** is a method to collect quantitative and qualitative information from and by users. It allows to understand their challenges and needs they face in their daily activities.
2. **Cultural probes** can be seen as a gamified extension of user diaries. Stimulated by prompts, users collect pictures, audio and/or videos where thoughts and feelings are recorded. It allows to capture information with a diversity of channels.
3. **User shadowing** is an observation method where a researcher follows a user and collects information about their behaviour. It allows to understand how people interact with a service within their daily lives.
4. **Contextual inquiry** involves also observation of users in their natural environment similarly to user shadowing, but it allows for more interaction between the researcher and the user. Inquiries will help to understand how and why users do what they do.
5. **Service Safari** is also an observation method where a researcher collects information on the location of a service. It allows to understand how a service is experienced by several users.

Once information is collected, **user journey mapping** or **user flows** are useful to visualize the different interactions the user is experiencing when using a service as shown in Figure 5. It allows to give a high-level description of actions, thoughts and feelings of users.

Figure 5: Example of a user journey map (source: NNgroup, 2024)

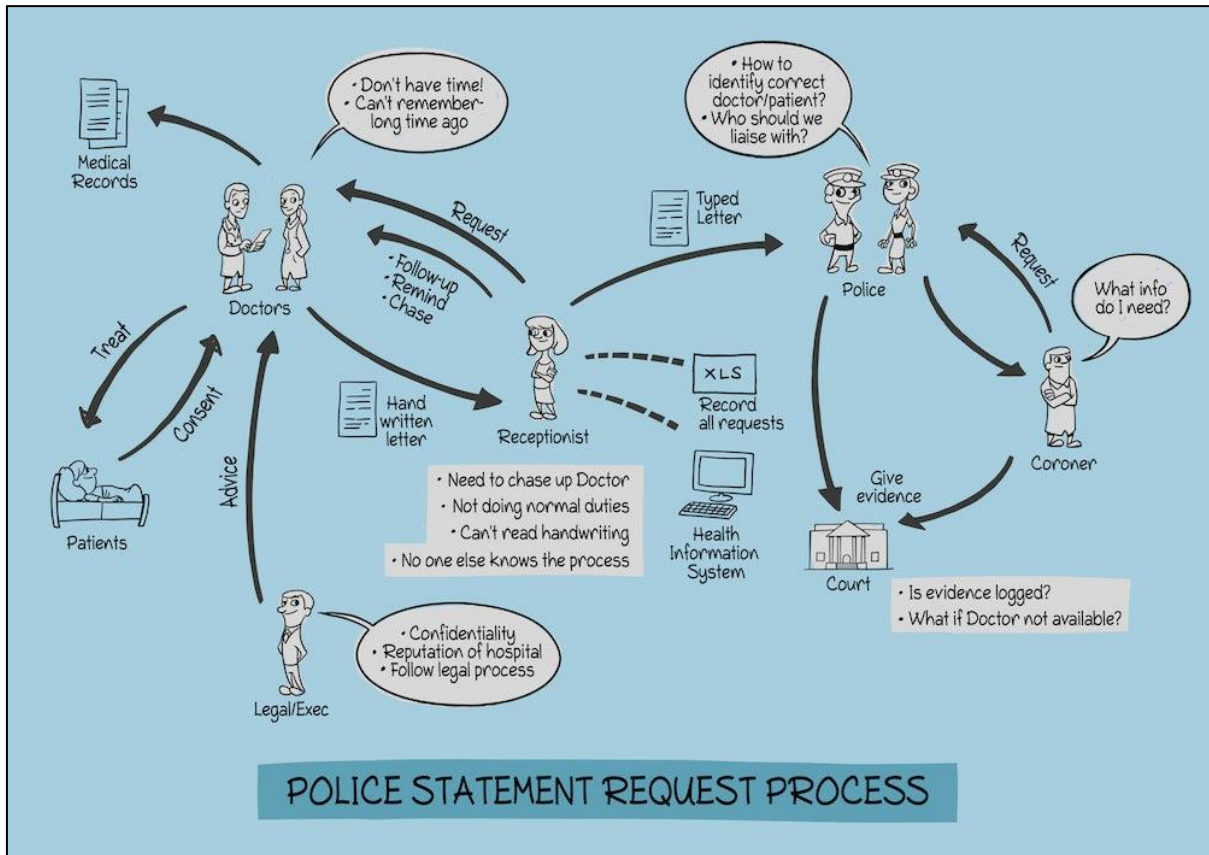


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User journey mapping can however be used in reverse to initiate collection of information in a workshop format. To start the discovery phase, Banbury et al. (2021) asked the participants to map their care journey from the pre diagnosis until their current status. Based on this map, participants could describe their experience including barriers and facilitators, their relationships with the organization, health professionals and services. Personal and emotional difficulties were shared. Based on the problem they faced, participants proposed a list of solutions addressing these problems. Issues were refined together with the group. The skills of the caregivers were found to be essential to support the solutions.

An alternative to user journey mapping is a rich picture such as depicted in Figure 6. It is a drawing representing a situation with the key elements and relationships to consider for intervening in that situation. It allows to explore and map a shared mental model of a situation in a group.

Figure 6: Example of a rich picture (source: BetterEvaluation, 2024)



Again, rich pictures could be used in reverse to initiate the collection of information. When pushed to the extreme of co-creation, it becomes participatory drawing. It is a visual research method that authenticates “non-textual ways of knowing” by activating the “performative dimensions” of image-making (Literat, 2013). The objective is to facilitate the expression of participants by using an alternative channel.

Thanks to these reverse approaches, the users become less a subject of observation for collecting information by the researcher. They become actors of the research process. Here are a few additional approaches that help to empower the users in the research and in the discovery phase during a co-design process:

1. **Card sorting** is a method applied with a group where different concepts are structured, for example in clusters. In a co-design approach, participants are ideally bringing up the concepts first individually. They are then collected, structured and prioritized.
2. **Narrative inquiry** is a research method that analyses stories and investigates the underlying assumptions they share. By sharing stories in a group, participants can discover the factors that contribute to their behaviour (Bell, 2002).
3. **Grounded theory** is a research method that aims at discovering theory from data. By sharing some key figures, participants can elaborate meanings around them.
4. **Q methodology** is a research method used in co-design process to facilitate problem definition. It helps to highlight the trade-off made in some complex decision-making process (Ambrose-Oji et al., 2024).
5. **Focus group** allows to explore different perspectives, behaviour and attitudes (Johnson et al., 2024). Thanks to a discussion in a small group, participants can interact about their feelings and perceptions on a specific topic.

6. **World café** is also an approach based on the interactions of small groups. It brings participants around tables of around four people where a specific topic is addressed. After 20 minutes, each group spreads to the different tables except one hosting the participants from the other table. The different topics are this way further explored with new perspectives.
7. **Lego serious play** is a facilitation method where participants build 3D models and tell their stories. The goal is to improve communication, decision making in a group and creative thinking.
8. **Role play** is an exercise where participants can assume the role of a person in a given situation. It allows to explore the feelings and behaviours they have in short, spontaneous presentations. It can be built on them afterwards to discuss the observations other participants have seen. The six thinking hats is a good example of such role play (Seeds for Change, 2020). In this game, a group is invited to consider a situation from different angles. Each hat represents then a different perspective.
9. **Foresight** is a technique exploring different possible futures. Based on different evolution of trends, scenarios can be described where each participant can take a role, picture their reality in that future and describe their hustles, their likes and dislikes.
10. **Mind mapping** is a brainstorm technique where the information is visually organized into a hierarchy. It allows to especially explore the roots of a challenge. The technique of the five Why's can support this exploration. Starting from a problem, participants think of the reasons for that problem iteratively five times and question again why the previous reason leads to that problem. The problem tree and solutions forest is a close alternative to mind mapping as seen in Figure 2.

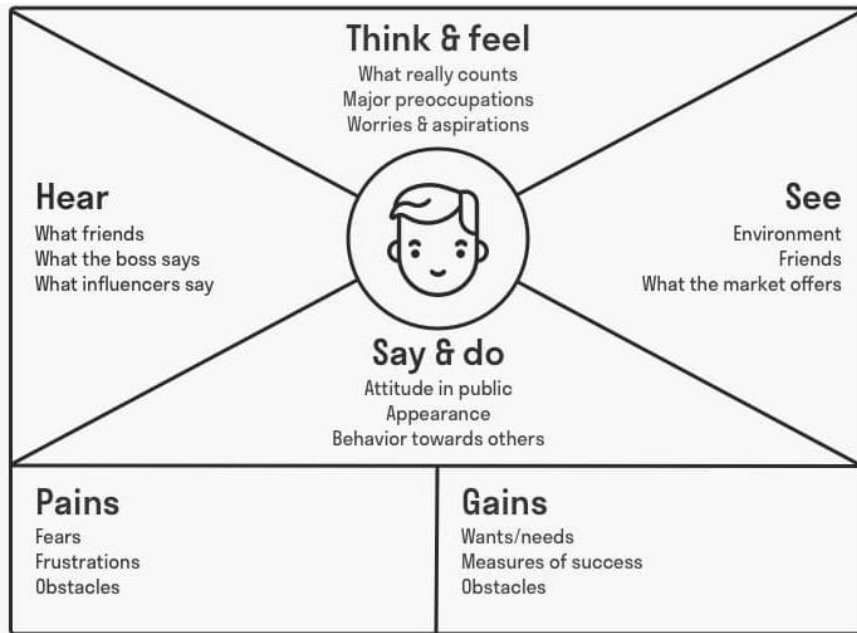
3.3.3 Define

The second phase of the Double Diamond is the convergence following the divergence of the discovery phase. It aims at refining the challenges identified and reduce them to a set of problem statements that can lead to actionable tasks (Johnson et al., 2024). The outcome of this stage defines then the fundamental challenge to be addressed in the next phase of the Double Diamond.

Converging to the challenges is therefore about synthesizing and prioritizing the challenges. A few tools are proposed by Design Council (2015) to facilitate this step.

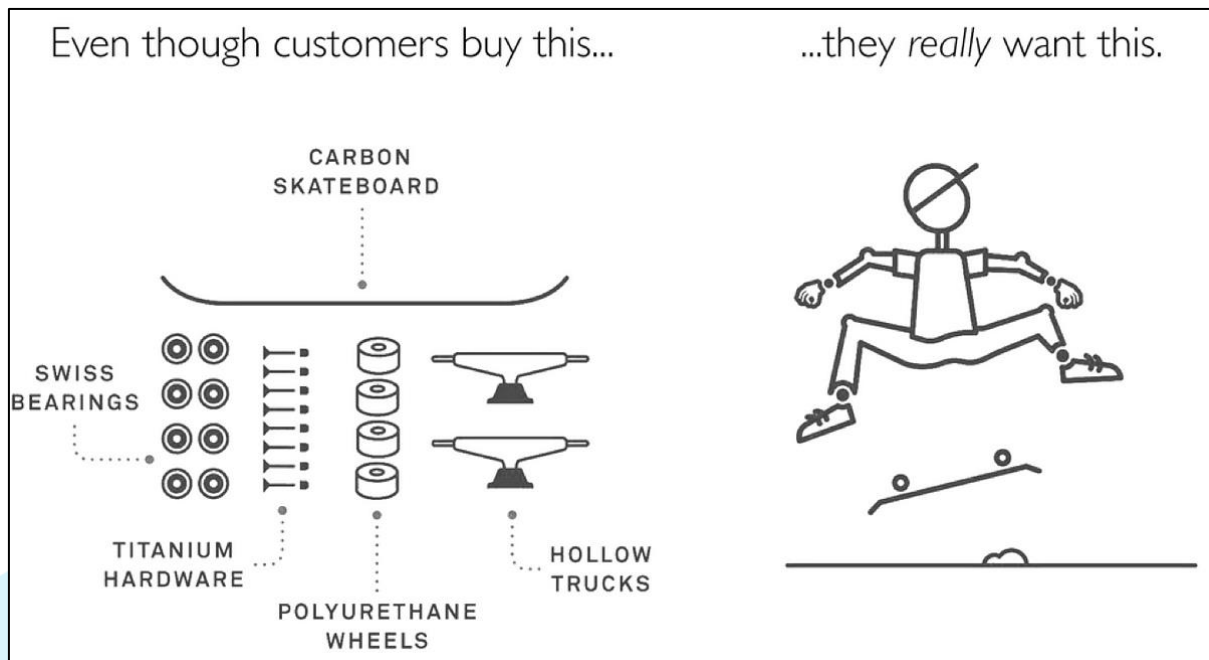
User Personas is useful to bring together lots of information into a single consistent profile that represents a cluster of similar people. They can be described according to their name, age, occupation, family situation, their likes and dislikes and most importantly their needs. Empathy maps describe them also according to their sayings, their actions, their thoughts and their feelings as pictured in Figure 7. User personas are useful to keep the user perspective in mind during the subsequent develop phase and make sure value is delivered to them.

Figure 7: Example of an empathy map (source: ToolsHero , 2023)



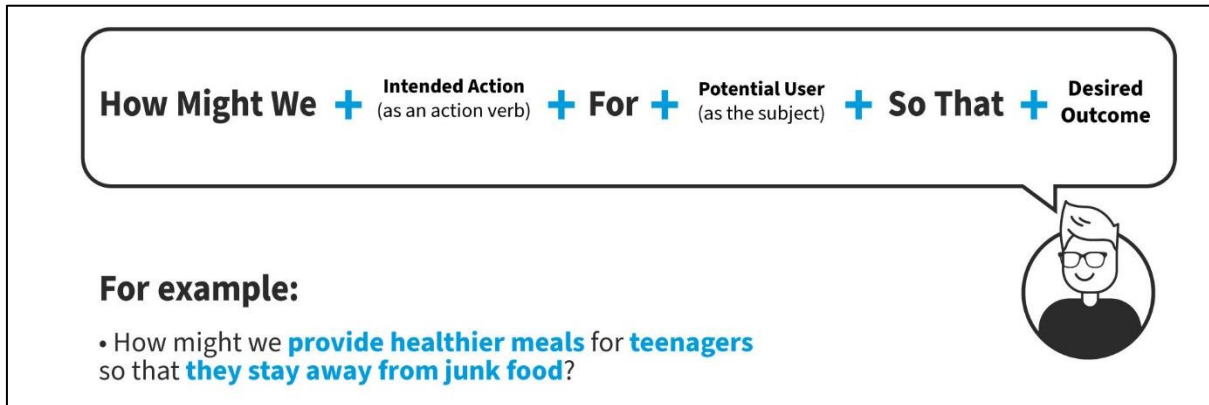
Jobs to be done (JTBD) is a framework that highlights the progress that a user hopes to achieve. It focuses therefore less on the user and more on the outcomes they want to achieve in a given circumstance as represented in Figure 8. By defining a JTBD, it calls for a productive or a service that supports the achievement of this job. The framework helps to highlight the underlying motivation and outcomes that drive a user to choose a specific product or service.

Figure 8: Example of a “jobs to be done” (source: Jtbd, 2016)



Design Brief is useful to summarize a challenge in a clear and structured statement that calls for action in the next phase. It includes the goals we want to achieve with a targeted audience while considering budget, time and risk constraints we face. The “How Might We” question is an example of framework to structure such a design brief as shown in Figure 9.

Figure 9: Example of a how might we question (source: Interaction Design, 2024)



3.3.4 Develop

The second part of the diamond aims at designing a solution to the challenge identified in the Define phase. Develop is the second divergent phase of the DD which aims at exploring the different options that can be used to address the challenge. This phase can involve several iterations and testing with users. The feedback collected through these steps helps to develop further the product or service while keeping the perspective of users. It helps to reach a final product or service which is ready for implementation.

Several tools can be used to guide the development process of a prototype:

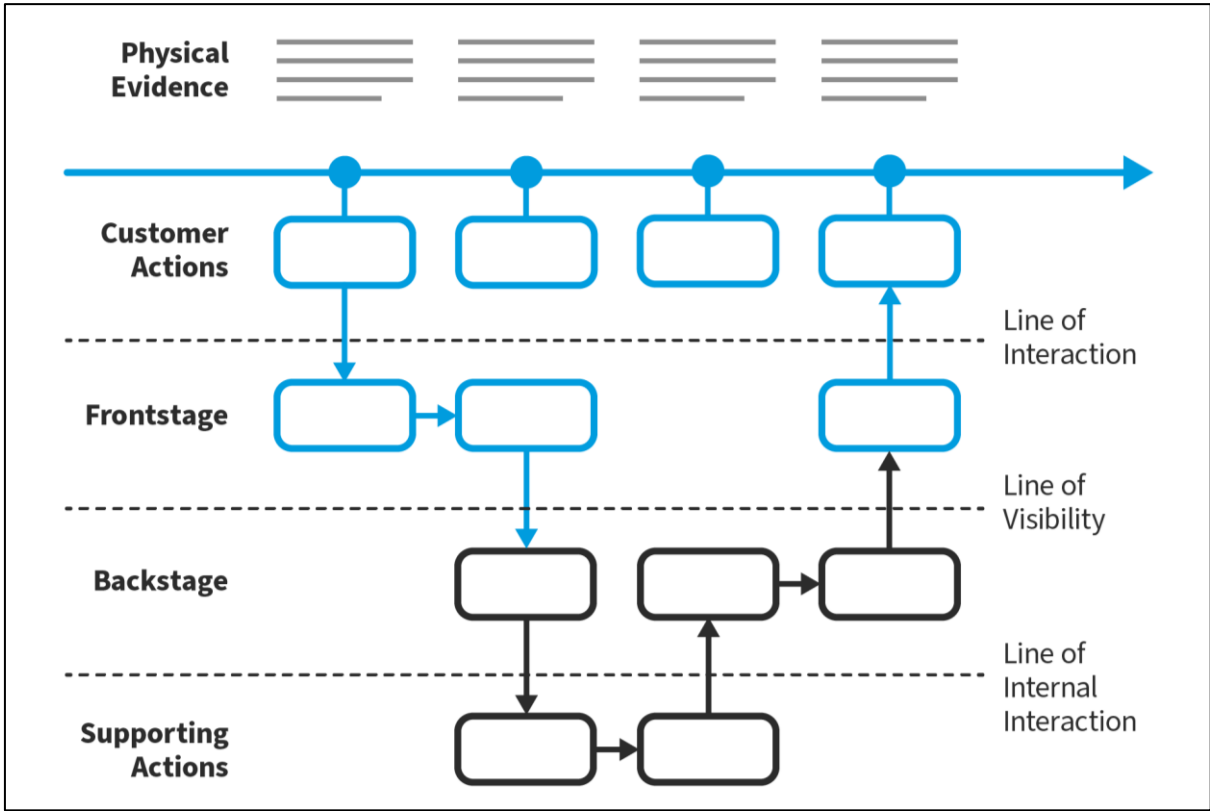
Logical framework (also known as the log frame) is a methodology mainly used for designing, monitoring and evaluating. It uses a matrix listing the global objective, the purpose and the expected outputs of any actions.

Crazy 8's is a method for fast sketching of ideas that can answer a challenge. Each participant has eight minutes to create eight distinct ideas. Quantity is more important than quality. It stimulates participants to go beyond the first idea. To get them prepared, it is good to leave 10 minutes to the participants where they can navigate back in the findings of the previous phase.

Reverse brainstorming is a method using brainstorming to generate undesirable solutions. Instead of thinking “how can I solve the challenge”, we think “how can we make the situation worse”. This approach allows participants to bring up in a second stage solutions that would be unthinkable at first stage.

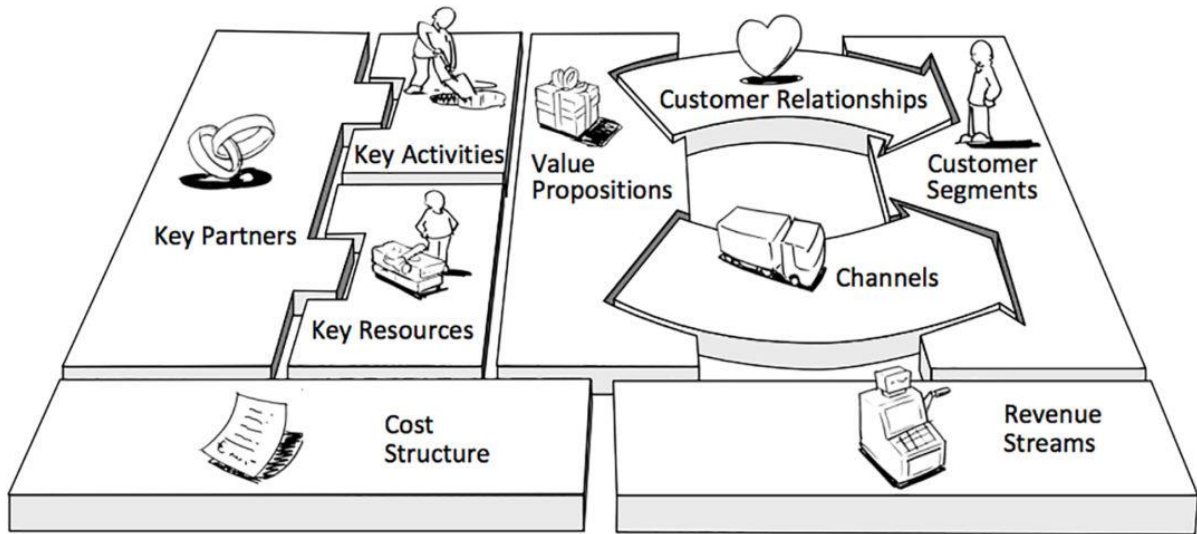
Service blueprinting is a visual tool that helps to identify the role and responsibilities required to support a coherent experience to the user of a service or product. It builds on the visuals of journey mapping by highlighting the behind the scenes as pictured in Figure 10.

Figure 10: Anatomy of a service blueprint (source: Interaction Design, 2016)



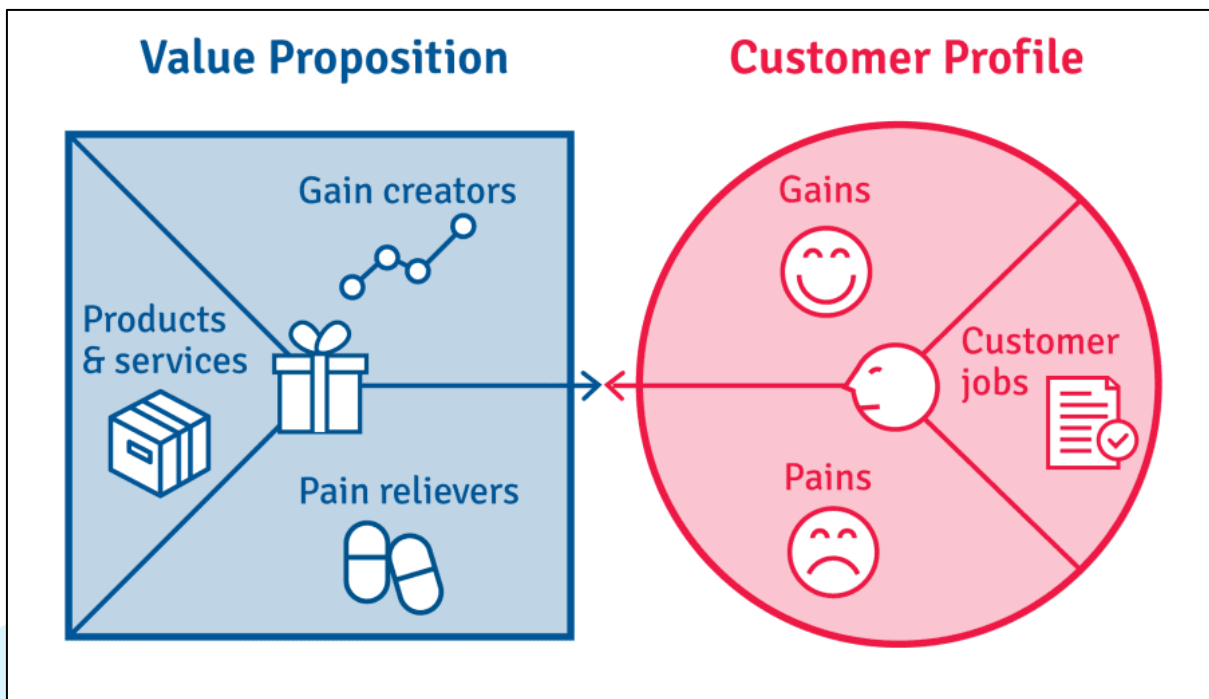
The **Business Model Canvas** is a tool that helps to describe the different key components of a business model and picture their interactions as shown in Figure 11. It starts from the description of the value proposition. On the right side, the BMC explores how the value can be delivered to the customers. On the left side, the BMC explores how the value can be supplied. The bottom line seeks to capture the value of the business model.

Figure 11: Anatomy of a business model canvas



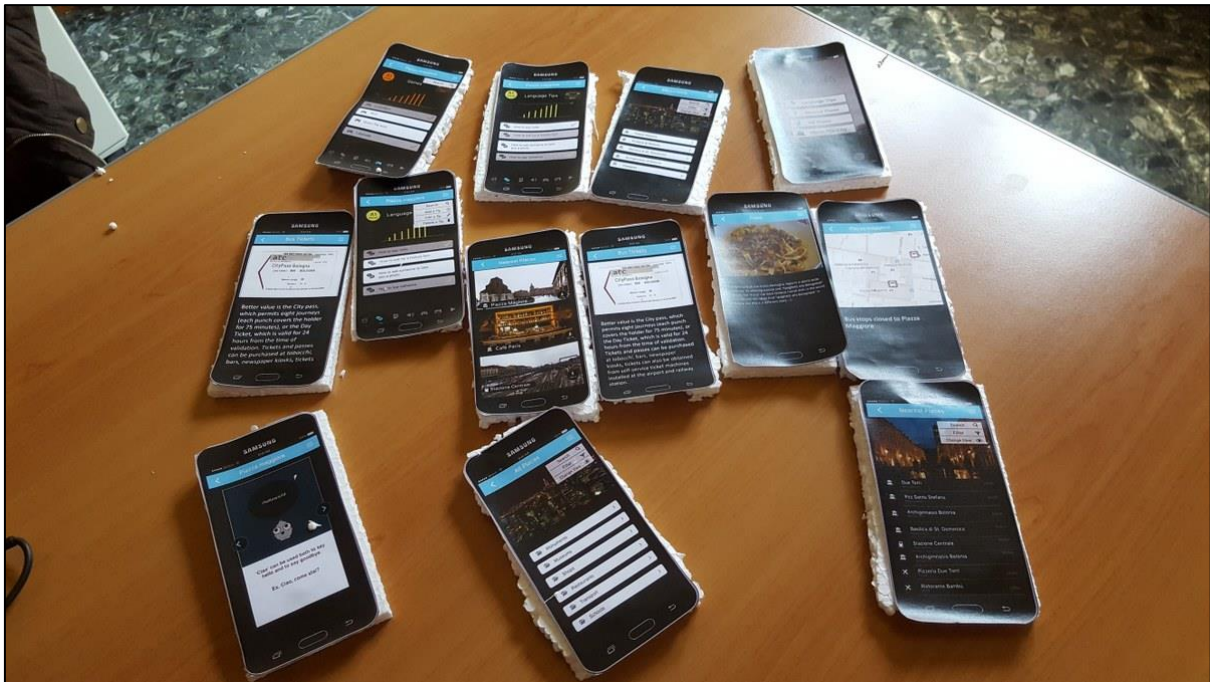
The **Value proposition** is a simpler version of the business model canvas that focuses on the description of the value proposition, the core of a business model. It helps to match a user need with a service or a product, to find a fit between the value proposition and the market as represented in Figure 12. It helps to reach a value proposition statement where it is described who is the customer, what problem is solved and how this problem is solved.

Figure 12: The value proposition canvas (source: Strategyzer, 2024)



Experience prototyping is building on the ideas to test them. It can be very soft by describing the value proposition to potential users and collect their feedback to refine or adapt the prototype. It can use hardware prototyping with paper sketches, coded app or a 3D model as represented in Figure 13. It can also simulate the experience with the users. But in general, it is recommended to make prototypes as quickly as possible in the design process even if they are ugly. They allow to integrate user feedback as early as possible and iterate as often as possible.

Figure 13: Example of prototyping (source: llocalapp (2016))



3.3.5 Deliver

In this last phase, we do not consider prototypes anymore. The final solution is implemented and feedback from consumer is collected. The solution is therefore evaluated in order to communicate about it and hopefully scale it up (Johnson et al., 2024). The co-design process also can be evaluated at this stage by identifying lessons learned across the experience about the tools, the insights or the collaboration.

Different tools can be used to support the deliver phase:

- **Design Scenarios** describe a set of future situations. They can be used as communication tool to create a narrative around the product or service for the user.
- **MAMCA** (Multi actors, muti criteria analysis) is an evaluation framework that allows to highlight the support from different stakeholders for a set of options. It can show how the implemented solution affected the users but also the stakeholders compared the business as usual.
- **Living labs** allow to test on site the solution that has been selected at the end of the develop phase. From this experience, lessons learned can be drawn as suggested by Charoniti et al. (2024).

4 The workshops

Previous sections provided an overview of the tools available to organise the co-designing process in CodeZERO. In this section, the workshops planned in the project are structured by making use of the collected library of tools.

Before getting into the content of these workshops, it is important to clarify their goal. In CodeZERO, **the workshops have the ambition to co-design a new solution that will be tested in each of the pilot cities to make transport in e-commerce more sustainable.** There are five key elements in that objective:

- Working on a specific city: the structure of the workshops below will be replicated in the four cities of the CodeZERO project. In each city, a local team will work together to propose a local solution to a local problem.
- Co-designing: in each city, local retailers, logistics service providers, local authorities and consumers will work together. The co-design approach allows to integrate the experience and expertise of the different stakeholders. To leave room to a co-design format while keeping the sessions compact, we planned three half days in the different cities.
- Finding a new solution: the co-design format uses an approach that enables more creativity and allows to shift away from the business-as-usual scenarios by breaking the silos and gathering different stakeholder groups. Doing so, we want to bring new ideas to innovate the deliveries and returns in e-commerce.
- Making transport in e-commerce more sustainable: the innovation should foster the sustainability of deliveries and returns in e-commerce. The scope remains however open to the economic, social and environmental pillars of sustainability. The first workshop will define further the focus that will be decided by the co-design team. Together they will aim in finding the most essential barrier that makes e-commerce not sustainable yet in their city.
- Developing solutions to be tested: The ultimate goal of this co-design exercise is to inspire the pilots that will be conducted in the WP5 of CodeZERO. In the second session, the co-design team will bring up a solution that solve the most essential barrier identified in the first workshop. The third and last session will share the lessons learned from the pilot with the co-design team and build on them to propose next avenues.

With clarity on that objectives, better engagement with stakeholders to build an efficient co-design team for the three workshops can be achieved. Local facilitators who will be running the workshops in each city need to be trained. The following two sections are therefore dedicated to the preparation of the three workshops that are briefly described afterwards.

4.1 Engaging stakeholders

As we saw in section 2.4, the co-design team should be composed by people who care about the objective of the workshops. It should ideally integrate professionals, people with lived experience and provocateurs in a team of a maximum of 20 people to prioritize trust, intimacy and social interactions. The responsibility of engaging participants across the three co-design workshops is given to the VUB for Brussels, TOI for Oslo, TNO for Utrecht and TRT for Milan. Each of these organisations will take the role of the local facilitator for these workshops.

The co-design teams are already partly formed thanks to the consortium partners of CodeZERO already involving the professionals (i.e. retailers, logistics operators and local authorities) from each city. To respect a balance between professionals and consumers, the number of professionals will be limited to a maximum of 10, meaning an objective of around three professionals from the retailer, the logistics service provider and the local authorities. When identifying the professionals attending the workshop, it

is recommended to have decision makers. It will bring more easily the output of the co-design exercise at the next level.

Engaging the consumers is expected to be more challenging. They should therefore be targeted through the right channels and stimulated by attractive financial incentives. The preferred channel to recruit consumers is through the retailer, although alternative channels are also possible (e.g. social-media campaigns). An example of invitation to be spread through the retailer is provided in the box below.

Hi,

At [name of the retailer], we are committed to sustainability, and we need your help with that! Together with the European project CodeZERO, we want to make e-commerce deliveries and returns more sustainable.

We invite you to think about new ways to deliver and return goods for a more sustainable e-commerce. You will brainstorm with a team of other customers and experts from [name of the LSP], [name of the retailer] and the city of [name of the city]. The solution of your team will then be tested in the delivery and return processes of [name of the retailer] in [name of the city].

What does your participation entail?

- Joining three half-day sessions:
 - 12 March 2025 from 8h30 to 12h30
 - 2 April 2025 from 8.30 a.m. to 12.30 p.m.
 - date in summer 2026 to be announced later.
- The brainstorming sessions will take place in [city hall].
- As a thank you, you will receive a gift voucher worth €XXX.

Take part!

- Register by Sunday 15 December at the latest using the form: [participation form]

It is advisable to host the workshops at the city hall, although alternatives are also possible (e.g. CodeZERO partners' premises). As the process should be accessible to all actors, the city hall is believed to be the most central to all actors interested to the topic. The date should be accessible to all actors. The choice of the most suitable time slot (e.g. day or afternoon) is left depending on the cultural differences across countries. In Antwerp for example, it was decided on a Wednesday morning because it is often a quieter day in the week. Sometimes parents have a day off because school ends earlier, around noon. The morning could therefore be a moment where consumers and professionals can easily meet. The specific date of the workshop can be decided in a doodle with the professionals that will attend the workshops and then communicated in the invitation to the consumers.

The co-design team should also guarantee diversity. The invitation to the consumers shall therefore foresee a quick registration form asking for their name, gender, age, education level and their contact details. Based on this information, a panel of maximum ten consumers that guarantees good diversity should be selected. In that form, consumers will be also asked if they are mostly buying online or at the shop of the retailer. The goal of the question is to select half of the consumers buying mostly online and half of them buying mostly in shops. The latter can then take the role of the provocateurs described in

section 2.4. The consumers not selected to join the panel as a first choice will be placed in a waiting list and contacted in case of dropouts before starting the co-design process.

4.2 Training the facilitators

Facilitators are needed to guide the co-design team across the procedure described in the next sections. Their role is key to reach the objective of the workshops. Their attitude needs to respect the co-design principles described in section 2.2. These principles will guarantee the inclusivity of each member in the co-design team and ensure them a safe environment despite the diversity of the group. Failing in that could imply that people who are not part of the dominant group might feel unwelcome and might drop the group.

In CodeZERO, the facilitation of the workshops is overseen by the different local partners (VUB, TNO, TOI and TRT). As they have a shared identity with the co-designed team, they will be able to support a meaningful process. They will understand better the social codes and use them to keep the dynamics of the group on track towards the objective. They will also better use the language of the community. Still, the facilitators of the workshops are not professional facilitators. A training was therefore organized by the VUB to illustrate the role of the facilitator and the procedure that can be used across the three workshops. The structure of the training is mostly inspired by Crespel & Nève Hanquet (2018).

Agenda (2h00 online meeting):

0h00-0h05: Welcoming the participants

0h05-0h30: Icebreaker (Activity 1)

0h30-0h40: Objective of the day (Discussion 1)

0h40-1h10: Needs of a group in a workshop (Activity 2)

1h10-1h50: The facilitator and the procedure (Discussion 2)

1h50-2h: Closure (Activity 3)

Activity 1: Ice breaker (25min)

To welcome the member in the online session, a slide will be already displayed with some guidelines on it. We will ask the participants to keep their mike off, to make sure they are comfortable, and they can already think about a previous great workshop they experienced. It will be used as a case during the session.

To kick off the session, we will ask everyone to present their name and one element of their background. We will make then a second round where we ask who are the (co-)facilitators and their experience with hosting a workshop so far.

After everyone had the time to take the floor once and connect to each other, we will take five minutes to debrief that icebreaker and understand its importance, especially at the beginning of the first session. As the members of the team do not know each other yet, the first moments are critical to the group dynamics. Giving an equal space to everyone in the group during the ice breaker allows everyone to directly jump on board and break the first barriers.

Discussion 1: Objective of the day (10min)

We will then introduce the goal of the workshops in CodeZERO and its sub-goals across the three sessions. We give also an idea of the participants who are engaged in the co-design team. Based on

that, we can highlight that the objective of the day is to see how the participants will go through the three sessions and how the facilitator can help that.

Activity 2: Needs of a group in a workshop (30min)

Before going through the structure proposed, we want first to take a moment to think about a great workshop we experienced. We think there about all the aspects that contributed to the success of the workshop. We invite attendees to write their ideas down. In the meantime, the VUB will create four breakout rooms and assign each facilitator to one room to discuss with someone else. Once two minutes have passed, we give them some final instructions before they leave in breakout rooms. They should in ten minutes explain their items and agree on the three most important ones. After ten minutes, we collect and cluster the item together.

Discussion 2: The facilitator and the procedure (40min)

Based on the cluster we identified, we can make a parallel with the theory of the 3Ps according Crespel & Nève Hanquet (2018). A workshop or a meeting in general is based on three key elements: Product, Procedure and Process. The meaning and their contribution to the workshops are explained. The responsibilities of the facilitator in each of these 3Ps are then highlighted.

The role of the facilitator is to support the group in reaching the product, the objective of the meeting. To achieve that, the procedure is key. The responsibility of the facilitator is therefore in proposing a procedure that help in reaching the product. The product itself however is not the responsibility of the facilitator, it is the responsibility of the group. It needs to be defined by the group. Based on it, the facilitator will design a procedure that supports best the group towards that objective. Once the meeting starts, the focus of the facilitation becomes then on the process. The process encompasses all the interactions we have when going through the procedure. The process is a shared responsibility between the group and the facilitator.

The process is not the focus of this training session, however. The focus is on the procedure, the key responsibility of the facilitator. We will show how the facilitator can guide the co-design team of CodeZERO through divergence, chaos and convergence. The participant of the workshop 0 experienced that process quickly in the previous activity. In the divergence phase, members of the team are encouraged to share their ideas. Questions are stimulating the members that are preferably working individually or in groups of two. During the chaos, we collect the ideas, we use active listening, and we aim at understanding each other, building on the ideas of each other. In the divergence phase, we let the group organize the ideas in clusters or ranking ideally according to a specific criterion. Let us remember therefore that it is normal that facilitation goes through chaos. The sooner we accept it, the smoothest will become our facilitation. We can end this theory with pictures that represent the role of a facilitator.

Once the role of the facilitator is clear, we can present the procedure recommended for the workshops in CodeZERO. We first present the Double Diamond that structures the co-design process, and we show where each session is located on the framework. More details are available in section 3.2. We highlight how divergence and convergence are integrated at the core of the Double Diamond. We can then focus especially on workshops one and two given that workshop three is taking place in a long time. We present the details explained in the next sections.

Each facilitator should, however, feel free to deviate and adapt the procedure by building on some tools within section 3.3. They can trust these changes since the facilitator knows best how to adapt the procedure to the audience. The most important is to make sure the process is clear and prepared before getting into the workshop. And during the workshop, the focus is on the process and supporting the team. Pressuring the team to go through each planned tasks would be a mistake.

Activity 3: Closure

Before closing, we want to make a last round table where everyone share what they think was most useful for their facilitation. We want them to answer the question “What is your key take away?” Finally, we leave them at the end with this deliverable and invite them to check it.

4.3 Workshop 1

Objective: The first workshop will define the focus that the co-design team wants to take when solving the sustainability of delivery and return options of e-commerce in their city. They will aim in finding the most essential barrier that makes e-commerce not sustainable yet in their city.

The first objective, however, with workshop one is to build a team that will go through the co-design process. The priority is therefore on building relationships. To have a smooth first session, it is important for the facilitators to be there enough in advance to have the time to set everything up before the first attendees join. It is good to be available as host from the beginning for a nice welcome. A welcome word, music, slide with pictures or food can eventually be used to welcome the members. Finally, we recommend avoiding tables. We want indeed to avoid the members of the co-design team opening their laptop. A round of chairs will invite better the members to get to know each other.

Agenda (4h workshop at the city hall):

08h30-09h00: Breakfast & welcome

09h00-09h20: Ice breaker (Activity 1).

09h20-09h30: Setting the scene (Discussion 1)

09h30-09h50: Building the right conditions (Activity 2)

09h50-10h00: Objective of the workshop one (Discussion 2)

10h00-10h45: Game Rigor Mortis (Activity 3)

10h45-11h00: Break

11h00-11h15: Introducing the HMW (Discussion 3)

11h15-11h45: Formulating the HMW question (Activity 4)

11h45-12h00: Next session & closure (Discussion 4)

Activity 1: Icebreaker (20min)

We will use the icebreaker “people names” described in section 3.3.1. In a circle, each person will give their name and share their latest purchase online. Each name and purchase will be repeated afterwards by the following people that still need to speak up.

Discussion 1: Setting the scene (10min)

We will introduce the importance of the team for the project CodeZERO. We make sure the co-design team understood the objective of the three workshops by stressing the five key elements of the workshops objective as described in the beginning of section 4. We can use keywords on a flipchart to make it visual.

Activity 2: Building the right conditions (20min)

As we will spend three half days together, we want to make sure we have a good time together. We invite the members for five minutes to discuss in groups of two on what is important to feel safe in the group. We collect in five minutes the most important ideas and we write them down on a flip chart. We keep then that chart as the rules of the group attached on the wall.

Discussion 2: Objective of the first workshop (10min)

We introduce finally the specific objective of the first session: we want to make sure we co-design the right thing within the scope of the workshop objective. We want to choose together the problem we will work on together in the next session. By the end of the workshop, we should have formulated a question that will trigger ideas for the next session.

As such, the goal is to go across the first divergent and convergent loop of the Double Diamond framework. We, however, do not present the Double Diamond framework in the workshop. We limit the objective of each workshop to one sentence to keep everyone onboard.

Activity 3: Game Rigor Mortis (45min)

Exploring the problem space with a role play inspired by the game rigor mortis.

Set up: We ask first among the consumers if someone want to take the role of Planet Earth. All the other members of the co-design team are then grouped according to their stakeholder group in one side of the room (e.g. consumers with consumers). On the other side of the room, we indicate four places corresponding to a different stakeholder group. We ask then the participants to split into these different new stakeholder group. The goal is therefore to mingle consumers with the LSP, the retailer and the local authority to start creating bounds. We want also to have balanced groups that take the role of one specific actor.

Pitch: Planet Earth is frustrated because the last online purchase on torfs.be was not delivered in a sustainable way. Since everybody is impressed by Planet Earth, nobody wants to take the blame and prefers to find excuses. When finding excuses, the blame is transferred to another group of people. If the excuse is good enough, the group receives a nice look from Planet Earth. If Planet Earth is not sure it was a good excuse, it can ask the group to transfer the blame to someone else without receiving a nice look. Once a group collects three nice looks, the group wins the game. We play then a second round about a return.

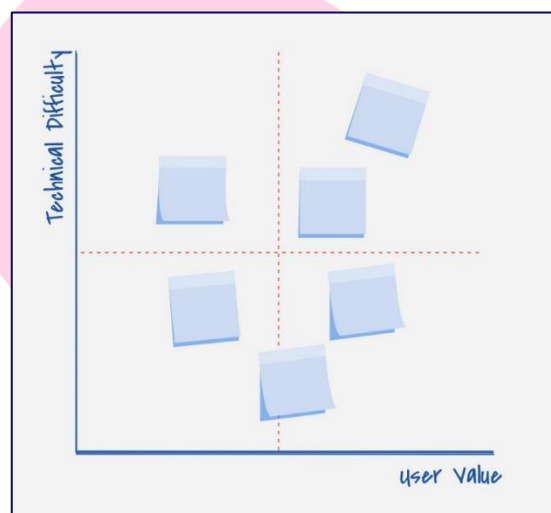
Objective: Through the game, the facilitator will note the different excuses according to each actor that received a nice look. When closing the game before the break, we invite the members to distribute one blue dot on the excuse that we might most easily solve and one red dot on the excuse that might bring most impact if solved.

Break (15min)

During the break, the facilitator organizes the excuses according to the criteria impact and feasibility in the canvas shown in next figure on the right.

Discussion 3: Introducing the HMW (15min)

After the break, we come back to the objective of the workshop one and we introduce the “How Might We” question. Based on the best excuses found during the game, we can formulate a question that is specific enough while large enough to inspire ideas for the next workshop. We first show different examples of a “how might we” question and what are the key elements in



their structure (the potential user, the intended action and the desired outcome).

Activity 4: Formulating the HMW question (30min)

Based on the matrix designed during the break, we can organize the challenges according to the most feasible and impactful problems the group sees. The group needs then to agree on an excuse to focus on. We need to be careful here about the dropouts. Sharing power is key here. We need also to make sure the excuse is a relevant one to tackle with all the groups.

Once an excuse is selected, each member will work individually to progress towards the HMW question. They should first translate the challenge into an objective to reach. They should then think about the different elements of the HMW question. Finally, they can propose a HMW into a Wooclap. We can have then three votes (first one vote per person, then two extra votes per person) to highlight the most inspirational how might we question. Eventually we combine the most supported ones.

Discussion 4: Next session & closure (15min)

In order to close this session, we can show that we meet the objective of this first session and congratulate everyone on the process. We can then show the objective of the next session. As a result, we can encourage the co-design team to think already of solutions that might answer the HMW. They can best note them down to keep the ideas safe. We will start the next session by building on them.

To close, we will ask the team to write in one big word what they appreciated today in the group. They can share if they like. They can leave it on the wall before leaving.

Equipment

- Four pages A4 picturing the logo of each group (LSP, Receiver, Local authority, Consumers)
- Wooclap prepared with a screen
- Flipchart with cards explaining the general goal of the workshop. Flipchart highlighting the goal of workshop one (we want to make sure we co-design the right thing)
- Flipchart cards explaining the How Might We structure.
- Blue and red dots
- Eventually cards with possible excuses that have been inspired by the learnings of WP1 and WP2).
- Flipchart to store ideas (box of ideas)
- Flipchart to park discussions (parking)
- Catering
- Nice looks from planet earth

Roles

- The local authorities are asked to take care of the catering and the logistics of the room
- The retailers are asked to follow up on the vouchers for the consumers.
- The facilitator takes care of welcoming the participants and guiding them through the procedure. They should therefore keep track of time while allowing some flexibility in the process. If necessary, some activities can be cut.
- The facilitator is backed up by one (or better two) co-facilitators from TNO/VUB/TRT/TOI). Their first responsibility is to take notes at the event. During groupworks, they can also act as coach to make sure the groups are not deviating too far from the guidelines.

4.4 Workshop 2

Objective: In the second workshop, the co-design team will bring up a solution that answer the challenge identified in workshop 1. This solution will be refined afterwards by the professional stakeholder group in order to prepare the pilots.

Agenda (4h workshop at the city hall):

08h30-09h00: Breakfast & welcome

09h00-09h40: Energizer (Activity 1)

09h40-09h50: Objective of the session (Discussion 1)

09h50-11h00: Designing the solutions (Activity 2)

11h00-11h15: Break

11h15-11h45: Presenting and selecting the value propositions (Discussion 2)

11h45-12h15: Debriefing the idea (Activity 3)

12h15-12h30: Closure (Discussion 3)

Activity 1: Energizer (40min)

To start the session and connect back the people to the team, the facilitator will first ask the attendees to position themselves in the room according to the three axes of a triangle: inspired-curious-creative. Then the facilitator can ask why they chose this specific position in the room. Doing so, we can explore to what extent the last session brought ideas and the state of mind at beginning of the session.

Based on their position, the facilitator will ask people to pair in groups of two with someone who has a different state of mind. We prefer also that they do not come from the same stakeholder group.

Once they are together, we can play the mirror game to energise everyone and build a dynamic in the groups. We will ask a first person in the group to mimic the movement of the other. Then we flip the role. When both have tried, the next step is to try to coordinate the movements together. Everyone is then the mirror and the person at the same time.

Discussion 1: Objective of the session (10min)

The facilitator can then start with a moment where we remind the important elements from last session. We let the group bring back their inputs. The facilitator make sure that the HMW question is clear. Then, the objective of this second session is stressed : solving the HMW and proposing an idea to test in Antwerp. The first session was about designing the right thing. This session is about designing the thing right.

Activity 2: Designing the solutions (1h10)

We are organizing a diverging and convergent thinking in this brainstorm. At the beginning of the different timed steps, the facilitator should give clear instructions on what is expected and in how much time. These instructions are limited to the coming step. Not all instructions need to be given at once.

-15min. We start first with an individual reversed brainstorm. Everyone sketches several ideas of solutions that would make the situation described in the HMW worse. The goal is to find eight ideas in eight minutes. Then we proceed in changing these solutions in positive outcomes by flipping the post it. One keyword only is expected per face of post its. We foresee again eight minutes for this exercise.

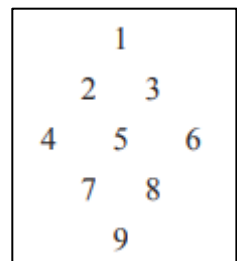
-20min. These first ideas are then shared in groups of two persons during fifteen minutes (about nine groups). Each group starts with explaining a first idea. The other shares then the closest idea to the one presented. If the ideas can become more solid by merging, the group take a few minutes to agree on a new idea. If there is no merging possible, the other person goes to the next ideas. In that discussion, we want each other to listen to each other and find what is interesting in the idea of the other. It is important also that each person takes their turn to present their ideas. By the end of this exercise, the group needs to select the top three ideas they have and write them on a A4 (one keyword or a figure eventually)

-35min. The groups of two persons are merged then with other groups in order to have three bigger groups. It can be groups of six or four persons. We use here the same approach. One pair starts presenting a first idea from their top three. If another group has a similar idea, they can present it and we try to merge it. If not possible or if there are no similarities, the next group presents a new idea. We are always trying to find the synergies between the ideas first. By the end of the exercise, each group needs to select their top three ideas. We ask them to picture each of the three ideas on a A3. A drawing or a cartoon are good examples of visuals to represent the solution.

Discussion 2: Presenting and selecting the value propositions (30min)

Finally, the three groups present in front of the co-design team their top three ideas, resulting in nine ideas to be pitched. We plan ten minutes per group to present their three ideas. The persons listening to the solutions do not try to build on the solution presented at this stage. Their goal is to understand the solution. Questions should be asked if something was not clear. Once the next group is presenting, they are free to position their solution close or far away from solutions that have been presented before. However, we avoid discussing the details of merging the ideas all together.

Once the ideas are clear to everyone, we will select the options that are the most interesting to test in a pilot in Antwerp. The facilitator asks first the group to select the five most feasible ideas for the pilot through a group discussion. Then among these five feasible ideas, the facilitator asks the group to rank them according the most impactful in terms of sustainability.



If the group cannot find an agreement, we can use the diamond technique. Each group ranks the ideas according to the solution they support the most towards the one they want to avoid as depicted on the figure on the right. We ask them to share their ranking by bringing a green dot on their top favourite, two orange dots for their second best and three red dots to the solutions to be avoided. The one receiving most support is selected. Only one dot can be used per idea.

We end up by reformulating the chosen solution in a value proposition that answers the HMW.

Activity 3: Debriefing the idea (30min)

If the previous phase did not take too long, we can still take the time to debrief the solutions that have been selected. But there is not enough time left, we can cut this step and jump to the closure. The closure is more important.

-15min. Once the idea is framed, each stakeholder group will get together and think about the important aspects to consider to make that idea successful according their point of view. Which criteria would be important to evaluate the pilot according to them. If evaluation criteria is too abstract, the groups can think in terms of strengths and weaknesses of the solution.

-15min. Each group will share afterwards the key elements of the discussions. These outputs will be taken further by the professionals to implement the solution.

Discussion 3: Closure (15min)

We first ask everyone to congratulate each other for the solutions the group managed to design. We take the time to measure the satisfaction level of the solution we found with a number of fingers they show at a given moment. Anyone who wants to say more is welcome to share his thoughts. They will also be considered although the democratic choice of the co-design team will be first considered.

The facilitator close in the end by reminding the next steps with the pilot and the last session. A date needs to be set if not decided yet.

Equipment

- Flipchart from the last session (with the charter, box of ideas...)
- Flipchart with the HMW questions
- Post-its for the crazy 8
- A4 papers for in between solutions
- A3 papers for drawing the solutions
- Pens & papers
- Dots orange, red and green

Roles

- The local authorities are asked to take care of the catering and the logistics of the room
- The retailers are asked to follow up on the vouchers for the consumers.
- The facilitator takes care of welcoming the participants and guiding them through the procedure. They should therefore keep track of time while allowing some flexibility in the process. If necessary, some activities can be cut.
- The facilitator is backed up by one (or better two) co-facilitators from TNO/VUB/TRT/TOI). Their first responsibility is to take notes at the event. During groupworks, they can also act as coach to make sure the groups are not deviating too far from the guidelines.

4.5 Workshop 3

Objective: The third and last session will share the lessons learned from the pilot with the co-design team and build on them to propose next avenues.

Agenda (4h workshop at the city hall):

8h30-9h00: Breakfast & Welcome

9h00-9h45: Energizer (Activity 1)

9h45-10h00: Show the evaluation framework (Discussion 1)

10h00-10h45: Validating, weighting and evaluating the criteria (Activity 2)

10h45-11h00: Break

11h00-11h30: Debriefing the results (Discussion 2)

11h30-12h00: Improving the pilot (Activity 3)

12h00-12h30: Closure (Discussion 3)

Activity 1: Energizer (45min)

As we have not seen the group for a year, we will take the time to welcome them back and hear about their stories since then. Once the moment is good to enter in the workshop, we can propose an alternative energizer than the very first one by making use of a ball. The person having a ball need to launch it at someone by calling her/his name. Once the ball is caught, the person needs also to remind the last purchase online from a year ago. The group can help. We can then refresh the names of everyone before starting.

Once the energizer is finished, we welcome anyone to share a first testimonial on the pilot and how they felt about it. Not everyone needs to talk. But a few stories might help in connecting back to the topic.

Discussion 1: Show the evaluation framework (15min)

The facilitator reminds then back where we are in the process of the workshops. We have designed the right thing, then we designed the thing right and during this last session we will debrief the design of the thing. We want to see how this pilot can eventually be scaled up in Antwerp and beyond.

To structure the discussion, we propose here to use the evaluation framework that have been designed in the WP3 of CodeZERO. But we want to evaluate the pilot based on the perceptions of the stakeholders. We will therefore start by presenting the evaluation framework. It can integrate the outputs of the last activity of workshop two where participants identified the key criteria to consider when evaluating the pilot. Based on that work, we show them the criteria that have been used for each stakeholder group.

Activity 2: Validating, weighting and evaluating the criteria (45min).

Once the framework has been presented, we ask the participants to group according to their stakeholder group. They will first take ten minutes to think about what is important for them in the evaluation of the pilot. If something is not reflected in the criteria of their stakeholder group, they should agree on the criteria to be used. Some can be removed or added. But we should limit the list to around five criteria.

Once their list is validated, they can raise a hand, and a coach will come to adapt the list in the MAMCA software. They will be able to weigh next the importance of their criteria on a tablet. Once the weighting

is finished, they can evaluate the impact the pilot had on each criteria compared to the business as usual and see the result of their stakeholder group.

Discussion 2: Debriefing the results (30min)

We come back as a group to show the results with the multi actor view of the MAMCA. The facilitator explains how to read the multi-actor view and how it integrates the results of their stakeholder group. The facilitator asks then to the group to describe what they see. The facilitator invites also each group to explain their position compared to the BAU.

Activity 3: Improving the pilot (30min)

Based on the learnings of the MAMCA, we propose to each stakeholder group to think together during ten minutes about ways to improve the pilot in order to improve the evaluation further based on the discussion they heard and the needs from the other stakeholders.

Each group gets then five minutes to propose to the group improvements options to the pilot.

Discussion 3: Closure (30min)

Once the discussion on the pilot is closed, we take the time to debrief the co-design experience together. The facilitator ask the co-design team to all choose from a set of images one that can describe the experience for them. Everyone shares their thoughts about the process based on what they see in the image.

We thank the team and share the voucher with the consumers, hoping they choose a sustainable delivery option of course.

Equipment

- Flipcharts from previous sessions
- Computers or tablets for each stakeholder group.
- Screen & Wi-Fi

Roles

- The local authorities are asked to take care of the catering and the logistics of the room
- The facilitator is taking care of welcoming the participants, following the procedure, keep track of time
- The retailers are asked to follow up on the vouchers for the consumers.
- The facilitator is backed up by one (or better two) co-facilitators from TNO/VUB/TRT/TOI). Their first responsibility is to take notes at the event. During groupworks, they can also act as coach to make sure the groups are not deviating too far from the guidelines. They are also responsible of the MAMCA software.

5 Conclusions

This deliverable has outlined the preparation phase for the co-design process within the CodeZERO project. The objective was to establish a structured methodology for engaging stakeholders in the last-mile delivery context through a series of workshops in Oslo, Utrecht, Antwerp, and Milan. The co-design approach is particularly interesting in this context as last-mile delivery solutions must balance efficiency, sustainability, and stakeholder needs. By involving the key-actors, such as local authorities, logistics service providers, businesses, consumers and non-users, co-design process ensures solutions that are practical, inclusive and widely accepted by all actors. This participatory approach not only foster innovation but also enhances the likelihood of long-term adoption and scalability of the proposed solutions to improve sustainability and efficient last-mile delivery.

By conducting an extensive literature review, the document has identified effective stakeholder engagement tools and co-design methodologies relevant to last-mile logistics and urban mobility. The Double Diamond model was selected as the guiding framework, ensuring a clear, step-by-step approach through Discovery, Definition, Creation, and Evaluation phases. A set of tools has been compiled to facilitate each step of this process, enabling meaningful interaction and ideas.

Additionally, the format and structure of the three workshops have been defined, detailing their objectives, duration, agenda, required roles, and equipment. They provide a structured yet flexible environment where stakeholders can exchange knowledge, refine ideas, and co-create solutions that align with local needs and constraints. To ensure their effectiveness, the deliverable also provides detailed guidelines outlining key activities, discussion points, and facilitation techniques. Furthermore, a dedicated training workshop for consortium partners has been designed to equip facilitators with the necessary skills to run the workshops successfully. This step is essential in maintaining consistency, quality, and engagement across the different pilot locations.

By establishing this structure, the deliverable ensures that the upcoming co-design workshops are well-prepared, methodologically sound, and aligned with CodeZERO objectives. The insights presented here will serve as a valuable guide for implementing stakeholder engagement strategies effectively during the workshops, ultimately contributing to the development of sustainable and efficient last-mile delivery solutions that will form the starting point for work package 5, which will test those solutions.

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