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Design Manual for Circular Change

A people-perspective on circular flows through Living Labs

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DESIGN MANUAL FOR CIRCULAR CHANGE

A people-perspective on circular flows through Living Labs

Interreg South Baltic

EUROPEAN UNION

European Regional Development Fund

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— A people-perspective on circular flows through Living Labs

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Introduction

Wasteman is a design driven project that seeks to identify solutions for sorting waste in households and easening reuse of materials. These solutions are identified in Living Labs where designed prototypes invite users to engage in the changes needed.

This handbook strives to inform about Living Labs and provides hands-on tools for those communities, municipalities, stakeholders, project leaders and people with general interest who seek circular changes with a high involvement from users.

The handbook aims to increase legitimacy and raise awareness of the potentials Living Labs can provide in circular change processes. This is done by presenting methodology and tools to engage everyone involved in the change processes.

As users change roles from passive consumers to active citizens Living Labs function as test arenas for new technology. This will shorten the time to market and secure a relevance in the everyday activities

In particular, the handbook is made for those persons in charge of waste management initiatives at a municipal level providing tools and action plans to design and implement living labs.

How to use this manual?

A readers guide

First, we partly present the theoretical framework of design thinking and co-creation that is useful as framework to organize the circular transformation. We also present concrete cases of user involvement and succesfull processes of user involvement in relation to waste management. Subsequently, we provide a toolbox with hands-on methods for involving and engaging users in developing circular waste sorting systems. You can use this book to:

- Understand design thinking in relation to changing waste sorting systems by involving users in Living Labs,
- Get inspiration from cases about how to involve people in sorting waste, recycling and managing the system
- Find suitable processes and methods for breaking hard problems down, remodelling and co-creating in living labs
- Get concrete tools to design and build living labs
- Get fools for further development

New inspiration, processes and tools that will be used in the ongoing and future work in Wasteman will be shared on www.imp.gda.pl/wasteman

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Scenario 1: shared waste sorting

Scenario 2: recycling stations

The new scenarios

New legislation in the EU will demand a giant step to reach a future 65% recycling rate and 10% landfilling limit in 2035. This calls for a paradigm shift where "business as usual is dead".

It also means the "prevention is better than cure" in terms of prevention of waste is the most effective measure. Meanwhile, more focus on citizen involvement and on the whole value chain will be required.

Over the last decade, the European Commission has developed several initiatives aiming at improving resource efficiency and, more recently, supporting the transition to a circular economy. In connection with the 2018 circular economy waste legislation package, the meaning of circular was further elaborated on in relation to product and material flows:

"In a circular economy, products and the materials they contain are valued highly, unlike in the traditional, linear economic model, based on a 'take-make-consume-throw away' pattern. In practice, a circular economy implies reducing waste to a minimum as well as re-using, repairing, refurbishing and recycling existing materials and products. Moving towards a more circular economy could deliver benefits, among which reduced pressures on the environment, enhanced security of supply of raw materials, increased competitiveness, innovation, growth and jobs. However, it would also face challenges, among which finance, key economic enablers, skills, consumer behaviour and business models, and multi-level governance".
Source: Briefing EU Legislation in Progress July 2018.

This means that we have to operate with two new scenarios among users:

- Scenario 1: Users have to use a shared waste point in a (semi) public space.
- Scenario 2: Users will have to return waste to a shared recycling station.

The Wasteman project is rooted in a philosophy that creating a general shift in households' waste sorting habits and performance for the general public going from 30% to 100% sorting and recycling in a "society without waste" cannot be solved only by introducing new technology and collection procedures.

Instead, attitudes, beliefs and the culture of waste handling need to be adressed, so

that users (citizens) are motivated and engaged in the future waste system. Accordingly, a future waste management system needs to be designed not only as a passive technological infrastructure but also as an active system with values and experiences for the users and administrators built in that create an emotional connection to the solution. In the defining work on the experience economy, Pine & Gilmore (2013) describe how theming services as experiences and activating the five senses of users will add considerable value to a product or service. Their research shows how many users prefer and are willing to pay more for services that represent symbolic, aesthetic or cultural value.

With the perspective of the experience economy (Pine & Gilmore, 1999), creating an efficient waste management system for households will include the development and construction of compelling narratives. Additionally the experience economy also approaches the whole waste service organisation as actors on a stage that a) perform a service and b)at the same time tell and enact an important story. Put simply, the waste management company can aim to win the hearts of citizens through seeing their service as a set of experiences that arouse emotions through activating users senses.

THE WASTEMAN PROJECT (2018-2021)

The idea of "Wasteman" is to facilitate the transition of the waste management sector from a linear to a circular economy using Integrated Sustainable Waste Management (ISWM) systems and solutions. Wasteman is supported by the EU's Interreg South Baltic Programme, and involves partners from Poland, Denmark and Lithuania. The Institute of Fluid Flow Machinery of the Polish Academy of Science (Poland) is Lead Partner in the project, which also includes Aalborg University (Denmark), the waste management companies BOFA (Denmark) and EKO DOLINA (Poland) and the municipalities of Nowa Karczma (Poland) and Tauragé (Lithuania).

A People-Centered Perspective through ISWM

The Wasteman project is based on the Integrated Sustainable Waste Management (ISWM) approach as the underlying project framework. ISWM provides a systemic way of thinking and looking at waste, which aligns with the Wasteman objectives and desired methodological approach of addressing issues in a more human-centric and design-driven manner. Contrasted with a technology-centered approach focusing on waste system elements alone, the ISWM framework places equal emphasis on planning aspects, and not least on stakeholders (Anschütz and Klundert, 2001), as follows:

Dimension	Pertinent Questions(s)
Stakeholders: Emphasis here is on mapping, understanding and engaging with stakeholders such as waste generators (engaged citizens), authorities, civil society organizations, enterprises and the informal sector.	Who are the people or organizations with a 'stake' or interest in solid waste management? Who needs to be involved, and how?
Waste System Elements: Emphasis here is on examination of physical components in the stages in the flow of waste from generation and separation, collection, transfer and transport to treatment and disposal using the waste hierarchy.	What are the technical components of the solid waste management system in question, and how does the system perform with respect to the waste hierarchy and circular economy principles? What needs to be done?
Aspects: Emphasis here is on understanding the framework conditions that can be affected by the waste system in question, i.e. environmental, socio-cultural, institutional, political and legal planning aspects.	What needs to be considered as part of a sustainable solution? How can the desired results be achieved?

When preparing for change, the ISWM framework provides a way of looking at the inherently linked social and technical dimensions. It can be applied as a baseline assessment methodology and as an overall performance measurement framework for a change process.

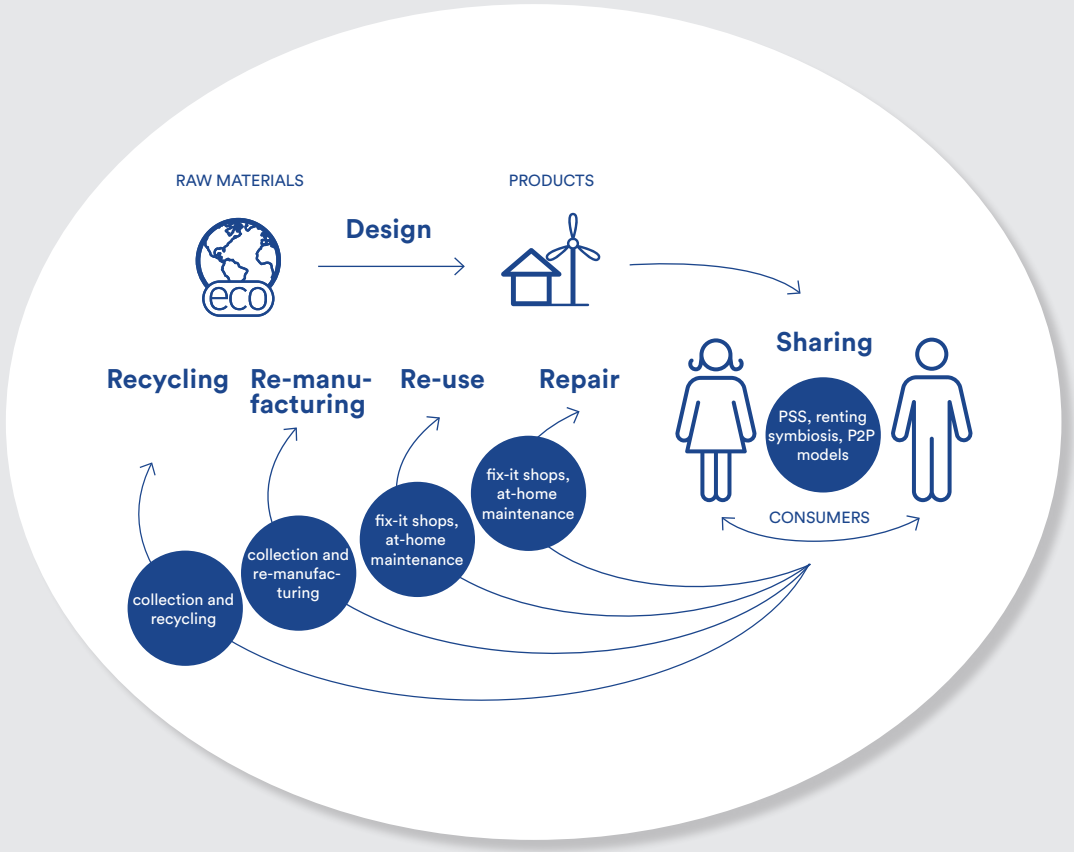


Figure 1: The six funcional pillars of circular economy (Miedzinski et al. 2016)

Circular Economy

Circular economy is an economy that learns from nature in that it wastes nothing. Circular economy (CE) is a concept beyond recycling. Key to CE is maximising the value of materials through product life extension. In 2013 the The Ellen McArthur Foundation proposed the following widely accepted definition of circular economy.

"Circular Economy is an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals which impair re-use, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models."
Ellen McArthur Foundation, 2013

Design is crucial in CE as this early stage determines 80% of a product's environmental impacts and predefines if the product is repairable, re-usable, remanufacturable, recyclable, or is suitable for shared use.

The Eco-Innovation Observatory (EIO) has defined six functional pillars of a CE, that are visually presented in the diagramme in figure 1 (opposite page):

Maintenance is a key activity to perform during the use phase of the product life cycle to prolong product lifespan and maintain the optimal performance of a product.

Sharing business models include car-sharing, carpooling, sharing of holiday houses and laundry facilities.

Repair can play a key role in service-based business models.

Re-use can include traditional second-hand product use as well as using the components from products that are no longer in use in new products.

Remanufacturing is an industrial process aimed at adding multiple lives to product offerings and is often delivered through service agreements.

Recycling is the action of processing a discarded or used product, component or material for use in a future product, component or material.

“We cannot solve our problems with the same thinking we used when we created them”

Albert Einstein

The value of circular change

The majority of European public waste management programmes are built upon the pillars of what one could call a “disposal paradigm”. The systems have mainly been designed to handle the on-going flow of waste from consumers and households with the objectives of minimising the potential environmental damage. Waste should not end up on streets or in nature. These systems have mainly been designed by engineers based on a technical viewpoint and with a focus on creating a flow as economical as possible to keep public costs down.

As a second tier the last 30-40 years has shown a growth in the effort to recover, reuse and recycle as much of the waste as possible. Nevertheless, this has mainly been an effort conducted by waste management companies and only to a limited degree by involving citizens and consumers in the process.

With the broad acceptance and scaling up of circular economy thinking it can be argued that waste handling in recent years has entered a third stage or “golden age” where the view on waste is changed away from something that should be disposed into valuable resources. With this follows ambitious visions of progressive circular resource thinking such as the concept of a waste-free-society and a circular society. However, in order for these scenarios to truly get into effect, broad cultural changes need to take place that alter the general awareness and attitude towards consumption, resources and waste. The first step in changing cultural aspects is breaking down strategies and visions into actions to empower people to sort all waste in order to be easily reused and recycled.

”With “cradle to cradle” design... everything is reused—either returned to the soil as nontoxic “biological nutrients” that will biodegrade safely, or returned to industry as “technical nutrients” that can be infinitely recycled.” (McDonough & Braungart, 2003)

Also, within the circular perspective, actions that promote a behavior change in the usage of products and services that enable a recycling and upcycling initiative should be embraced in the design. This might both include waste-prevention, everyday actions and lifestyle choices as well as consumers taking active steps such as repairing broken things, shifting consumption to product-service systems or using sharing economy initiatives.

Ultimately one can argue that the true circular society also will have to focus on being a quality-oriented society going away from

the fast moving consumption culture as a goal in itself. Instead focus should be on a quality-oriented society, which is a departure from lasting solutions including a choice-architecture that allows a quality lifestyle to flourish. As Allan Chochinov formulates it in his Manifesto for Sustainability in Design:

"We have to stop making crap. It's really as simple as that. We are suffocating, drowning, and poisoning ourselves with the stuff we produce, abrading, out-gassing, and seeping into our air, our water, our land, our food—and basically those are the only things we have to look after before there's no we in that sentence. It gets into our bodies, of course, and it certainly gets into our minds. (...) And when you think about it, this is kind of grotesque. "Consumer" isn't a dirty word exactly, but it probably oughta be."
Chochinov, 2007

Linking circular economy to EU legislation

The EU Commission is rolling out a set of initiatives based on the Action Plan of CE, including yearly reviews and updates on the action plan. The initiatives and strategies are strongly linked to legislation and the set-up of the existing European regulatory framework. As an on-going process, the focus in the initiatives is to remove regulatory barriers and create requirements and incentives to support a circular economy. Many of the earlier policy instruments are now under revision to further support a transition to a circular economy.

The considerations and the amendments to the waste and packaging directives emphasize leading the transition towards CE by focusing on prevention (extending lifetime of products), EPR (Extended Producer Responsibility), on packaging and on material management including quality standards for recyclable materials. The EU initiatives primarily regulate the waste management — and to some extent the production phase — of the product's life cycles. However, regulation in the production phase primarily focuses on energy, not on materials. The consumption phase is mostly regulated through voluntary initiatives.

Additionally, behavior change is needed

We throw away waste at every meal — not only a few left overs but also the plastic from food packaging at the store and the bio-waste from peeling a carrot or a potato. Each household accumulates approx. 500g of waste every day. On an annual basis this adds up to 182,5 kg of waste that hardly can be reused. We all keep producing waste this way yet we know it is wrong.

As humans we have an ability to keep in balance (Festinger, 1957). We have an inner drive to hold all our beliefs and attitudes in a state of harmony and avoid any kind of disharmony, as this dissonance will have a physical impact on us. When we cannot keep this cognitive consistency dissonance appears. And when we end up in a situation involving conflicting attitudes, beliefs or behaviours it leads to a feeling of discomfort. E.g. when we take the plane to Thailand and we know we we generate CO2-emmissions it gets to our guilty conscience. As we strive for comfort and harmony we alternate in either attitude, belief or behaviour to avoid the physical discomfort. Yet sometimes we end up in situations with inhibited gaps of continuity and that is when we start to create inconsistent thoughts in order to make sense and meaning out of the actions we do. E.g. when taking the plane to Thailand we know we emit massive CO2-emmissions so we can compensate by e.g. planting a tree. We can change the dissonance — and close the gap — by changing thoughts or behaviour. In doing so we need the freedom of being able to make choices and to understand (experience) that the inconsistency in our behaviour plays out poorly in some way in the future. Creating an environment where people have choices is essential in order to increase the ability to create cognitive consistency.

As creating a circular future requires a change in behaviour in order to overcome the current situation and achieve a society with only resources motivating for changes is as crucial as framing the right context for the future scenario. Essentially people are on a baseline motivated to (Kaplan & Kaplan, 1989):

- Know and understand what is going on.
  - but don't disorient and confuse them.
- Learn, discover and explore.
  - but let them do it at their own pace.
- Participate and play a role in what is going on around them.
  - but let them not feel incompetent.

To encourage sustainable behaviour change Kaplan (2000) further argues that the most efficient way to have people joining the change movement is by *"helping people to understand the issues and inviting them to explore possible solutions"*. A logic that is inherent in the participatory approach in a living lab aiming to understand human problems in relation to waste. Living Labs function to test which environment is most fruitful to see and evaluate choices. A zero waste environment can be tested in living labs to understand beliefs and meanings and prototype choices in order to create a society with cognitive consistency in a circular reality.

Design Thinking & Co-Creation

Design is essentially an outcome that is either a system, a service or a product. Or even a synthesized version of the three framed as a general concept or platform. The design is established on the basis of a process — during a timeframe, certain choices are made on behalf of information given to the process in a dynamic flow of opening and closing of information and ideas. This includes activities. When you perform an activity in relation to making a choice you automatically use your conscious cognitive capabilities. When performing Design Thinking you use this ability to critically ask relevant questions such as “how might we..?”. These kinds of meta-questions, framed in tools to perform activities that pushes the process onward are the essence of design thinking. Design cannot be completed without having undergone a process of design thinking with a range of tools.

These tools that structurally allow designers to work their way through the chaos also work from an outset where current situations do not match future needs. As Simon (1996) says: “Everyone designs who devises courses of action aimed at changing existing situations into preferred ones.” Design is the result of a strategic goal with unique expectations. The design outlines and defines specifications, plans, parameters, costs, activities, processes and how legal, political, social, environmental, security, and financial constraints are addressed, incorporated, or processed to achieve the unique goal.

Design is thus more than the man-made surface or a result of form and function. Design focuses on the user and puts the status quo on the agenda to challenge this and seek a far better solution to secure the future. Design is in this sense just as much a method as a concrete product - a method that ensures user involvement as a

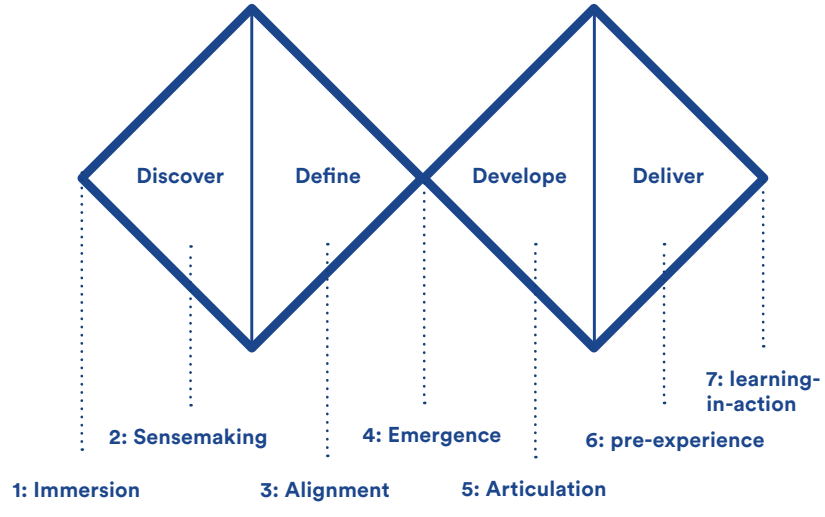
central element and merges needs with concrete opportunities that solve given problems.

"Put simply, [design thinking] uses a designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity."
Tim Brown, IDEO

The challenges of successful innovation require superior solutions (something that is new and useful), and a way to lower the risks for businesses and to establish employee buy-in. The key is to organize processes, as it keeps people on track and explore the complex problem at hand. Working with Design Thinking requires the double diamond as a framework in organized four steps and seven activities — each leading to the next step.

Each of the steps in the framework for Design Thinking: The double Diamond (Discover, Define, Develop and Deliver (figure on opposite side)) qualify a focus that leads to the next. Essentially Design Thinking takes an empathetic outset trying to understand people's needs and desires in order to design new solutions that will improve life quality for the people in focus. We are people designing for people.

Each of the steps require a certain set of methods to extract meaning or build something that is new and useful (innovation). The tools are many and count for specific situations. It is crucial for the process and outcome to chose and design a range of methods that is suitable for the product, system or service being designed. By establishing Living Labs as a central method to develop and deliver the future scenario for the end user, we emphasize to understand essential needs, routines and behaviors relating to waste management in private households. This way we can inform and co-create the final outcome in a correct way. Additionally we will use and be inspired by methods in all aspects of the process of creating circular change.



And although these activities are geared and moulded to experience users needs, each design-thinking activity critically questions the status quo, the scenario or the need at hand and as a result reshapes the experiences of the innovators themselves.

Design thinking has the potential to unleash people's full creative energies, win their commitment and radically improve processes by structuring the process around the usage of these tools. This will allow a natural flow from research to roll out and along the way the tools counteract human biases that thwart creativity (Liedtka, 2018). At the same time the tools frame the challenges concerned with reaching superior solutions. By structuring the process, creating an overview of the portfolio of ideas and constantly including

end users, risks will be eliminated. Additionally, all stakeholders in the process are equally valued, which will create a natural buy-in on creating the future as it plays on our natural human motivational need of belonging. All in all, the structure of the Design Thinking process helps innovators, stakeholders and users collaborate and agree on what is essential to the outcome at every stage/phase by shaping the experiences at every step.

Learning about the future scenario occurs in circular movements as learning loops, and when new concepts for the world are established, there is a need to process. These processes are established conciously with tools from the Design Thinking tool kit.

The Wasteman project is rooted in a philosophy that creating a general shift in household waste sorting habits and performance for the general public going from 30% to 100% sorting and recycling in a “society without waste” cannot be solved only by introducing new technology and collection procedures.

Instead, attitudes, beliefs and the culture of waste handling is to be changed, so that users (citizens) are motivated and engaged in the future waste system. Accordingly, a future waste management system needs to be designed not only as a technological infrastructure but also as an active system with values and experiences for the users that forms a positive attitude towards the solution. In the defining work on the experience economy, Pine & Gilmore (2013) describe how theming services as experiences and activating the five senses of users will add considerable value to a product or service. Their research shows how many users prefer and are willing to pay more for services that represent symbolic, aesthetic or cultural value.

In this perspective of the experience economy we find Design Thinking to become a relevant framework to create an efficient and successful waste management system for households that will thus also be about developing compelling narratives. By approaching the whole waste service organisation as actors on a stage that a) perform a service and b)at the same time tell and enact an important story the waste management company can aim to win the hearts of citizens through seeing their service as experiences that arouse emotions through activating users senses.

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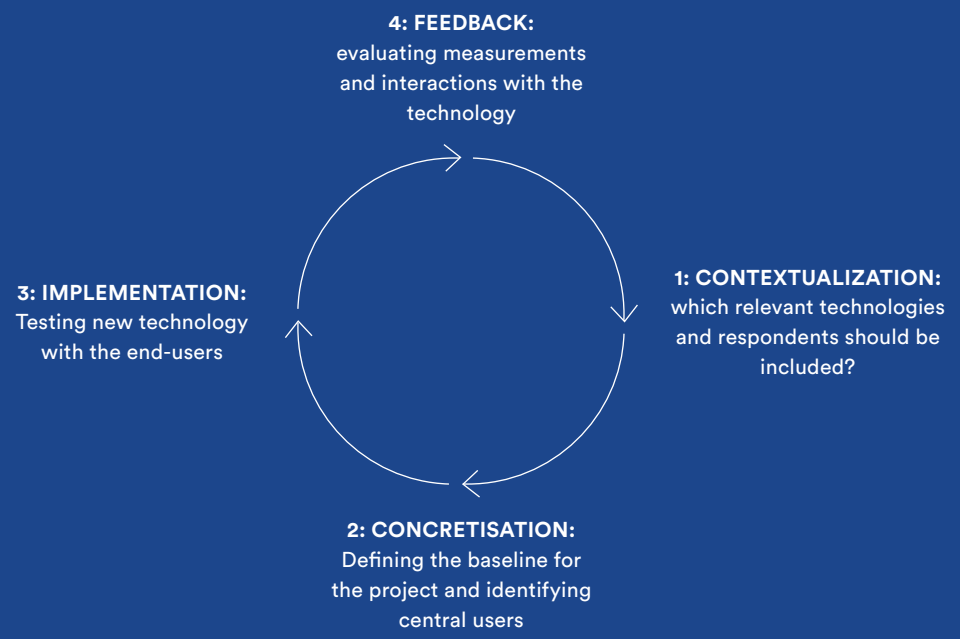
The process of a living lab

A living Lab is organized around a life cycle (Pierson and Lievens, 2005), and includes the following process:



Living Labs as test arenas for circular changes

A Living Lab is an environment created temporarily to involve users in an on-going innovative development project. Its main purpose is to test any kind of technology by including and engaging in dialogues with the future users. You can call it a forum for testing the challenges related to people that the innovative project is facing (Følstad, 2008).

A living lab is well suited for:

- A way to research and test the new technology in use in a familiar environment
- A way to gain insights and discover new opportunities within a given timeframe
- A way to involve users to co-create
- A way to experiment and experience new technology
- A way to evaluate and validate the technology that is tested

A Living Lab can have two major focus points: either it can be unfold in the context of the users and elaborate on co-creation activities or it can provide the service of being a test-bed extension where users access the technology in a familiar setting. The information gathered here is essential for further adjustments in the product or service (Følstad, 2008). A living lab is therefore both a temporary arena to test technology in a familiar setting and an approach within the overall innovation process that is established to include users and inform next steps in the process (Ståhlbröst, 2012).

Why a living lab?

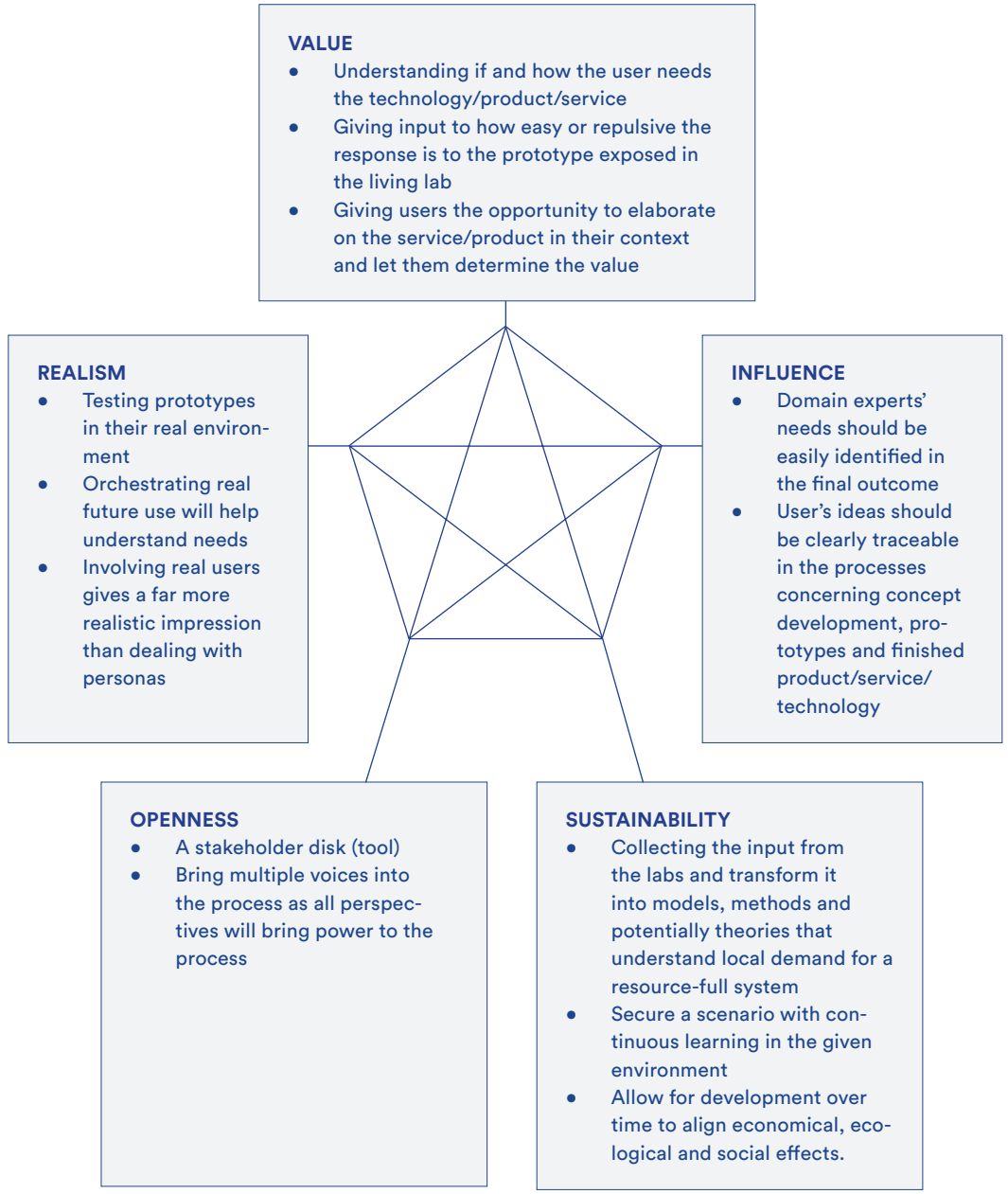
Developing and buying new technology and equipment is expensive. Risks are especially located around the understanding and usage of the new technology by the end user and it is therefore essential to lower the risk by having a close relation to the end user and therefore essentially know what they want (Pierson & Lievens, 2005). Hyysalo & Hakkarainen (2014) found in a study that challenges concerning redesign in pilot use and dimensions related to co-creation were made quicker and lessened the strain to end-users in a Living Lab in comparison to similar innovative processes without a Living Lab. Living Labs are organized to facilitate a co-creating environment, learn from users to quickly incorporate these inputs in product development and this way also minimize risks and thereby costs as the users must know what they want in the end. In this sense it serves as an important stream for the innovation process as it involves users in testing prototypes in an organized setting and eliminates crucial mistakes early.

Essential principles for a Living Lab

As a Living Lab is a temporary arena occupying an environment during a defined timeframe they can be played out in many contexts such as: Within an organization where members co-create changes, through an intermediary inviting partners into a neutral space, or as corporate meetings with stakeholders to co-create and develop innovations. What defines and gives identity to the Living Lab is the environment. But no matter what arena the Living Lab is played out in the key principles shown in the 5-star figure (opposite) is what a Living Lab should include. These dimensions are the functional foundations of a Living Lab and define what counts.

The five principles will also be used when evaluating ideas for Living Labs and choosing the exact activities and performance criteria in the Living Labs.

Certain challenges are expected when working with large scale Living Labs including various levels of the technological scale and these main challenges can be expected to relate to creating and sustaining the Living Labs, choosing the users (how many and who) and especially facilitating the changes to get involved in the Living Lab as well as the transition from the behaviour performed in the Living Labs and back to everyday lives. A lot of this can be managed with learning loops but will only be a success if the company or municipality is adaptable to the change.



CASES

Examples of best practice

The cases are selected and described in collaboration with Danish Waste Association representing five special challenges relevant for the Wasteman Living Labs. The study includes examples on collection methods for multiple fractions in old down town areas and old villages with lack of space for collection bins, as well as innovative suction systems and approaches for using shared recycling facilities to create awareness and changing user habits.

The study is also focused on the food waste system - the loop from households through pulp technologies to prepare food waste to biogas treatment and how to ensure the residuals from the biogas plant can be used as a soil improver/fertilizer.

Co-creating transport of household waste to public collection points

Project owner: Miljøpunkt Indre By is a local NGO, which supports and develops sustainability projects. It also offers counselling on urban nature, climate and sustainability

Special challenge: residential buildings with no space for cadastral bins

Kartoffelrækkerne and Kultorvet are both residential neighborhoods of central Copenhagen. With regards to waste sorting these neighborhoods are exposed to special challenges, namely that there is no space to place bins or to establish collection points in the courtyards of the residential buildings. Therefore residents are forced to use public collection points at some distance from their home.

Project aim: Development of smart solutions for residents waste transport

The project aimed to map, test and develop functional solutions for local residents to transport their sorted waste to public collection points. The ambition was to path a way to improve sorting in the residents' homes.

Process: Involvement through interview, exhibition, prototyping

Prior to any involvement of residents a mapping was carried out of public collection points and spatial conditions. Then, through door-stepping 15 test-families were recruited for preliminary interviews. These gave an impression of residents' experiences, habits, barriers, motivations as well as numbers on their sorting. The interviews, however, also revealed a critical demand for assisting guidance and counselling in relation to the residents sorting at home, prior to participation in tests and workshop about new carrier solutions. This finding occasioned the set-up of external collaboration with producers of furniture solutions for sorting. A selection was put on public display at Miljøpunkt's premises, whilst test-families were offered solutions of their choice to bring home and use for the duration of the project. Next step and the project's biggest event, was a workshop for all residents in the area where functional transport solutions were prototyped.

Findings: Transport solutions need to couple home with public facility

The workshop produced one overriding learning: Solutions for transport need to fit with both that residents solutions for sorting at home and the public collection point. In this sense, it needs to be anchored in the residents' need and provide a good coupling between home and public sorting solutions.

Unintended findings: Waste sorting is wanted but also better guidance

Although this insight was not directly sought for, the project revealed an unambiguous want of more information and guidance about how to sort properly into the different waste fractions. Especially dialogue-based guidance was positively received and produced results. Some residents even need to be informed that they have the public possibility for sorting. Moreover, it was found that the distance to the collection point is of lesser importance as long as residents are motivated to sort. Motivation is there and further cultivated, through better information. For a majority of the participants motivation was so strong that they volunteered as local waste ambassadors.

Source:
http://a21.dk/wp-content/uploads/2017/08/Smarte-løsninger-affaldssortering-i-KK-2017-Miljøpunkt-Indre-By-Chr.pdf

Creating a community hub through co-creative design of a local recycling facility

Project Owner: Platant Architects in close coorporation with the municipality and local stakeholders in Hørgården.

Special challenge: Residental area with high occurance of vandalism

After the old recycling facility burned down, Hørgården needed a new one. Hørgården is part of "Urbanplanen", which is a socially deprived neighborhood on the outskirts of Copenhagen. Vandalism of both private and public property is frequent. Therefore an important fulcrum of the project is the cultivation of locals' ownership through involvement.

Project aim: Development of new recycling-facility with local involvement

The area's old recycling facility was fenced off and open only three times a week. The ambition for the new facility was a more open place with stronger integration in the local neighborhood and with a strong engagement of residents.

Process: Involvement through interview, exhibition, prototyping

Prior to planning the new facility residents of the area were encouraged to share their wishes to the new construction. The construction of the new facility was then divided into two parts: Platant, the contracter, provided the heavy construction, while the furnishing of the facility in terms of smaller scale constructions and activities was performed with extensive involvement of residents. Part of the involvement consisted in a collaboration with a local school, a socioeconomic project 'Lommepenge Unge' as well as a local open workshop. Besides a bike reparing workshop, an urban garden, a stage for performances, urban furniture and more has been established. Furthermore, educational and informative materials has been developed, also with involvement of locals.

Results: A popular new local facility, empowerment and education of locals

The involvement of local residents and other stakeholders contributed to expand the functional and social scope of a local recycling facility. The new facility has become a social hub in the area where locals initiate and run different activities. It is popular amongst the residents.

Uninteded findings: Involvement creates ownership and personal discoveries

The experiences from the project indicated that involvement cultivates a sense of ownership amongst the involved. It also appeared to give the participants a chance to show and discover hitherto unknown personal qualities. Moreover, involvement also gave the participators a chance to gain new knowledge and competencies, e.g. in relation to handicraft and sustainability.

Source:
www.platant.dk/hoergaarden-naergenbrugsstation/

Increasing waste sorting in one central sub-surface collection point in holiday house areas

Project Owner: Municipality of Kalundborg

Project aim: Is waste sorting increased by decentrally assembled containers?
The purpose of the experiment was to investigate if increased use sorting of organic waste, paper and glas can be achieved through establishment of sub-surface containers that collect the waste from holiday houses at one decentral point.

Proces: Identification of placement and baseline, then involvement
Prior to planning the placement of the new collection point maps and aerial photographs were used to identify a suitable area for the project. Sub-surface containers were placed in accordance with these critiria; area with one or two pathways and 80-100 holiday houses, a vacant area for placement of the containers near at least on pathway and the residents' accept to participate in the experiment.

Prior to the experiment's launch a baseline of organic and residual waste was made for later comparison with effects of the common sub-surface collection. Choice of containers was then made based on both the number of participating households and estimated waste volumes as well as the planned frequency for their emptying. To ease the residents' transport of waste from holiday home to the collection point, assisting equipment such as bicycle baskets, pushcarts, etc. were offered free of charge.

RESULTS: POSITIVE RECEPTION BUT MODERATE EFFECT
The feedback from participants was generally positive. Overall a reduction of noise and smell was reported although it should be noted that the house closes to the collection point reported on smell and noise and that the residents furthest from the point experienced increased inconvenience. Therefore both placement and frequency of emptying should take the exposure of these residents into consideration.

The project could not identify an improvement of the sorting of residual waste, rather the opposite. On the positive side, sorting of organic waste was improved and the quality of the fractions with paper and glass was high. The volumes of collected paper were way less than expected.

Unintended findings: Exceeded budgets due to emptying
Emptying the sub-surface containers proved to be far more expensive than expected and exceeded the expenses of the existing arrangement. This in part was due to ineffectual utilization of the dustcart's capacity.

Source:
https://genanvend.mst.dk/projekter/projektbibliotek/2015/decentral-indsamling-af-husholdningsaffald-i-sommerhusomraader/

Common collection points in medieval towns with constricted space and pathways

Project Owner: Forsyning Helsingør and Helsingør Municipality

Special challenge: Constricted pathways and limited space for placement of containers

In medieval towns with old city centers, narrow and winding streets, small courtyards and close proximity between residential and commercial buildings pathways to and the logistics around waste collection represents a huge challenge

Project aim: Building an informed foundation for the choice and design of solutions

The purpose of the project was to research and evaluate waste solutions established in cities and towns with similar challenges as those of Helsingør. Based on this the aim was to choose and design the best possible solution for the specific case of Helsingør

Process: Identification of challenges, review of experiences, analysis, suggestions

First conditions specific to the collection of waste in medieval town were identified alongside identification of waste potentials for multi-story buildings and small commercials as well as experiences with the existing, traditional household collection scheme. Then waste systems were evaluated according to criteria such as, increased recycling, usability, work environment, aesthetics, economy, suitability in relation to the different waste fractions and whether the system is applicable for smaller commercials. Then the following systems were evaluated in relation to the case-specific criteria represented by the specific challenges of medieval town and Helsingør in particular: traditional household collection with containers in the backyard. Common collection points in public with screened containers, hives in public, sub-surface collection points in public, public suction system.

Results: The good choice is a compromise

The overall conclusion of the project was that there is no all encompassing solution for medieval towns. The best solution must therefore be a combination of systems, decided upon with involvement of the users.

The analysis showed that common collection points in public space were found to be a suitable solution. Amongst the drivers for a re-arrangement of the waste system, the desire to move the waste out of backyards, increased recycling and the need to solve the challenges related to confined space and heavy vehicles were identified. Common collection points have improved the recyclable waste with 20-40% and there are several examples that waste charges have diminished with 10-20%

Further reading and resources

The report from the project contains descriptions of circumstances that characterize medieval towns and possible waste solutions. It also contains a checklist with significant aspects for consideration in relation to establishment of collection systems in medieval town.

Source:
https://genanvend.mst.dk/projekter/projektbibliotek/2015/bedre-affaldssortering-i-middelalderbyer/

Combined recycle facility and platform for cultivation of sustainable behavior

Project Owner: Copenhagen Municipality and Naboskab

Special challenge: How can a municipality cultivate more sustainable behavior?
The transition to a more sustainable future requires cultural changes regarding citizens' behavior, consumption and awareness. How can a municipality support such changes through integration with its other and liable projects, practices and services?

Project aim: A recycling facility that motivates and communicates sustainability
The vision of the project was a novel version of a recycling facility. This facility would have the traditional functions for handling recyclable waste but moreover a strong focus on developing models for circular economy and involvement of citizens through hands-on activities.

Process: User survey, experience mapping, activity program and catalogue
First step of the project was to conduct a survey with the facility's future users (n: 120) to identity what motivates them and what kinds of activities are in demand. Then all organizations, associations and networks experienced with involvement of citizens in circular economy concepts, were mapped. On this basis, both a catalogue and a program were developed with activities, such as workshops, debates, film-screenings. Common to the activities in the program and catalogue was a focus on sustainability and a prevalent ambition to target and engage as many of the different user segments in the municipality.

Results: A novel recycling facility with wide array of involving activities
The project yielded an expansion of the classical understanding of a recycling facility. The new facility would not only be a place for citizens to do away with their waste but moreover to engage in different cultural and educational activities. All activities center on sustainability and targets different audiences in the municipality. In this way, the need for a new recycling facility is integrated with an ambition to build a platform, which may motivate citizens to take on more sustainable practices and in general become more aware. Besides film screenings, debates and workshops the new facility houses both repair and upcycling activities.

Further reading and resources
Naboskab, which is a private consultancy specializing in concepts that integrate community based and cultivating activities with waste prevention, recycling and sorting concepts have produced a report and summery for the project. These resources describe how activity catalogue was developed, analyzed and qualified.

Source:
www.naboskab.dk/udviklingafborgerrettedeaktiviteter

Common collection points in large housing developments

Project Owner: EkoMaz Płock, Poland

Special challenge: Anonymity and poor waste separation in large housing developments. In large housing developments, anonymity among citizens leads to poor waste sorting and low quality of the collected waste fractions. Socially disadvantaged communities add even more to the challenge.

Project aim: Improved control and interaction with administrative personnel to encourage better waste separation.
The project purpose was to improve control and quality of waste separation by hiring trained personnel to advise citizens on the rules of separation.

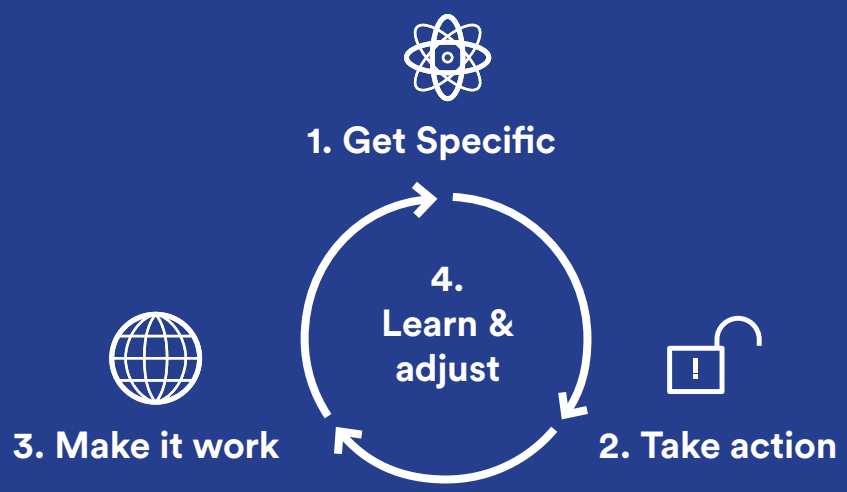
Process: Location of collection points centrally in housing developments with trained personnel.
An important issue is the change of attitudes towards considering waste as a problem to considering it as resources which should be separated in proper way. The waste is separated at homes in 3 fractions (kitchen biowaste, resources and residual waste) and brought to collection points placed centrally in the housing development. The trained staff can further separate the waste into 25 different fractions increasing their market value. Biowaste is kept in a cooled room which decreases odour generation. Special attention is paid towards hazardous waste e.g. lighting equipment, batteries, electrical and electronic equipment, chemical and medical waste. The residual waste is converted to RDF (Refuse-Derived Fuel) for incineration. Each collection point is intended to service 600–1000 citizens and works in two shifts, 6 days a week; 8 points have been constructed in Plock (which service more than 6500 citizens) in order to implement the idea in real scale.

Results: up to 75% recycling achieved - up to 45% of recyclable materials (plastics 16%, paper 14%, glass 10% and metals 3%) and 20-35% biowaste.

Despite low waste separation quality at homes, the personnel of the collection points were able to increase the quality of segregation. As a result, much less waste is deposited in other public places, odours are eliminated and issues with rodents and insects are limited. The method has had a positive effect on local employment. The system is economically viable and its economy grows with increased citizen support. The environmental effect (with recycling above 65%) is the best in Poland and probably one of the best in the EU.

Further reading and resources
The next generation of the system is operated in Nakło and Zamość where additional encouragement methods have been introduced. Every family gets a card which helps to register the amount of recyclable resources brought to a collection point. If someone does not bring his or her waste to the collection point, the system informs bout the increased rate he or she need to pay for waste collection.
https://www.portalsamorzadowy.pl/pliki-download/89059.html
http://archiwum.rp.pl/artykul/1402946-Do-smietnika-z-workiem-karta-i-kodem.html

THE TOOLS



A toolbox to develop Living Labs

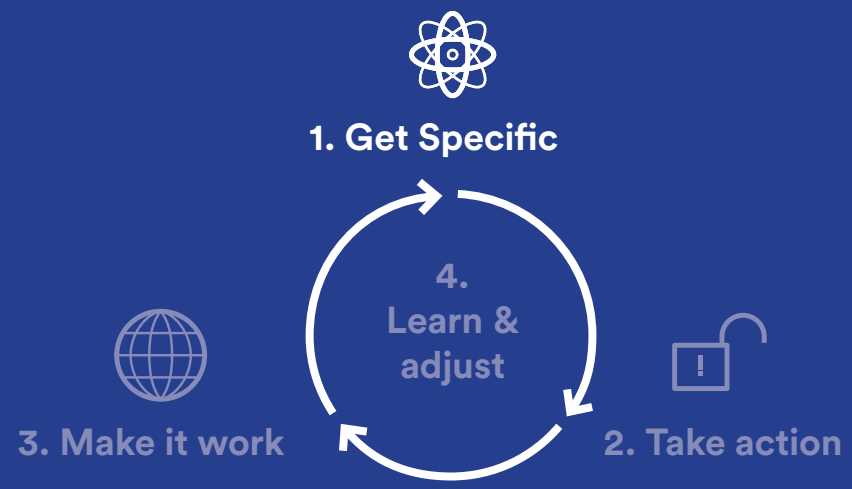
This toolbox aims to give hands-on methods for everyone who wants to build a circular future in a small community. The key output is the Living Labs — but before these can be a reality several steps of design thinking methodologies must be treated with some cognitive power with a build-in do-er attitude.

We have divided the toolbox into 4 categories all adressing the essential steps of a Design Thinking process. All tools focus on transforming a linear society into circular connectedness with people in the center.

This toolbox is curated to serve the purpose of developing Living Labs at low costs in small communities and municipalities in EU. It is designed to easily break down a 'hard' problem, understand how to engage with users, develop relevant Living Labs and learn and adjust from the process.

The content in this part of the book is sampled and inspired by the sources referenced to.

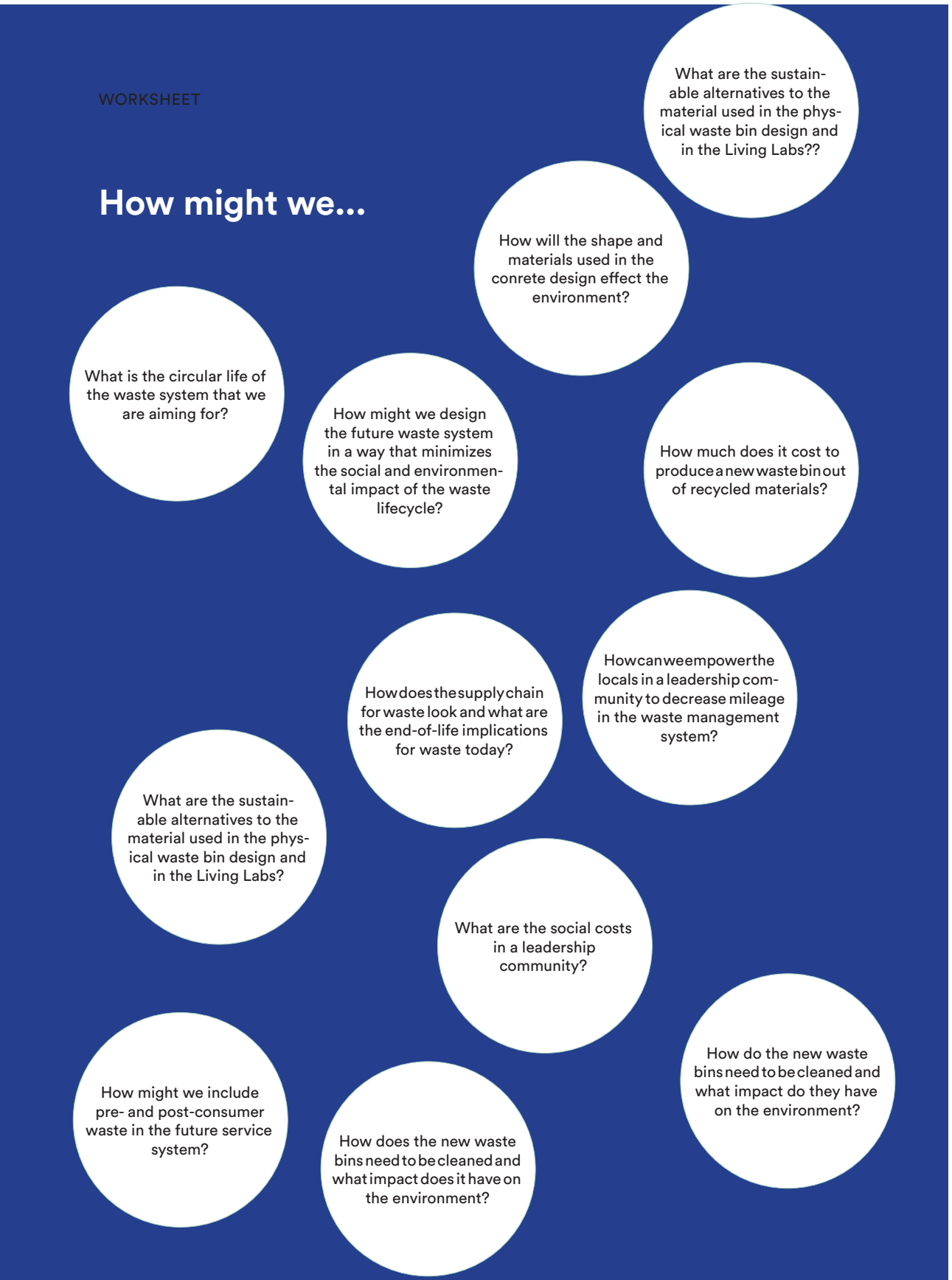
Interreg South Baltic
EUROPEAN UNION
European Regional Development Fund



1. Get Specific

In this part of the toolbox you can gain insight into how to understand your hard and complex situation as well as getting a concrete understanding of how to shift from linear to circular thinking. Make a statement about the challenge you are looking to explore and establish some goals for your project. The following tools can be used to get specific about your current situation and set a focus for the future and your Living Labs.

- Brainstorming on circular opportunities
- Identify circular opportunities
- Map your stakeholders
- Define your hard problem
- Create a brief to get concrete



Circular Brainstorming

This is a beginning without a defined end. The purpose is to start a directed conversation on the problem at hand where questions keep pushing and outlining the problem in focus. The purpose is to ask questions. It might seem as an odd beginning without focus but by keep on asking you will experience what is interesting and identify an emerging pattern of themes that are crucial to follow.

How to:

1. Consider wether you are striving to prolong product life or create purposeful inputs and outputs? Additionally, also start a discussion by answering whether or not and how you can make the current situation easier, transform products into services, sustain product lifetime, and if somehow you can restore, etc.? Also, how are the current materials treated? Can they be sourced more locally? Can you minimize the waste stream? Is there a un-used bio-cycle?
2. Ask “how might we...” to all these questions to specify your goal. An example of a serie of question related to waste collection system is presented on the left.

MATERIALS: Post-its and pens
TIME: 2-3 hours workshop

SOURCE: Ellen McArthur Foundation, The Circular Design Guide + IDEOs www.designkit.org + leyla Acaroglu: www.leylaacaroglu.com

Pick an opportunity you have identified (e.g. making a circular waste flow)

HOW DOES THIS IMPROVE THE CUSTOMER EXPERIENCE?

WHAT DOES THIS NEW SYSTEM/ OPPORTUNITY REQUIRE?

HOW MIGHT THIS AFFECT OUR CURRENT BUSINESS STRATEGY?

WHICH ROLES AND STAKEHOLDERS ARE NEEDED?

WHERE DO WE BEGIN?

Identify circular opportunities

Start small if you want to make your community circular. It might be helpful starting with what you have full control over. Build small succeses on your way to achieve the bigger picture.

How to

1. Start by picking a specific product, service or a business challenge to focus on in your line of possible changes, e.g.: “making a circular waste flow” or “have people sort all waste”.
2. Consider whether you are striving to prolong product life or create purposeful inputs and outputs?
3. Specify the opportunity by flipping the problem around.
4. Line out how this opportunity is affected by using the tool on the left side.

MATERIALS: Paper & pen
TIME: 60 mins

SOURCE: Ellen McArthur Foundation’s “The circular Design Guide”, www.circulardesignguide.com

STAKEHOLDER NAME

RELATIONSHIP

	1 2 3
	1 2 3
	1 2 3
	1 2 3
	1 2 3
	1 2 3
	1 2 3
	1 2 3

Map your stakeholders

The stakeholder disk helps you to identify all the stakeholders needed in order to succeed in your achievement of building a circular solution. — And identify whom to collaborate with in Living Labs

How to

1. Take one scenario at a time and outline who would be involved to make it a reality.
2. Decide whether the stakeholder is crucial or only secondary to the realisation of the project and Living Labs.

MATERIALS: Big piece of paper and colored pens
TIME: 2-3 hours

SOURCE :A simplified variation made with inspiration from Stine Degnegaard PhD thesis, 2019

THE DEFINED HARD PROBLEM:

_____

_____ is

a complex problem that we need to start working on now

and will be working on during the nex _____ years.

THE IMPACT OUR WORK WILL HAVE:

Specifically, this impacts _____

(person's in the world) by _____

_____

_____

_____

_____ (symptom)

THE FUTURE WE ARE WORKING ON IS:

We envision a future in which _____ and

_____

_____

TO BEGIN WITH WE:

To get started, we should _____

_____

and _____

Define your hard problem — a brief

Coming from identifying opportunities and stakeholders it is now time to define your hard problem so you can use it as a guiding star and unfold actionable tasks from now on.

How to

1. Make the hard problem precise by filling out this blanket:

THE HARD PROBLEM

HEADLINE: Building a circular waste culture

DESCRIPTION: We want to build a system of waste management

so that people living in small communities/

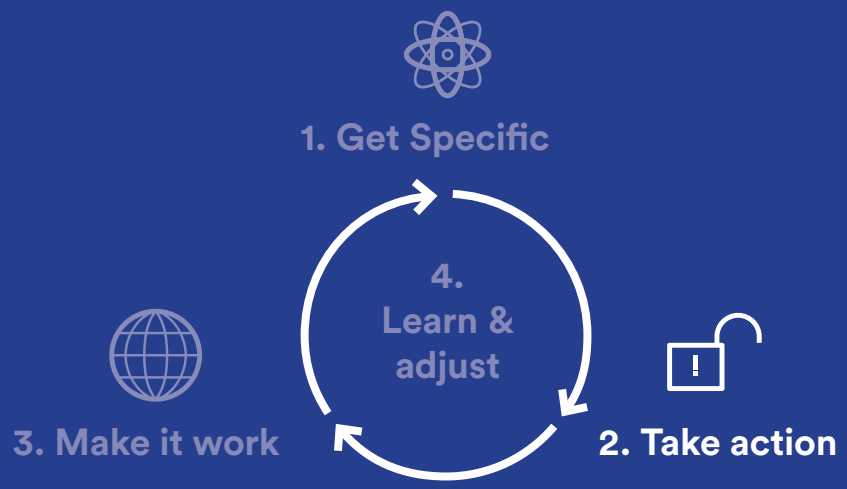
towns take action and sort the waste themselves

100% in semi-public spaces

2. Specify why this is a hard problem, who is involved, the future scenario and first step by filling in the guide on the opposite page to make it realistic and actionable.

MATERIALS: paper and pen
TIME: 30 mins

SOURCE: IDEO co-lab, www.ideocolab.com



2. Take Action

To take action a multidisciplinary team of people that can operate at all levels to achieve the goal is needed. Understand the every day problems among the users of the current system by emphasizing and identifying opportunities for circularity through idea generations and knowledge is required to understand. Then build scenarios and prototypes to exemplify content for the Living Labs.

- Build a world class team
- Identify user groups
- Mapping with users
- Ideate on what the Living Labs should contain
- Conceptualize the Living Labs
- Co-create and prototype with users
- Organize sprints
- Sketch business models

ESSENTIAL QUEESTIONS TO CLARIFY IN THIS PROCESS:

- Who will spearhead the initiative?
- Who will lead the design process?
- Who will provide expertise around best practices in circularity?
- Who will lead implementation?
- Which stakeholders or advisors need to provide input along the way?
- Who are the partners outside of your organisation that you need to engage with?
- How will you collaborate internally?
- What are the creative tensions? How can these help us find new pathways and disrupt existing pathways?
- How will you collaborate with outside partners?
- How will you engage your key stakeholders to ensure they feel invested?
- How will you engage your users across the value chain?

Build a world class team

You need to build a interdiscipinary team to strengthen and cover a broad field of relevant knowledge — that at the same time also can build strong relationships to stakeholders. The key to making it happen is to align on the shared goal and to define how you collaborate.

How to

1. Start by defining your needs. Typically needed roles are: a project lead, context expert(s), designer(s), implementers, technical experts, advisors, etc.
2. When you reach out remember that they all function externally — make sure you set clear expectations and align level of commitment.
3. Invite them into the process of defining the challenge and discuss your roles.
4. You then need to define how you plan to collaborate.
5. Make sure the plan for how you collaborate is visible to everybody as you go along (e.g. by drawing it out)

MATERIALS: Board/A0 papers + pens
TIME: 3 hours

SOURCE: Ellen McArthur Foundation “The Circular Design Guide”
www.circulardesignguide.com

WHAT MAKES A GOOD INTERVIEW:

1. Talk about the goal of the project
2. Ask: “Tell me about yourself?”
3. Engage by having them showing relevant spaces actions objects, etc
4. Dig deeper by asking “why?”
5. End by inviting in for any last ideas or thoughts before you say thank you.

WHAT MAKES A GOOD INSIGHT?

Crafing a good insight should:

INFORM (shed light on needs and wants)

INSPIRE (motivate you to do something new)

MEMORABLE (a bit provoking, stick and is sharable)

What do users need?

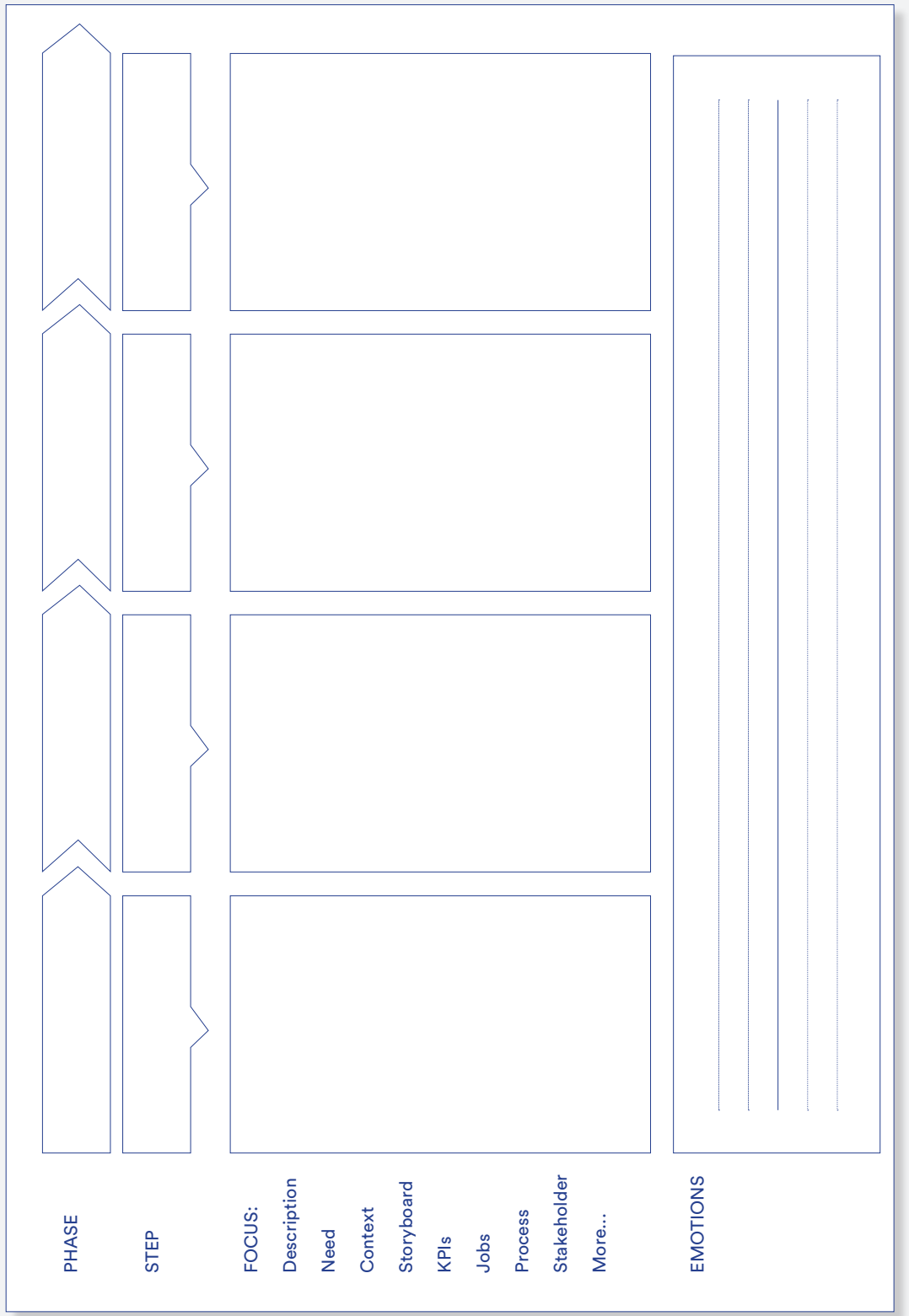
To understand the users an empathetic understanding of the people you are designing for is natural. You must gain an understanding of the need in each step of the process or service you are designing for.

How to

1. Define who sits within your value chain — this includes all variations of your end users.
2. Ask what you will learn from the users? Come up with a range of questions that identify what they need.
3. Go into the field and experience their lives lived. Research is best in the users context and done best in a team. What do they experience?
4. Capture anything they show and talk about (with notes and photographs) and try to identify how it could be solved.
5. Share your insights from the field and learnings with your team.
6. Taking these insights from the field and using them as your framework for the future solution by thinking about what circularity could offer around this product or service, and pair them to user needs before heading into brainstorming.

MATERIALS: Paper, pen, camera
TIME: 3 days planning and creating questionnaires. 2 hours in the field w/each user and 1-2 days of sharing and creating insights.

SOURCE: Ellen McArthur Foundation, The Circular Design Guide, www.circulardesignguide.com, The Fieldstudy Handbook by Jan Chipchase (2017) and IDEO, www.designkit.org



Map a journey

When coming back from the field, essential insights are most likely bound to certain points in the journey relating to the problem you try to solve. Mapping it all out is helpful to understand the users' pains and use it as opportunities to design better solutions.

How to

1. Choose a scope for your map. Is it higher level or does it have a focus on a small scale specific problem?
2. Choose which user you are making a journey for.
3. Identify the steps - start by identifying what is the most crucial interaction the user can have and move forward and backward from this point. Do they interact with persons, technology or machines? Are they walking, waiting, etc.?
4. You can always add more lanes to your journey map to broaden the level of experiences, e.g. by filling in images or draw a storyboard.
5. Your focus point in each lane could be insights from the field or how the waste systems' KPI's are beeing maintained.

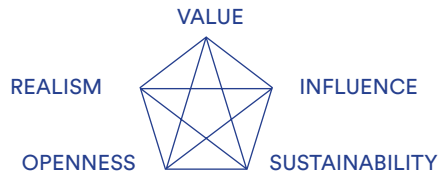
An alternative version is creating a behavior map that focuses on behavior change models (motivations, trigger points and abilities), core motivators (pleasure/pain, hope/fear, social acceptance/rejection), simplicity factors (time, money, physical effort, mental power, social deviance, non-routine) and triggers (how are they facilitated, sparks and signals).

MATERIALS: Big piece of paper or create a template online
TIME: 2 hours - 2 days depending on the level

SOURCE: BJ Fogg on www. behaviormodel.org, Norman & Nielsen on www.nngroup.com

Ideate on Living Labs

The ideation should focus on exploring opportunities to solve users' needs and stakeholders' interests in the future solution as well as aligning with the five dimensions of what a Living Lab essentially should perform (see below).



How to

1. Initially, it is important to keep an open mind without judgement and wait to give criticism until the end.
2. Start with good questions (see worksheet). Or start asking a good question by "how might we..."
3. Look at the opportunities from your field trip — what can be explored?
4. Which pains in your user journey map can make the offerings more circular?
5. Choose a focus (an opportunity/topic/etc.)
6. Brainstorm individually for 2 mins — then share. Do this 2 - 4 times. Then brainstorm together. Then do it again with a different topic/opportunity.
7. Go for quantity. Defer judgements.
8. Choose pile of ideas by using the five dimensions as a framework for evaluating ideas and making decisions:

MATERIALS: Post-its, stickers, pens and paper
TIME: 2 hour workshop

SOURCE: Ellen McArthur Foundation, The Circular Design Guide, www.circulardesignguide.com and IDEO

WORKSHEET

CONCEPT NAME:

VISUALIZE THE CONCEPT:

DESCRIPTION

WHAT PROBLEM IS IT SOLVING?

WHO ARE THE USERS?

WHAT TECHNOLOGY IS NEEDED?

HOW SHOULD IT LAUNCH?

WHAT PROBLEM IS IT SOLVING?

IS IT DIFFICULT TO IMPLEMENT?

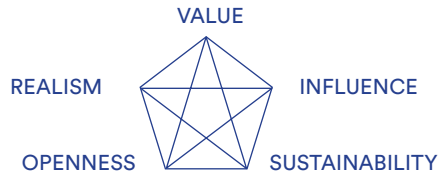
low ..... high

Conceptualize the Living Lab

Coming from identifying opportunities and stakeholders and generating ideas on what the Living Labs should unfold as, it is now time to cluster the ideas from the brainstorm into several concepts that can be used as frameworks for your Living Labs.

How to

1. Look at your ideas from the previous brainstorm
2. Cluster them
3. Identify connections between them and build a concept around these connections
4. Does this concept align with the 5 definitions of a framework for living labs?:



MATERIALS: Pieces of paper and a pen
TIME: 1-2 hours

SOURCE: Jan Chipchace: The Fieldstudy Handbook (2017), IDEO and beyond

Involve users and create scenarios

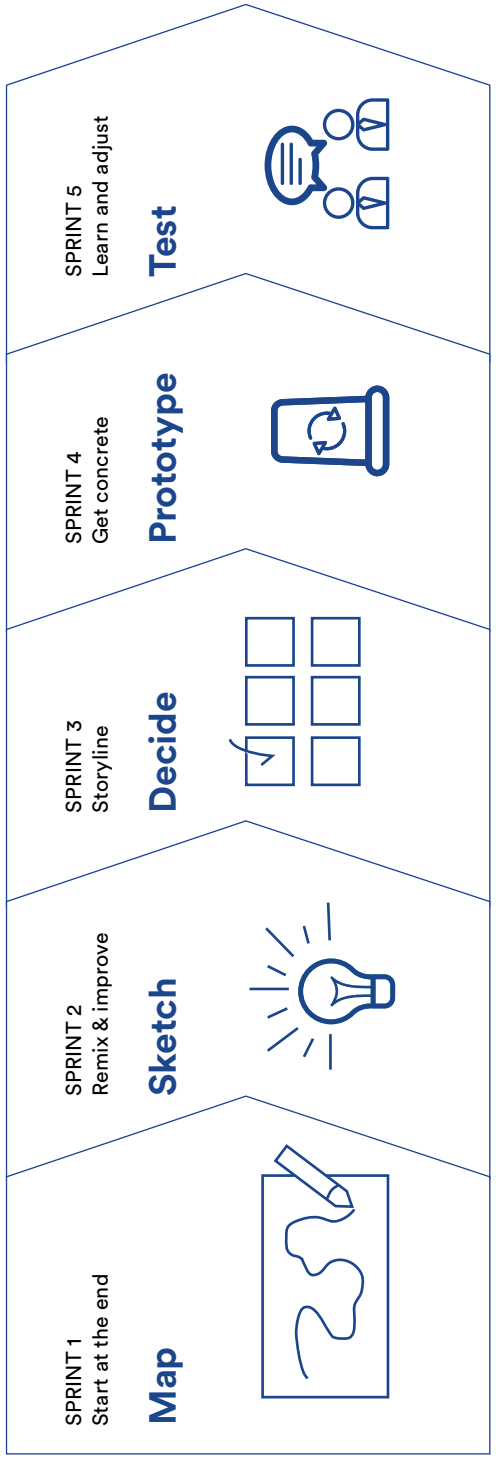
Engaging in dialogue with the end users and co-creating early on will secure a relevance of the future design — and has the added benefit of applying a feeling of involvement which in the end results in motivation and a positive attitude towards the change.

How to

1. Identify exactly who to invite — is it everybody in the community or only a selected group of people that will be using the Living Labs? Are there specific demographics, psychographics. etc.?
2. Arrange a space — app. 3 hours at night — and get some workshop supplies (post-it-notes, colored pens, big pieces of paper, etc.)
3. Do an agenda including a 'conversation starter', a brainstorm-session, maybe a roleplay in a future scenario, or even some early rapid prototyping as a dialogue tool to make focussed conversations about the future scenarios.
4. The point is to get feedback and not only hearing from the end-users, but to incorporate them in the process and make them feel a part of the greater team.

MATERIALS: Workshop materials and a place to be
TIME: 3 hours

SOURCE: Robertson & Simonsen (2012) "Routledge handbook of participatory deisgn" D.School, IDEO, www.designkit.org, etc.



With a focus on one specific task —e.g. designing waste bins and the system of collecting waste accordingly — map out the service system and identify points to be addressed in the design.

Include experts and cases of best practice to get inspired from. Remix the input with experiences and improve by cross pollinate incoming ideas. Sketch out a scope of possible solutions.

In the proces of making a storyboard you continually select the solutions that fit your situation and at the same time support the goal.

Make the decisions in the storyline tangible by building it — either in cardborad, digitally or in 1:1 with materials that exemplify reality. Always take a prototype as a conversation starter.

Go out and test the prototype with the users. Make sure that the feedback suits the project so it can easily be used to adjust for a more suitable solution.

Organize sprints

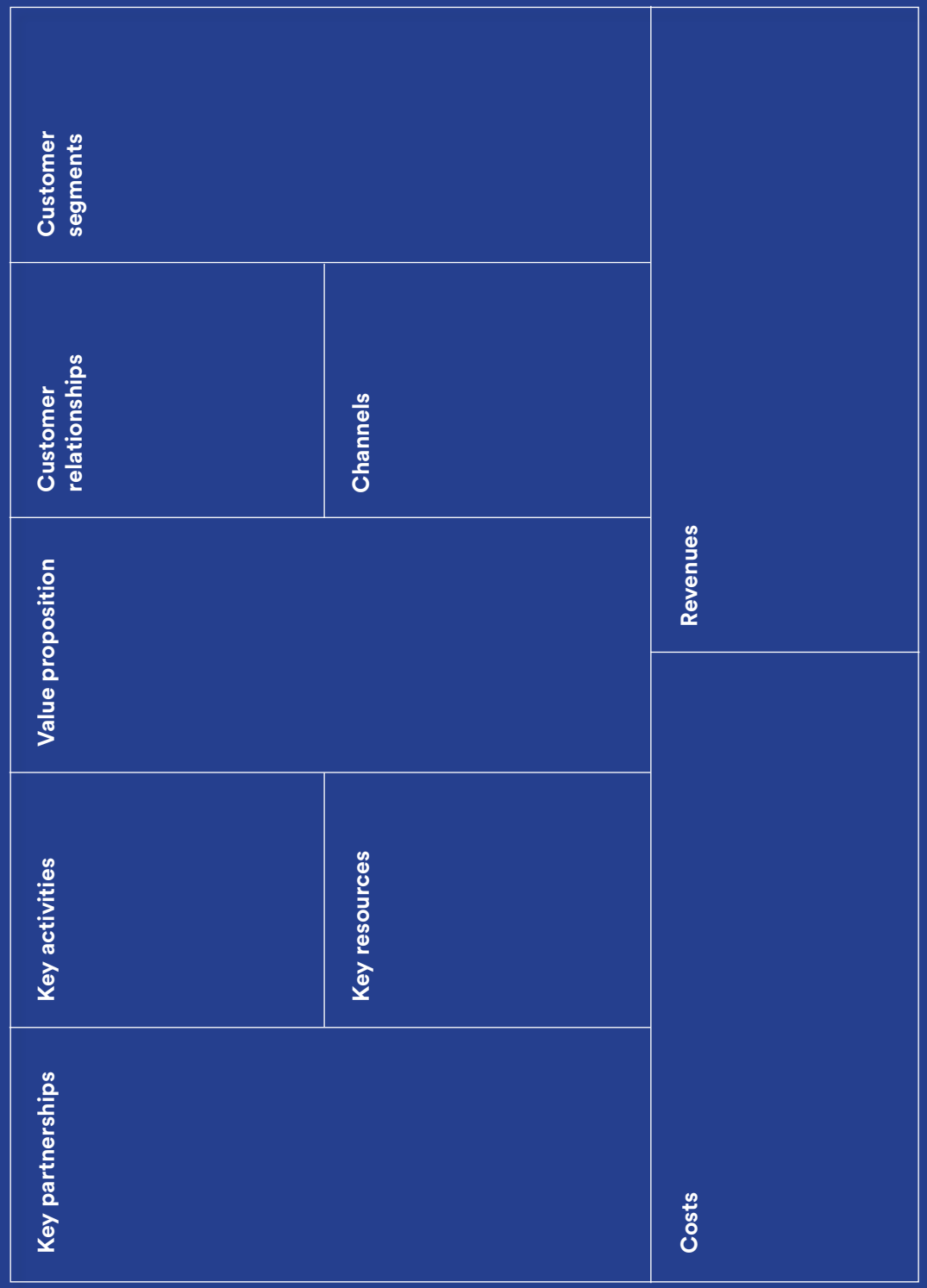
To optimize the development of a new waste management system include designers from all branches in the development of a new waste sorting system by inviting them into a process of sprints — which essentially is a week-long organized process of 5 steps that will end in tested protoypes ready to meet the end users.

How to

1. Collect a range of designers from different fields
2. Set up a week of sprints following the simple outlined plan on the opposite side.

MATERIALS: Big piece of paper or create a template online
TIME: 2 hours - 2 days depending on the level

SOURCE: GV, www.gv.com/sprint/, “Sprint” by J. Knapp and Danish Design Center, www.danskdesigncenter.dk/da/sprint-loeb-dig-til-bedre-ideer



Identify circular business models

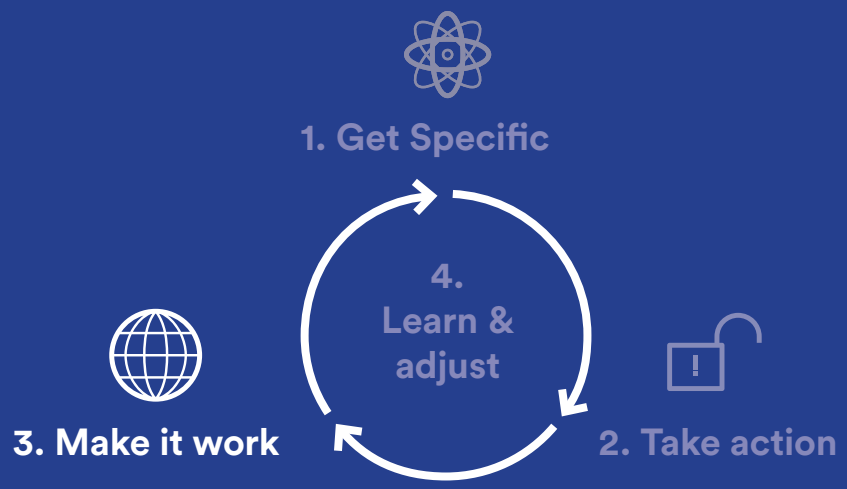
Now that you have a pretty thorough insight into your end user needs you can start building business models by using Osterwalder & Pigneurs Business Model Canvas (BMC). This way opportunities for both new stakeholders and circular flows allows for circular businesses to arise and intersect with your core business — and this is where circular economy starts kicking off around your Living Lab ambition.

How to

1. Gather the team and start filling in the canvas by defining the value proposition you can offer the end-users.
2. When you are working with circular design thinking keep in mind that it is an iterative process of continnual prototyping, learning and adjustments, so what you start out defining as a value proposition you most likely need to adjust later on.
3. Accordingly, expect to end up with gaps that need further research in order to complete the BMC.

MATERIALS: Big piece of paper or create a template online
TIME: 2 hours - 2 days depending on the level

SOURCE: The business model canvas is been developed by Osterwalder & Pigneur, www.strategyzer.com



3. Make it work

Now it is time to unfold the Living Labs and actually make them work. This requires involvement, communication and a degree of management during the time period of the Living Labs. The following tools can be used for this step:

- Framing the message
- Storytelling to start the movement
- Growing the change through storytelling
- POEM-management of the communication channels
- Nudging — make people use it in a subtle way

AN EFFECTIVE FRAMING:
Imagine you are trying to frame a change within a community: “How might we rally people behind more conscientious consumerism and less wasteful behavior?” ExampleSource: IDEO, “Change by Design”

A GOOD FRAMING ESSENTIALLY CONTAINS THESE ASPECTS:

1. Emotional — awaken trigger points
2. Logical — describe the aspirations for your change in an achievable way. Relate to a previous success.
3. Tactical — explain how it is done by pointing toward concrete actions

EXAMPLE (Source: IDEO, “Change by Design”):

1. Emotional: “In the US, 60 million tons of produce are thrown away every year. Enough waste to fill 700 football stadiums. Contrast that with the people who are undernourished. Families, elderly, children. Could they benefit from waste reduction? “
2. Logical: “According to research, unrealistic cosmetic standards lead to waste production. Consumers don’t want things that look ugly or imperfect — bruised fruits and vegetables are left on the shelf, or in the fields to rot.“
3. Tactical: “How might we all get smarter about the true cost of food waste? By educating one another, and working closely with local grocers, we can begin to change the way in which we consume and distribute produce”

EVALUATION CRITERIA FOR A GOOD IDEA:

- The idea must contain some sort of passion and energy
- The idea must hold an inhibited excitement
- The idea must be able to be processed with ease — meaning it should be easy to get permissions, it is not time consuming and can be executed within a given budget.

Framing-tool to build an effective story

Framing the message is fundamental for the task of achieving a 100% circular future in waste management. Once you have talked to future users that are both positively attuned and nay-sayers to the project you are ready to frame your message and work on the storytelling:

How to

1. Put all key insights on post-its and start clustering them into themes.
2. Look across all interviews, inspiration and insights: What are the emerging patterns? Are there consistent problems? Anything significant? Surprises?
3. Sort these themes by identifying what they mean — You now have some preference points to aim your framing at.
4. Start adressing the themes with ‘how might we…’ questions.
5. A framing for this opportunity should be (se opposite).
6. Start to build the story by making several framings — ideate a lot to open up additional opportunities. See opposite side for an example (Source: IDEO).
7. Select a framing of a story by using the criterion listed on the opposite side.

MATERIALS: Big piece of paper or create a template online
TIME: 2 hours - 2 days depending on the level

SOURCE: IDEO course “Change by Design”, www.ideou.com

A

You need to identify whom you can build a coalition together with. Who is the group of dynamic people that can build on top of your ambitions and mobilize the change?
Think about the people your change will involve.

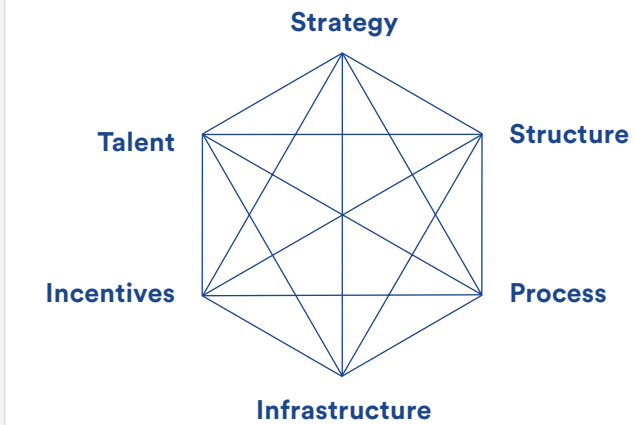
- **Who is already excited about your change?**
- **Who might you count on for support or resources?**
- **Who might derail you early on?**

B

Once identified and included in the process you need to build on the characteristics of a good storyline that will change behavior, which is:

- **Rooted in action**
- **Relatable and human**
- **Illustrates a journey**
- **Ends with a call to action**

C



Storytelling to start a movement — the snowball effect

Stories are the key to growing change. By telling big stories about the small things people have done to achive the higher goal, we will eventually reach the new standard.

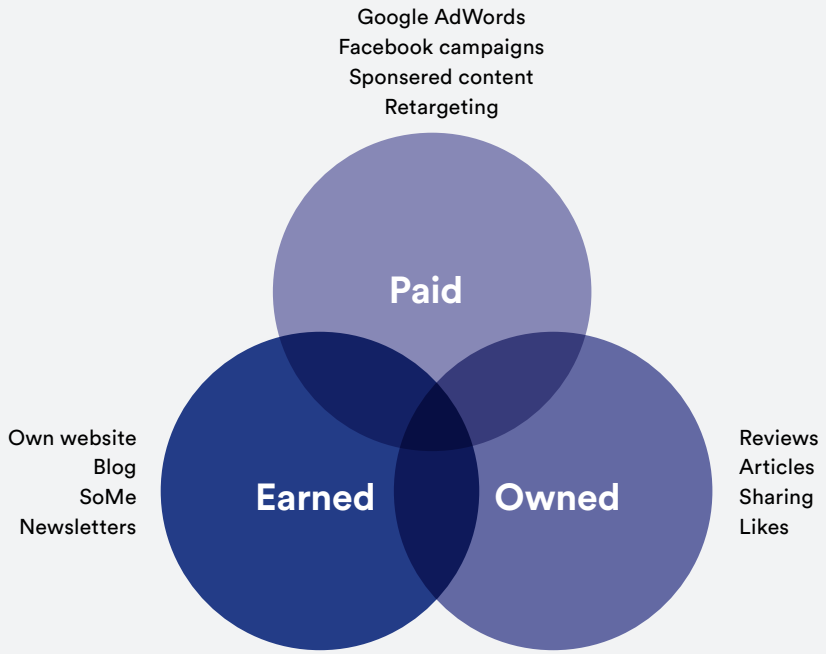
How to

First of all you need to identify and build a coalition and then build the storyline aimed for these people (see A+B on the opposite side). Then adress the following:

1. Who is your audience?
2. What does the audience value?
3. What should be remembered?
4. How should it feel?
5. Now write the story by using the framing tool (above)
6. Make several prototypes— and include naysayers and supporters to get feedback and support empowerment.
7. Change cannot happen without friction. To sustain the movement you need to identify structural conditions that need to change. The story needs continual adjustment as it is a process of change. Always keep an eye on each of the dimensions in the star — your coalition of users and stakeholders respond to changes so continually adjust framings to support a focus on the goal. (C)

MATERIALS: Big piece of paper, post-its, your computer and pens
TIME: 2 hours - 2 days

SOURCE: IDEO “Design by Change”, Tim Brown, 2015, www.desiugnkit.org and www.circulardesignguide.com



MEDIA TYPE	DEFINITION	EXAMPLES	THE ROLE	BENEFITS	CHALLENGES
Owned media	Channel & brand control	Website, mobile site, blog, twitter	Long-term relationships with customers and earned media	Control, Cost-efficient Versatility Niche audience	No guarante, Takes time to scale Trustworthiness
Paid media	Brand pays to leverage a channel	Display ads, paid search, sponsorship	A catalyst that feeds owned and create earned medias	In demand Immediacy Scale Control	In demand Immediacy Scale Control
Earned media	When customers become the channel	WOM, buzz, viral	An orchestrated result of a well-coordinated owned and paid media	Key role in most sale, Most credible	Key role in most sale, Most credible

POEM - Creating a communication strategy

Creating a flow with paid, owned and earned media is what is called Converged Media — an infused approach to communication strategy that is managed partly from a bottom-up and top-down perspective. Using this approach for a strategic, integrated marketing communications program can be extremely effective and powerful.

By mapping paid, owned and earned media a synergy of the channels will appear and this is highly useful in the attempt to build success in the way you reach the audience. An example of this is: You write a blog post and post it on your blog (Owned). Then you share a link to the blog post on Facebook and encourage your followers to like and share (Earned). To get the most visibility, make the post for a Facebook ad (Paid).

How to

1. What you need to be aware of when building an integrated converged media strategy is:

- How do these channels complement each other for the audience?
- What is the level of influence across a lifecycle for the receiver?
- What is the cost of investing in each of these channels?

Framework for evaluating ideas and making decisions:

2. You can use the table to outline your strategy.

MATERIALS: A paper and pen or your computer
TIME: 1 day

SOURCE: Forrester Research Inc. and Jenkins, H. & Deuze, M. (2008) “Convergence Culture”

1. MAKE IT EASY
- Harness the power of defaults. Make options for a new default.
- Reduce the 'hassle factor' by reducing efforts related to a service.
- Simplify messages.

2. MAKE IT ATTRACTIVE
- Attract attention.
- Design rewards and sanctions for maximum effect (e.g. Incentives).

3. MAKE IT SOCIAL
- Show that most people perform the desired behaviour.
- Use the power of networks.
- Encourage people to make a commitment to others.

4. MAKE IT TIMELY
- Prompt people when they are likely to be most receptive.
- Consider the immediate costs and benefits.
- Help people plan their response to events

Creating nudges

Once you have gained behavioral insights and mapped the pains and gains you can use this as a simple, pragmatic framework to help think about behaviour change.

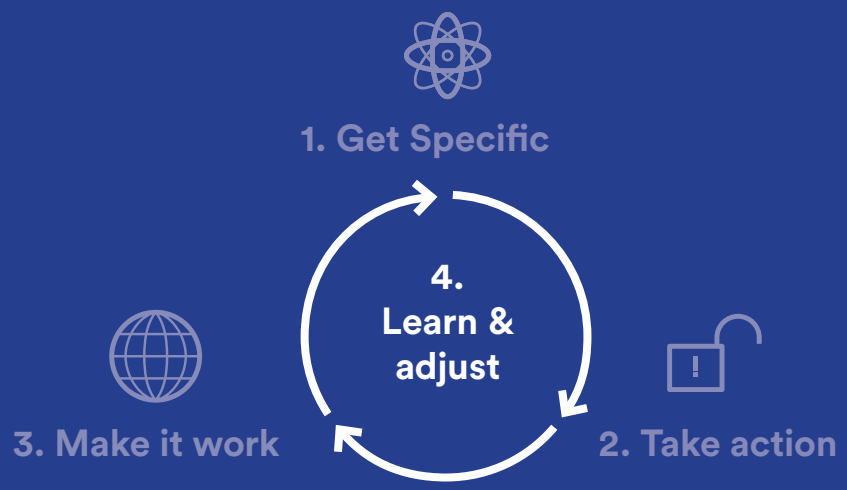
How to

The trick to encourage a new behavior is to make it Easy, Attractive, Social and Timely (EAST).

1. Start by defining what future behavior your users would have in the perfect world.
2. Examine the context that these users are in — make clear insights from a field study or a behavior map.
3. Work your way around each corner of the EAST-tool with your insights and get ideas in an iterative process.
4. Frame the nudge by collecting your ideas from each corner.
5. Make the intervention, test, learn and adapt to it.

MATERIALS: A4-paper (use each corner) and pens
TIME: 5 X 15 mins (15 mins for each corner and 15 mins to brainstorm nudges).

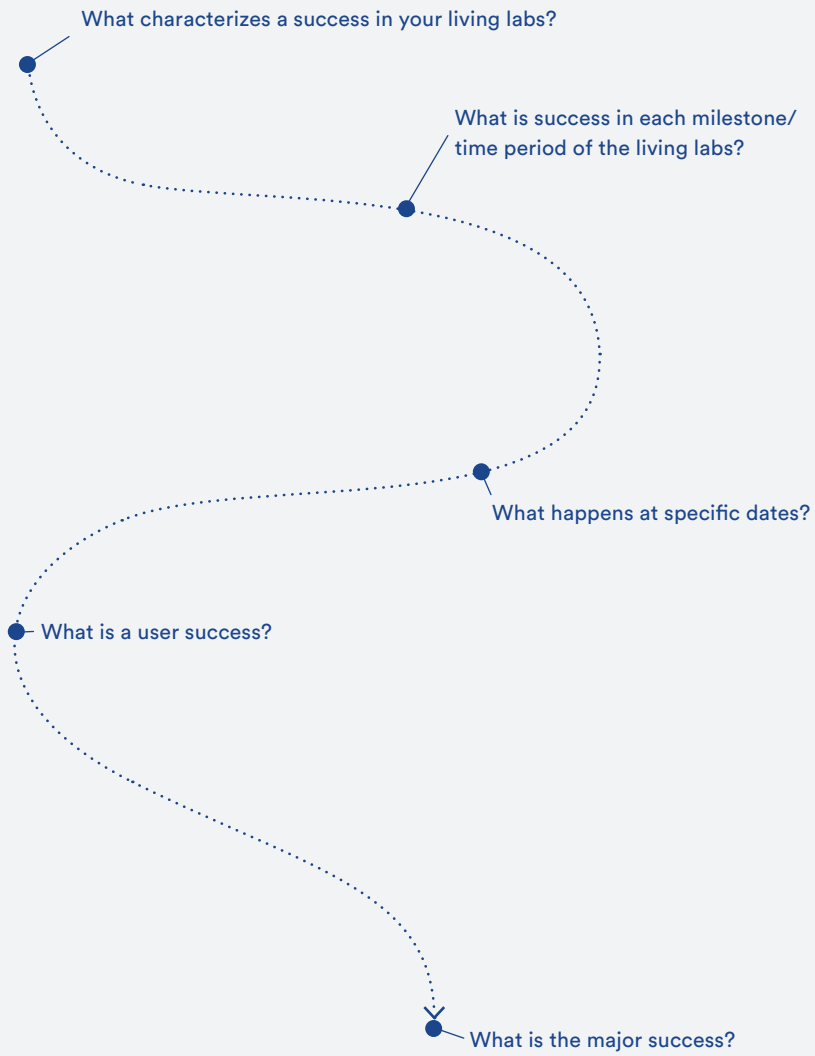
SOURCE: Behavioral Insights Team,
Se more at: www.behaviouralinsights.co.uk



4. Learn & adjust

Essentially when the Living Labs are up and running you must learn from what you test. Here is a range of tools — not listed in any hierarchic way — you can use in a Living Lab to learn and adjust from.

- Define success
- Set benchmarks
- Easen the behavior according to the change
- CREATE
- Evaluate with 10 heuristics
- Behavior mapping over time
- The growth model



Define success

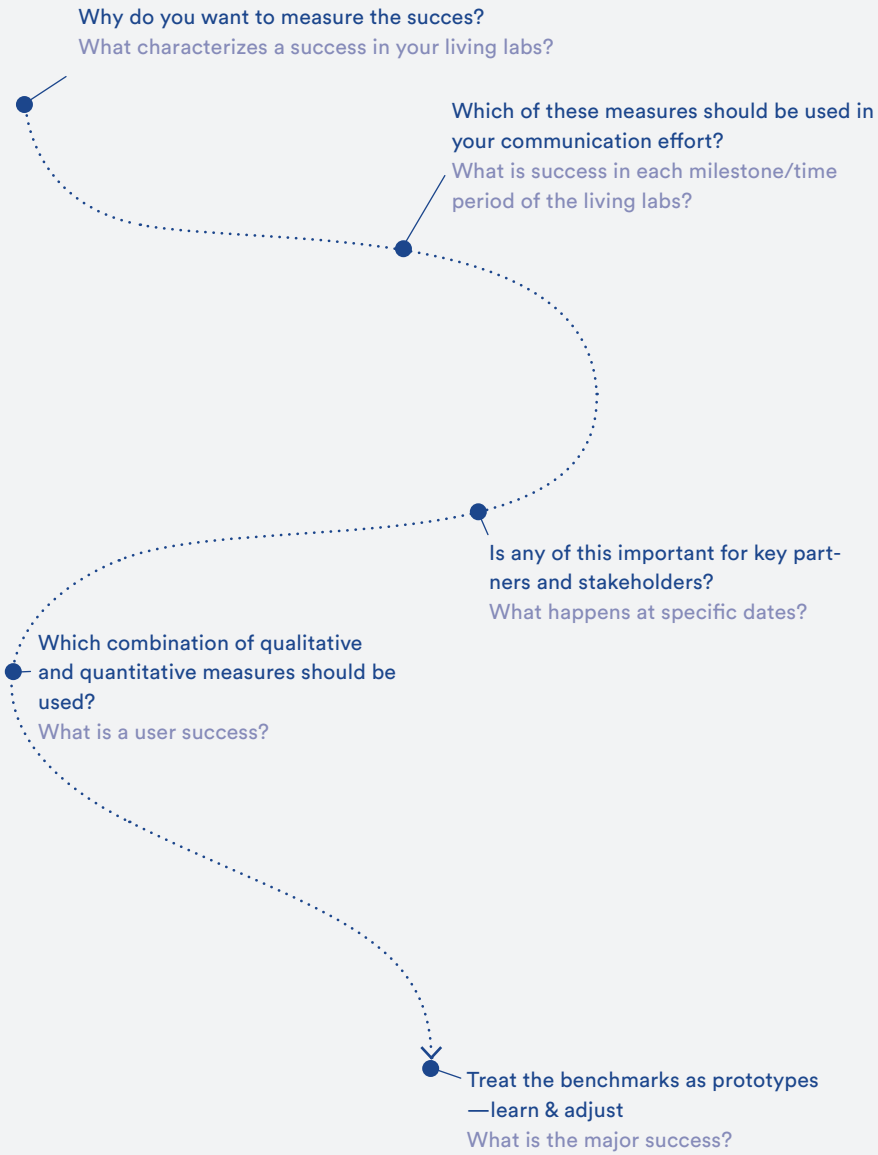
Define together with the team what success is. Identifying key milestones will keep you on track on your way to success.

How to

1. What does success look like? Is it that all people sort the waste or is it that all wastebins get picked up? Define the success by asking “How might it...” to these scenarios.
2. Include your roadmap and define what a success is in each big milestone.
3. What does this mean for specific dates? Plan — and adjust living labs — to make sure you stay on target.
4. Have a look at the successes from various perspectives — use the 6-star-model for growing change (from the ‘Make it work’-chapter).
5. How do people you include in the Living Labs define success?
6. Ask these questions to be able to identify the ups and downs in your project.

MATERIALS: A roadmap and milestones + pens
TIME: 3 hours

SOURCE: www.designkit.org



Set benchmarks

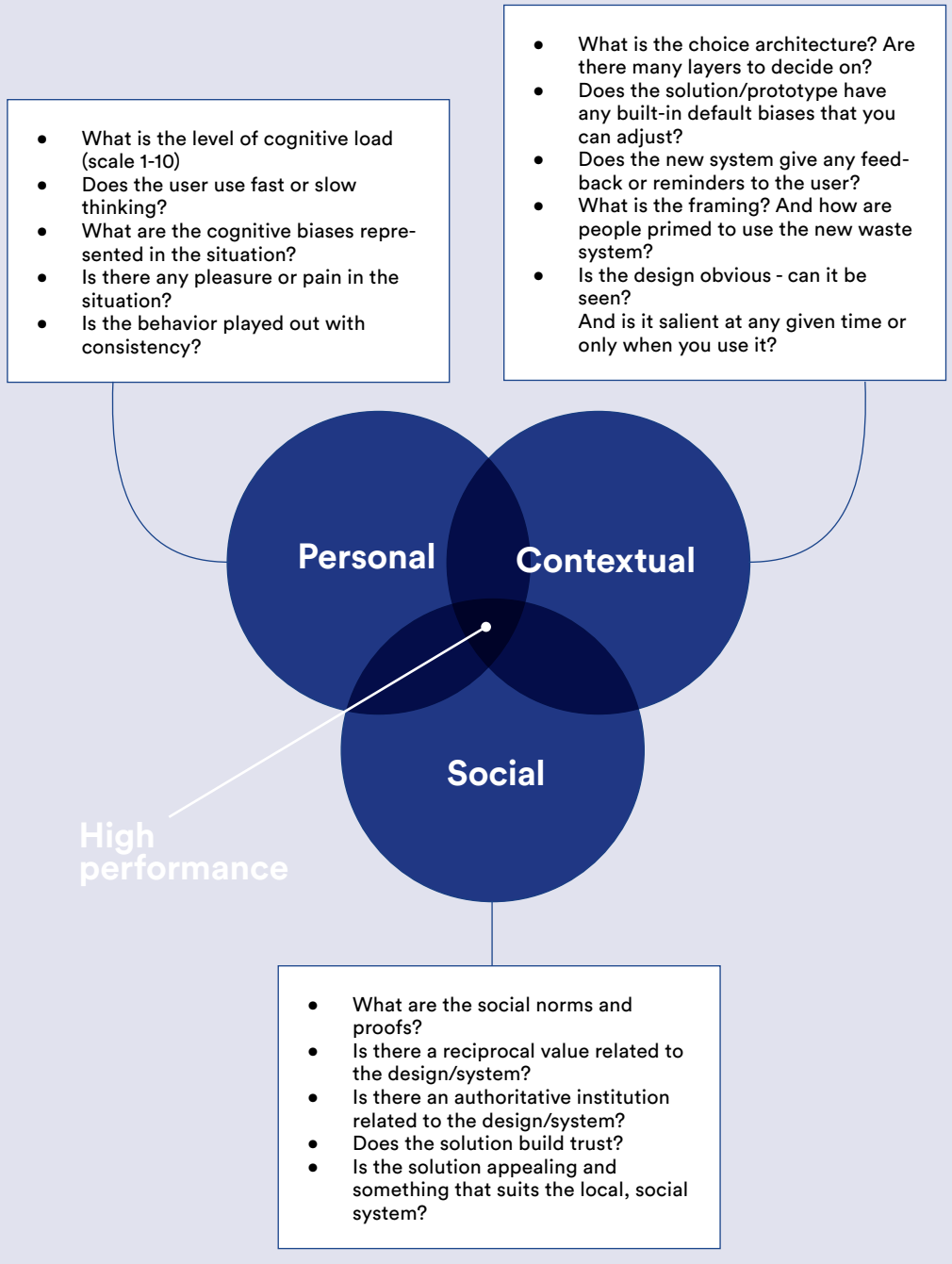
Define together with the team what success is. Identifying key milestones will keep you on track on your way to success.

How to

1. Specify the reason why you need to measure and evaluate the Living Labs. Is it because the waste handling service must be more responsive? Is it to identify pains among the users? Or is it to communicate impact?
2. Key partners and stakeholders might have an interest in setting benchmarks as it might be useful to either adjust, learn or use the insight for communication.
3. Measures can potentially come from qualitative studies in the Living Labs focusing on experiences, and quantitative studies in the Living Labs focusing more on usage and waste handling.
4. Essentially your measurements in Living Labs should be treated as prototypes. The business model must be adjusted accordingly to the information coming in — this way you can tune in on maximum impact.

MATERIALS: A roadmap and milestones + pens
TIME: 3 hours

SOURCE: www.designkit.org



Easen the behavior according to the change

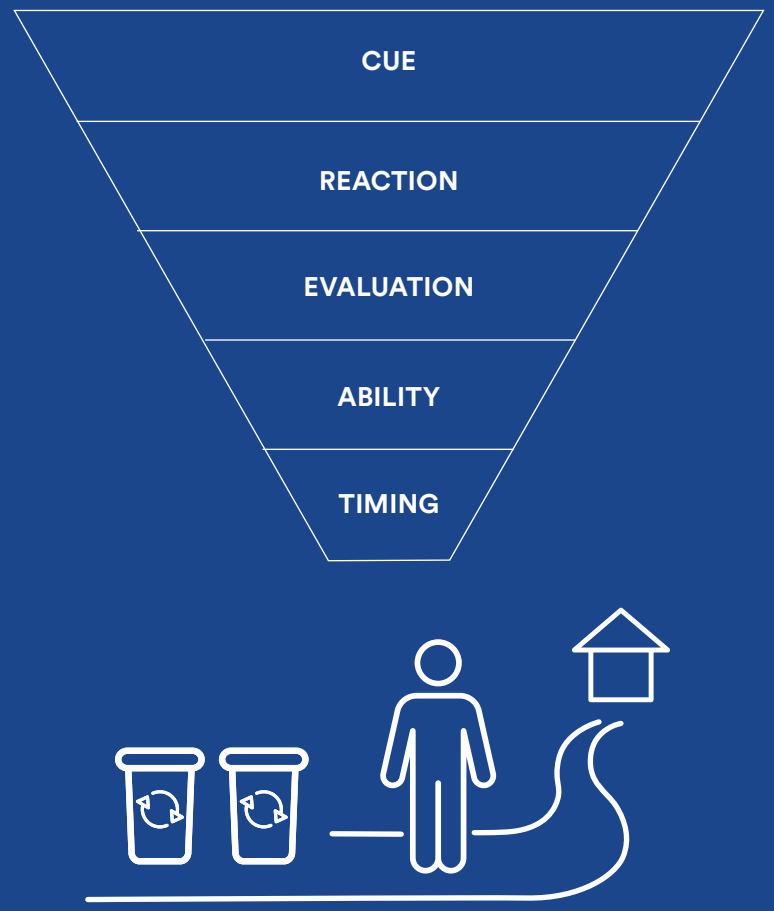
Giving shape and meaning to an innovative solution and putting it into practice is a complicated process to land. This tool will ease the usability of your designed solution and help you understand where your design is going and what should be adjusted in the people perspective so that the interaction is performed with ease. It will make sense to set up nudges after having identified behavioral obstacles and feasibilities with this tool (opposite side):

How to

1. Use the following check-list (to the left) to identify behavioral obstacles within these three dimenstions:
   - Individual factors
   - Social factors
   - Contextual factors
2. Map it out in a suitable way to identify painpoints that need your attention
3. Act and adjust

MATERIALS: A paper and pen or your computer
TIME: 1 day

SOURCE: Forrester Research Inc.



CUE
A cue activates attention. A cue activates the mind to e.g. go running. It could be an image, a push notification, a bill to your work-out studio could cue you to think about running.

REACTION
Once you are cued with something, the mind will react on it automatically as intuition or from an emotional response. What does your users think about waste? Is it smelly or is it a valuable ressource?

EVALUATION
Now the mind does a fast cost-benefit-analysis of weather or not to actually do something. How hard will it be to perform the action? what's the value that the user gets out of it? Is it a waste of time sorting the waste? Etc.

ABILITY
The user must be able to know logically what to do and how to do it in order to have self-confidence in doing it. Clear and recognizable affordances built into the scenario will underpin the ability to perform.

TIMING
There must be a reson to do it here and now instead of in the future. Some kind of urgency and/or flow is essential to build in to the future system

C·R·E·A·T·E

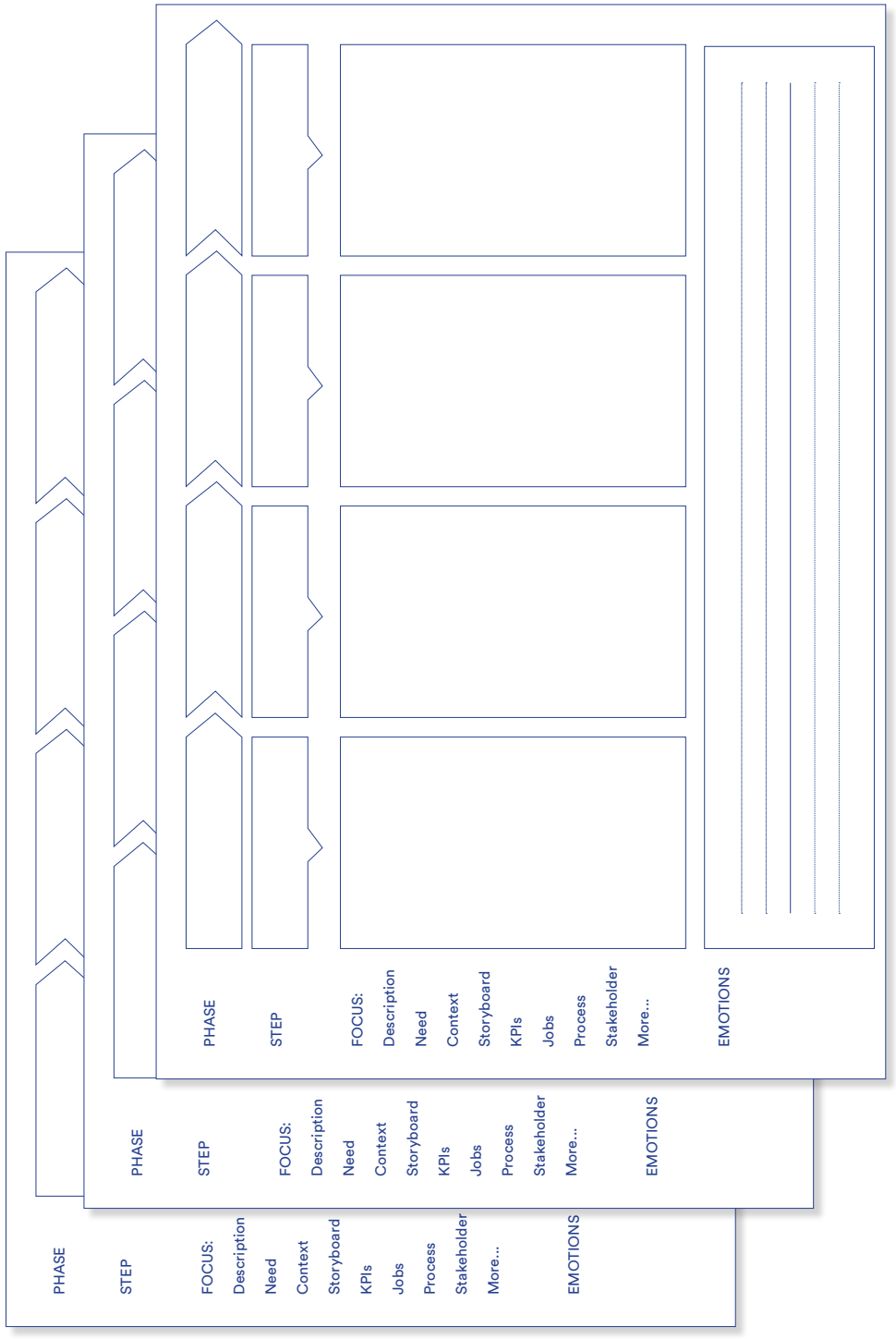
A good design enables users to act with ease and convenience. Using the funnel to CREATE you will have a backbone of designing a suitable choice-architecture surrounding your users. By applying the CREATE tool you will end up helping your users take action.

How to

1. There are five preconditions for taking action (see opposite)
2. Any action must pass these preconditions to take action — so you can think of them as a test that you can apply to your prototype.
3. The funnel to CREATE action is leaky and you will have to include and solve all the obstacles that can cause the poor condition of not beeing noticed. This means there must be a clear call to action, some kind of urgency connected to the usage, and build up of a confidence to act, whenever needed.
4. If the prototypes are not working it is because there are holes in the funnel that you need to plug.

MATERIALS: Some paper and a pen
TIME: 2 hours — preferably in the context with the prototype

SOURCE: S. Wendell (2013) "Designing for behavior change" and www.uxmag.com

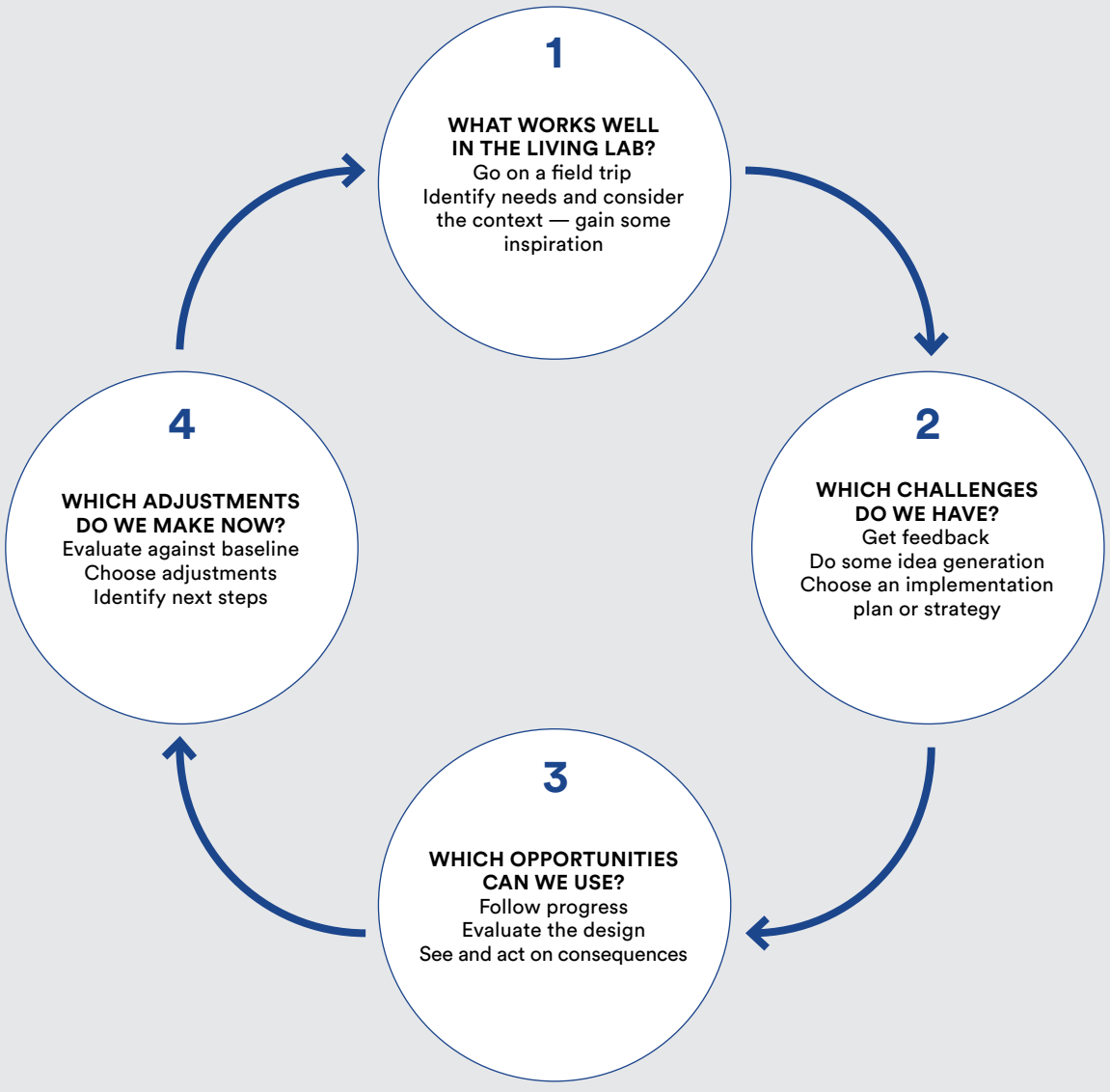


Behavior mapping over time — identify learnings

To keep track of the usage and to identify which pains and gains are experienced, a mapping over time is an easy way to pinpoint a relevant focus to be addressed.

How to

1. Start by selecting phases and steps you find essential to monitor.
2. Create a suitable baseline-map and make sure you have it filled in from the beginning.
3. Along the way and during the timeperiod of the living labs, make behavior map according to your milestones and benchmarkings. Filter out the learnings and use these maps to adjust for better usage of the future design that is beeing tested.



Establishing a learning loop to grow

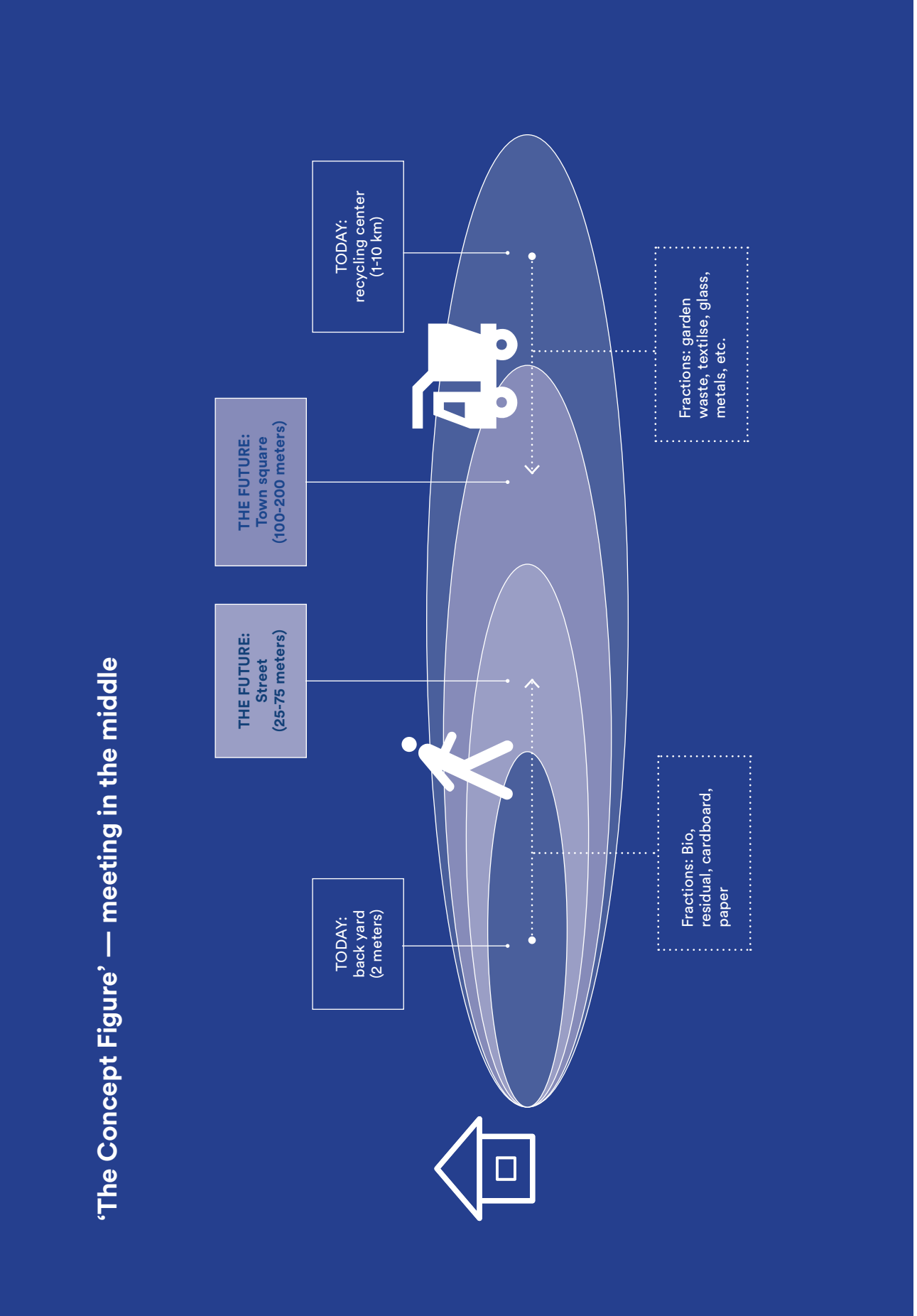
While testing the prototypes and during the timeperiod of the functioning Living Labs ideally your waste management system should learn and adjust from the users and usage of the prototypes.

How to

1. Collect a baseline that you can grow from
2. Collect stories and insights from field studies to the sites where the prototypes unfold. Do they suit the context? Are there any unmet needs? Ask yourself “what works well in the living labs?”
3. Include the users and prioritise to get feedback and open up for generating ideas on how to solve possible obstacles. Ask: “which challenges do we have?”. Iterate a bit on the incoming suggestions and develop new implementations.
4. Follow the progress and ask “which opportunities can we use?”. Evaluate with the team and look for consequences that might fall out to your advantage.
5. Evaluate and include ROI. “Which adjustments do we make here and now?”. Make your learnings clear by measuring your insights to the baseline. Then identify new challenges.

MATERIALS: A paper and pen and some coloured cards to make it visual
TIME: 3 hour workshop/meeting

SOURCE: Inspired by DYI toolkit, www.diytoolkit.org/tools/learning-loop/ and Attractor (Mannaz).



The Living Labs in Bornholm

On Bornholm three Living Labs will be set up on the locations, Pedersker, Gudhjem/ Melsted and Rønne.

Pedersker
(GPS coordinates: 55°1’50.3”N 14°59’34.1”E)
Pedersker is a smaller countryside town with 242 inhabitants (2018). The dwellings are comprised of individual houses built from the 1900’s to 1970’s spread over a geographic area of approximately 17 hectars.

The plan is to include two different street sections with approximately 10 houses each to test the street stations shared collection points of household waste.

Additionally, as part of the Pedersker Living Lab, a local recycling centre will be established in an abandoned building next to the towns only grocery shop that will be open for all of the residents in the area. The recycling centre is already under development and will also include a range of other green transitioning activities to make Pedersker a sustainable community.

Gudhjem/Melsted
(GPS coordinates: 55°12’31.3”N 14°58’14.4”E)
Gudhjem and the adjoining town Melsted together comprise a town area located by the east coast of Bornholm with approximately 749 citizens (2019), 409 households and 124 holiday homes.

Gudhjem and Melsted are old fishery-towns characterised by narrow and steep streets. Gudhjem is often referred to as one of Denmark’s only “mountain towns” due to its steep elevations (several streets with slopes of more than 20%). The two towns together cover an area of approximately 85 hectares.

The plan for the living lab is to include two different street sections, one in Gudhjem and one in Melsted with approximately 10 houses each to test the street stations with shared collection points for household waste.

Rønne / Bo42
(GPS coordinates: 55°6’49.9”N 14°42’31.5”E)
In Rønne, the main town of Bornholm, a Living Lab will be established in the social housing association Bo42 that comprises a neighbourhood of approximately 800 apartments. The area is made up by a series of “classical” 3-floor apartment complex’s built in the 1960’s and 1970’s. The red brick-buildings are placed in a green area with grass and bushes in between and con-

nected with walking paths. Cars are parked in shared parking spaces. The BO42 area in Rønne covers an area of approximately 10 hectares in total.

The plan for the Rønne Living Lab is to include apartments in 2-4 stairways to test equipment for increased sorting with a special focus on food waste.

Household waste fractions in the living lab test projects

The focus area of the living labs will be for participating households to sort minimum 7 waste fractions. The minimum number of waste fractions include: food, glass, metal, paper, cardboard, plastic, wood and residual waste. Additional waste fractions might be added such as textiles, different types of plastics, cork, ceramics, light bulbs, electronics and other specialty fractions. Defining and testing sorting of additional waste fractions will be part of the Living Lab development process to explore together with household participants.

Principles for a new household waste collection system on Bornholm

The three living labs in Bornholm will test ambitious sorting schemes for household waste including a complete redesign of the collection logistics. The principles of the planned waste system are summed up in 'the concept figure' on the previous page and comprise two major changes compared to the way things are done today. In the current solution, household waste is collected at the doorstep of individual households and the primary shared collection point for additional fractions would be one of the island's six recycling centres. This will be challenged in the tests.

Introducing shared and decentralised waste collection solutions

With the Bornholm living labs, the approach to be tested involves moving primary fractions of household waste (food and residual waste) from the individual parcel to a shared street collection point up to maximum 50 meters from each house each covering 5-15 households. Defining the optimal range will be a key part of the living lab tests. This will be supplemented by a local recycling centre where waste items that previously might be needed to be brought to one of the island's six central recycling facilities.

Reduced costs and energy usage from changed emptying schemes

The key idea behind the scheme is to address the economic and environmental effects from transportation and emptying of bins at individual house hold level. This effort is estimated to take up +75% of costs under the current Bornholm waste system.

A solution that fits narrow roads and medieval town areas

A significant reason behind the suggested system is to get rid of the many bins at each household, which especially when placed on the street create a messy atmosphere. In some of the older towns of the island with smaller streets as well as steep slopes, it is even considered practically impossible to place containers at the street level.

Also, the idea is to anticipate and prepare for a higher number of special fractions in the future, as demands for detailed sorting might rise in the future, making the challenge of individual solutions even greater.

Creating better working conditions for renovation staff

From the perspective of garbage collectors a solution with shared containers in the street will also provide a much-needed improved working environment. This is compared to today's situation where garbage has to be carried from backdoors, garages and up and down steps manually by the staff.

Strengthening local recycling

A core idea of the Living Labs is to introduce a more dynamic type of local recycling centre closer physically and mentally to users, aiming for a higher degree of reuse, repair and upcycling before entering the traditional waste stream. Whether this can also contribute to indirect positive environmental effects from reduced individual car transport to the island's central recycling stations will be studied in the test project.

Focus points and design openings related to Bornholm Living Labs

The three complimenting Living Labs on Bornholm will be structured with the following targeted focus points for designing and testing new solutions: (see next page)

Focus point 1: Waste sorting in the home

Objectives: Participating households should sort minimum 7 waste fractions in their homes. The minimum waste fractions include: food, glass, metal, paper, cardboard, plastic, wood and residual waste. Additional waste fractions might be added such as textiles, different types of plastics, cork, ceramics and more. This will be part of the development process to clarify together with users. In order to sort these different fractions in an efficient and convenient manner different ways of handling the waste in the household will be tested with users.

Challenge: For many households trash collection and sorting inside in the home is treated as something that should be invisible and hidden away under a cupboard or desk-table top. This might easily result in flawed sorting and less amounts of the more specialized waste fractions. The hiding solutions lack convenience and ease of use, while the out-of-sight approach make some people forget. Additionally many households are short of space. Techniques for sorting food waste in the home will receive special attention to resolve issues related to possible smelling and greasy handling.

Design openings: Can the use of special gear and communication to make waste sorting in the home visible increase awareness; make it more user-friendly and aesthetic? Can rainproof sorting equipment placed outdoors in a garage or entrance for households with limited indoor space be used? What approaches can make handling of food waste easier? How can participating households collaborate, create shared solutions and support each other in their street waste micro community?

Focus point 2: Solutions for users to bring waste to collection stations

Objectives: The living labs should come up with solutions that support users in handling and moving their waste from household level to a) the shared containers in the street stations 10-50 meters from their parcel and b) the local recycling centre.

‘
‘

Challenge: Some citizens are uncomfortable handling their waste in public spaces especially when it comes to food and residual waste. Waste handling can be perceived as a “dirty job” with a possible reluctance towards showing one’s garbage publicly.

Design openings: Can special gear and carrier solutions be designed to make waste carrying in the public space a positive experience such as trolley-based bins, bike baskets or containers that fit in the car trunk or a trailer? Can “drive-through” solutions be applied that supports people in flow? Can communication support the action, including nudges that motivate taking the steps out on the street?

Focus point 3: Design of street stations with containers in the public space

Objectives: New waste containers should be designed for the street stations to collect food waste and residual waste. The containers should be small in size and enable a frequent emptying schedule to avoid possible problems with smell.

Challenge: Placing public collection bins on streets and squares might cause opposition from neighbours and local population due to visual disturbance, noise and problems with smell plus aesthetics disturbance in the public space. How can the living labs ensure that the physical prototypes become accepted?

Design opening: Could the project include a professional design contest to work with the technical and functional aspects as well as the visual design for a street based collection system? Could public space cubes be used as signage and communication towards users?

Focus point 4: Design of vehicles for emptying public collection containers

Objectives: A collection vehicle suitable for emptying street station shared containers needs to be designed or identified. The solution should include food waste and residual waste and be matched to the containers’ design – in particular the expected characteristics being small in size and with a frequent emptying schedule to avoid problems with smell.

Challenge: Existing, traditional waste trucks are too large for a frequent and local collection scheme. This calls for developing a prototype of a small collection vehicle.

Design openings: Could small self-driving collection vehicles be applied that circulate and empty bins on an on-going basis? Instead of vehicles, could an option of using suction systems with pipes to a central container be explored as a radical alternative?

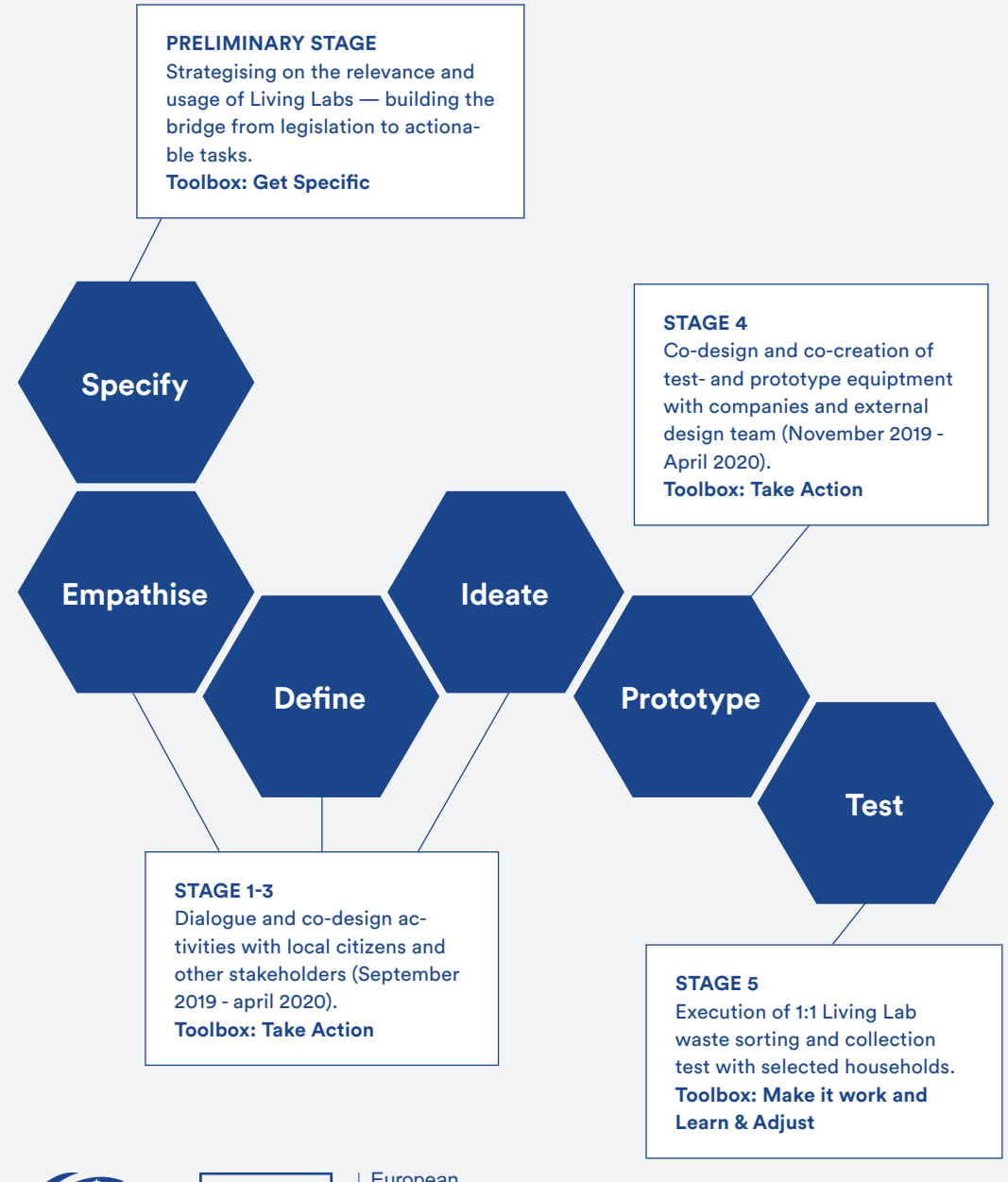
Focus point 5: Design of local recycling centre

Objectives: A local recycling centre will be designed, established and tested in the Pedersker living lab on Bornholm.

Challenges: How can the design of a local recycling centre be fitted to and support the local communities, volunteers, local shops and other stakeholders that will be part of organising and running the place? Which incentives and design parameters can be used to motivate citizens to use the recycling centre?

Design opening: There will be worked on ways to use “gamification” and positive “competition” among local citizens to get involved in the sorting efforts at the recycling centre. Different types of monetary incentives might be included such as deposit fees on different waste streams including metal, paper, sorted plastic and alike.

Timeline



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EUROPEAN UNION
European Regional Development Fund

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