

EXECUTIVE SUMMARY Part II: (Re)design for Change

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Proeftuin Circulair Bouwen

Editorial details

This paper summarises the results of the second sub-task within the Circular Building Living Lab. It comprises an introduction, the approach and conclusions of the assignment described in three parts: a systemic view, practical tools, and recommendations with regard to practice and policy.

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1. Introduction

The Circular Construction Living Lab

With a view to developing a new policy programme for 2022–2030 containing short- and medium-term goals for further evolving towards a Circular Construction practice, the establishment of the Circular Construction Living Lab was commissioned by the Public Waste Agency of Flanders (OVAM) and Circular Flanders. The purpose of this Living Lab, in parallel with the Green Deal on Circular Construction, is to make **policy and practice recommendations based on substantiated practical experiences and research findings**. Since 'Circular Construction' is a broad concept, the task was split into two sub-assignments, with the first two years focused on 'Urban Mining' and the subsequent two years on 'Design and redesign of buildings for change'. The consortium, consisting of the Flemish Institute for Technological Research (VITO), Buildwise (formerly BBRI), Hasselt University (UHasselt), and Vrije Universiteit Brussel (VUB), supported by Datavisser, devoted itself to this task.

In this paper, we summarise how the Living Lab approached this second sub-task from three pillars, how a systemic view informed the research, and what results it produced.

As 'Design for Change' is a relatively new topic within the built environment a proper definition is helpful to read the next paragraphs. According to the explorative study [“Design for Change: Development of a policy and transitional framework”](#), commissioned by OVAM in 2015, Design for change is to be understood as:

“a design and construction strategy that acknowledges our continuously changing requirements and aspirations for the built environment. The aim of Design for Change is to create buildings that support change more efficiently and effectively.”

Because this design and construction strategy applies to both new construction and refurbishment of buildings and building elements, in the text below we sometimes refer to '(re)design of buildings and building elements for change'.

Approach: Two sub-tasks and three pillars

The Living Lab joined two perspectives of Circular Construction. The **first sub-task** involved studying the topic of **Urban Mining** closely. With current construction and demolition practices as the starting point, it explored how Urban Mining as a concept and term can be better adopted in the construction industry and how all costs and benefits can be (re)distributed within the value chain to recover building materials for new high-value building applications. This sub-task was completed in 2021 and the results were summarised here. In the **second sub-task**, the Living Lab focused mainly on unravelling the opportunities and obstacles that (re)design for change has to offer regarding circular economy, focusing on three perspectives: change-orientated building solutions, circular business models, and the role of (local) governments.

A Living Lab is intended to provide the space to 'learn by doing' and to 'do by learning'. Both sub-tasks were therefore structured according to **three pillars**, as shown in Figure 1:

- **(Construction) projects and demolition sites**
Relevant data were collected and lessons learned from real-life experiments with and by parties from the construction and demolition sector that are useful for practice and policy.
- **Research programme**
Specific research questions were linked and investigated based on data from experiments of sites and projects.
- **Compass group & theme-based sessions**
Lessons learned from the experiments and research were tested with some key figures within the policy and practice community. Shared practical experiences were used as a basis for a systemic view of current construction and demolition activities.



Figure 1: The organisational chart of the Living Lab with 3 pillars: research, experiments and Compass Group.

In order to arrive at recommendations for the sector and policy that contribute to an acceleration of (re)design for change in Flanders, the Living Lab devoted its full attention to the above three pillars. Where the transition experiments compelled implementers to make difficult choices (e.g. implementation of a specific business model, choice of a particular technological solution, or implementation of a particular procurement formula), the research group was able to further analyse, compare, and derive broadly applicable advice from different solutions through desk research, regardless of practical constraints. On the other hand, the experiments also ensured that the research did not remain tied up in theoretical models and that the results were sufficiently attuned to concrete real-world needs. Finally, the Compass group allowed for 'zooming out' and critical thinking at appropriate times.

Research programme – sub-task 2: buildings (re)designed for change

The research programme on (re)design for change focuses on three key perspectives:

TECHNICAL

- How can the uncertainties regarding technical performance and guarantees of buildings and building elements (re)designed for change be eliminated?
- What does it take to inspire and guide designers and implementers in their application?
- How can building professionals justify their choices for these building solutions; why should they choose them?

REQUIREMENT FROM PRACTICE: Tools that allow construction professionals to confidently implement technical solutions successfully in practice.

BUSINESS

- How to establish collaborations to take circular business models to the next level?
- What risks and opportunities should be considered when financing circular products/services and building projects?
- What legal arrangements need to be made to fairly divide responsibilities?

REQUIREMENT FROM PRACTICE: A practical overview that allows successful circular business models to broaden and scale up with attention to concrete preconditions for fruitful collaborations.

AUTHORITIES

- How can authorities address lowest price as being the main award criterion through public procurement?
- How can an authority still outsource to a circular product/service provider that has a unique market position without creating market distortion?
- How can principals for the construction or renovation of public buildings be specifically encouraged to adopt (re)design for change concepts?

REQUIREMENT FROM PRACTICE: Overview that guides (local) authorities regarding the different roles they can take up to accelerate (re)design for change innovation and legal answers to frequently asked questions in public procurement of circular projects.

50 experiments followed up

The researchers followed up on a wide selection of projects from the Targeted Call for the Circular Construction Economy. These are (unlike the demolition sites within sub-task 1) not always actual construction projects, but transition projects that seek to eliminate systemic barriers through alternative circular construction practices, tools, try-outs in projects, and companies.

In addition to individual follow-up of these projects, the research group also facilitated knowledge exchange meetings over the duration of these projects (2021-2022) and Communities of Practice (CoPs) during the 'action days' of the Green Deal on Circular Construction (GDCC). During these meetings, the research group ensured **maximum connection and knowledge exchange** between the projects themselves and the research programme. As a result, many projects shared experiences, built knowledge together and were able to take steps in the right direction.

Compass group to zoom out

The Compass Group is a transdisciplinary arena where experts share insights and information concerning construction and demolition. The financial and legal communities, knowledge institutions and NGOs are also on board. This group consists of frontrunners (who play an active role in the transition), innovators (who want to share innovative visions) and bridge builders (who can facilitate and accelerate implementation).

During the first phase of the Living Lab, the Compass Group primarily helped to **identify key systemic barriers** (see also later in this document) and the levers needed to initiate and accelerate change towards a desired resilient built environment. In the second sub-task, the Compass Group was primarily used to collaboratively define one or more innovative approaches to phase out unsustainable linear practices and accelerate 'regenerative' circular practices, as well as to consider how to close the gap between ongoing initiatives and ambitious long-term goals. These moments of reflection helped towards **formulating recommendations** for practice and policy.

2.A systematic view

The construction and demolition sector is complicated and complex

Buildings consist of a variety of materials, products and building elements. Each physical component has its own individuality (e.g. technical performance and life time) and is involved in many processes (design, construction, maintenance, refurbishment, demolition, waste processing, etc.). Each process involves many different actors (building owners, users, investors, architects, engineers, manufacturers, suppliers, construction and demolition contractors, waste sorters, waste processors, building managers and so on). In addition, buildings, building products and waste from construction and demolition processes must comply with several more sets of regulations, guidelines and standards.

Consequently, many laymen and even professionals see the construction and demolition world as incomprehensible. Therefore, the set of parameters and interconnections between physical building components and the underlying processes and rules are highly complex. The external world is not unchanging either. Valid approaches of the past can have the opposite effect today if the changing context and environment are not taken into account. If the full benefits of a circular construction economy are to be realised, the construction and demolition world will have to continue to be viewed as a **complex system in a state of flux!** Systems thinking may help in this regard.

Systemic barriers unravelled

Systems thinking often involves observing events or data, identifying patterns of behaviour over time, and unpicking the underlying structures that drive these events and patterns. This form of observation is illustrated in Figure 2 by the '**systemic iceberg**', where a systems thinker will also search 'below the waterline' for patterns, structures, and mental models. This easily accessible **systems analysis technique** was used to cluster personal experiences and insights of Compass members regarding common practices. Key **systemic barriers** were identified on this basis.

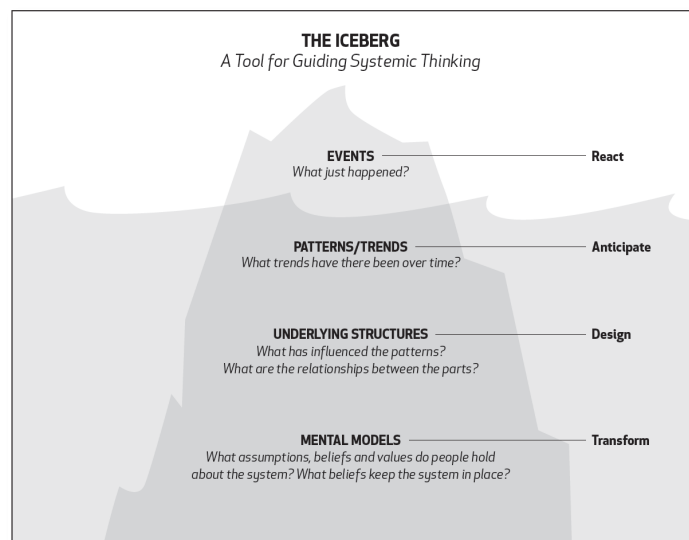


Figure 2: Systemic iceberg, source: jenal.org

Systemic barriers for (re)design of change

As was the case for the first sub-task on Urban Mining, several systemic barriers are observed that explain why both the demand for and uptake of building solutions (re)designed for change is still low in Belgium and Flanders. If we want to accelerate the transition to a circular construction economy, we will need to address systemic barriers profoundly. These barriers are described in detail in "Recommendations on building solutions (re)designed for change". We summarize them below (see also diagram in Figure 3):

Systemic barriers concerning the limited demand for building solutions (re)designed for change.

- Principals, investors and users are often **unaware of the long-term consequences** of building and renovation solutions.
- However, **total cost of ownership (TCO) and environmental impact analyses** are rarely considered when selecting technical building solutions or related business models.
- The focus of building clients and investors is still on the **initial cost** of building and renovation solutions.
- **The financial returns** of building solutions (re)designed for change are often only achieved **in the long term**, for example when the building is altered or when building elements and building products are replaced.

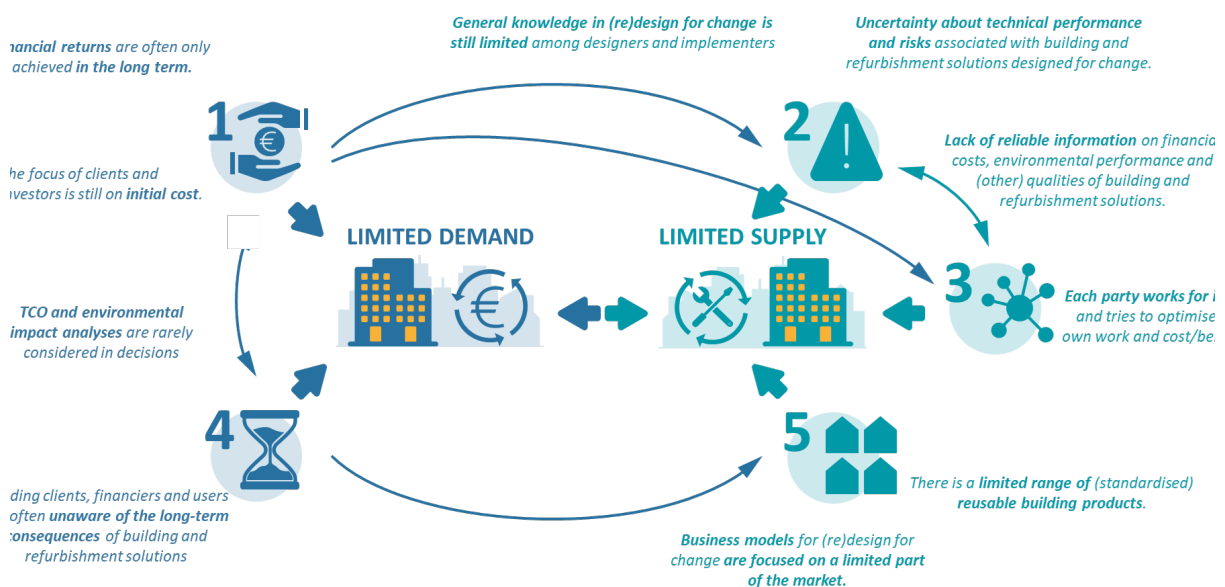


Figure 3: Diagram of systemic barriers of building solutions (re)designed for change.

Systemic barriers concerning the limited uptake of building solutions (re)designed for change

- **General knowledge** of (re)design for change is **still limited** among designers and contractors.
- **Uncertainty concerning technical performance and risks** associated with building solutions (re)designed for change.
- **Absence of reliable (life cycle) information** regarding financial costs, environmental performance and (other) qualities of building and refurbishment solutions.
- **Each party works for itself** and tries to optimise its own work and cost/benefit.
- There is a **limited range** of (standardised) reusable building products.
- **Business models** for (re)design for change are focused on a **limited section of the market**.

Some of these barriers are rather practical in nature (e.g. lack of clarity on technical performance and risks associated with change-orientated building and renovation solutions) and were linked to the

research issues within the Living Lab, meaning that it was possible to translate potential solutions into **practical tools** that the sector can start working with immediately.

Others are found at the level of mental models (e.g. the focus of building clients and investors is still on the initial cost of building and renovation solutions). A longer and intensive process is needed to eliminate these barriers. The Living Lab offers strategies and specific measures to address these sticking points through **recommendations for practice and policy**.

3. Practical tools

In the second sub-task of the Circular Construction Living Lab, the research group focused mainly on unravelling the opportunities and obstacles that (re)design for change has to offer regarding circular economy. Insights into this were gained from experiments within the targeted-call projects and the supporting research programme, focusing on **three themes**:

- Effectiveness and feasibility of technical solutions for building and building elements (re)designed for change
- Collaboration for circular business models
- Authorities as an accelerator for circular innovation within the construction industry

These insights were translated into **four tools** (only available in Dutch) for building and renovation practice and local policy:

1. [Circular Construction practice guide – Applying innovative solutions with confidence](#)
2. [Circular procurement guide – Legal FAQs](#)
3. [Circular business models guide – Creating synergies for Circular Construction](#)
4. [Policy matrix on Circular Construction – Inspiring actions for local governments.](#)

The four practical tools (see Figure 4) are not intended to be exhaustive. They translate current questions and needs from practice and invite parties to **engage with them**. Therefore, we invite stakeholders to test out the 'tools' in different contexts and add new questions and (partial) answers to help others move through the process. The practical tools address specific target groups, with targeted recommendations, tools and inspiring cases to make it easier to **move from theory to practice**.



Figure 3: Presentation of the four practical tools (only available in Dutch)

1. Circular Construction practice guide – Applying innovative solutions with confidence

In the [Circular Construction practice guide](#), we bring together key lessons learned from the experiments of the '[Targeted Call](#)' to answer the question: **How can innovative solutions be applied with confidence?** It is logical to distrust innovative circular solutions at first. They raise many questions. Can the information and claims of the producers be trusted? Are they technically reliable? Does the system have a BENOR inspection label or national or European Technical Assessment (ATG or ETA)? And if not, is it safe to use?

This guide provides recommendations on putting innovative Circular Construction solutions into practice, structured according to the key questions being asked, focusing on each of the actors involved: **building client, designer, producer and contractor**. The guide intentionally does not specifically target any one of these target groups, but provides recommendations for each of them on what they themselves can do to put circular innovation into practice. However, more importantly, this guide also provides insights into what the other actors need to do this. It brings together the needs and opportunities for more effective adoption of circular solutions in practice and **points each of the actors to the role they can play in it**.

2. Circular procurement guide – Legal FAQs

The transition to a circular economy in the construction industry requires efforts from both consumers and manufacturers. There are already a huge number of elements worth exploring from the consumer perspective, such as product-service models, ownership aspects, and economic ways to encourage circular consumption. However, this part of the work of the Circular Construction Living Lab focuses on the largest consumer of all: **contracting authorities**. Authorities in the European Union spend some 14% of their GDP annually on public procurement. In 2021, as much as 65% of all Belgian public contracts were related to building and renovation activities.

The theoretical research conducted, the followed-up projects within the targeted call, and the discussions during the Communities of Practice (CoPs) at the action days of the Circular Construction Green Deal on Circular Construction show that there are still many legal issues regarding the implementation of circularity in the context of public procurement for building contracts. However, the applicable legislation already provides a number of tools to get started in a circular way. Therefore, common questions and answers were compiled into a set of [legal FAQs](#) in an effort to clarify issues in a clear and accessible way, in such a way that (local) contracting authorities can and dare to take new steps to fulfil the circular goals of their construction projects. The FAQs currently compile **eleven questions (and answers)** divided according to the three stages of a public contract: (1) **preparation**, (2) **procurement** and (3) **execution**. The FAQs are always based on a contract in the traditional sectors and does not take into account specific regulations relating to concessions, for example.

3. Circular business models guide – Creating synergies for Circular Construction

Whereas in the linear built environment, a business model usually starts from generating financial value for one organisation, a circular built environment requires collaboration between several players across the value network. The [Circular Business Models Guide](#) outlines various facets of the search for collaboration within a circular construction economy and offers **pointers for business case owners, financiers, building clients and construction professionals** on how to get started.

Just as there are different circular construction strategies, there are also different possible business models to put these strategies into practice. At present, many sectors are focusing on what are known as product-service models; such as pay-per-use and leasing, as key to circularity. But as the cases in the ['Info sheets on business concepts in circular construction'](#) indicate, circular goals within the construction and real estate sector are still rarely put into practice through these models. It is therefore important to develop several different business models tailored to the construction industry and to test them out in practice. Based on some [inspiring cases](#), we've examined the added value of circularity in the construction world, the business concepts used to achieve this, and the opportunities and barriers. These cases supplemented by literature review indicate the importance of collaboration within circular construction practices, and have enabled us to formulate some general tips for establishing and maintaining partnerships.

Of course, in today's linear built environment, collaboration is already taking place, but this happens mostly on a project basis and rarely does it involve agreements on the entire value chain of the building, building system or building product. In the ['partnership agreements'](#) section of the guide, we outline from a legal standpoint how emerging forms of cooperation, such as 'construction team' (in Dutch: 'bouwteam') and integrated contracts (e.g. 'design-build-finance-maintenance-operate' or DBFMO) can provide an effective basis for integrating circularity from the start of the building and renovation project.

Generating funding for a circular case can also pose a challenge. Financiers are still unfamiliar with circular projects, so their perception of risk is sensitively higher. What is more, the duration of many financing contracts is shorter (typically only five to seven years) than the life time of most building elements (typically longer than 20 years). This guide contains some [guidelines for successful financing](#) of circular projects for business case owners and financiers.

4. Policy matrix on Circular Construction – Inspiring actions for local governments.

To build according to the principles of a circular economy, it is necessary, first and foremost, to close material cycles as efficiently and effectively as possible. In addition, reuse must be made feasible in the future. There are many ways local governments and administrations can contribute to this themselves: both through policy, and through their own operations.

The [Circular Construction Policy Matrix](#) explores [35 inspiring actions](#) that a local government can take to accelerate the shift to a circular construction economy. The actions are organised into an interactive overview of handy sheets with more detailed explanation of what specific measures can be taken, illustrative cases, and in-depth reading material. The policy matrix is a step-by-step method for exploring and prioritising opportunities for the circular economy, identifying barriers to these opportunities, and engaging relevant stakeholders. There are three ways to get started: (1) use your [own role](#) as the starting point, (2) [find out how far along you are](#), or (3) [what policy fits best](#). This will direct you to different actions.

This matrix builds on a toolkit that the Ellen MacArthur Foundation provides to policymakers. This provides a step-by-step method to explore and prioritise opportunities for the circular economy and estimate their impact. Levers are vision development, stakeholder engagement, spatial management, financial incentives, and statutory regulation.

5. Recommendations for practice, policy, and the research community

The observed systemic barriers and practice insights make clear that different types and levels of interventions are needed to accelerate the integration of (re)design of change into building practice and policy in Flanders. To address this, we distinguish between **three 'strategies'**, as shown in Figure 5, characterised by some key questions:

- I. **Advocating niche practices in today's construction sector:**
 - How do you ensure that circular (frontrunner) practices can be easily replicated, extended and scaled up?
 - What can frontrunners themselves do within their own projects and what can others do to facilitate this?
- II. **Weaving together the value network to change the construction and demolition sector from within:**
 - How do you ensure closer collaboration within the construction and demolition sector?
 - How do you ensure that sustainable coalitions are created at the project and ecosystem level?
 - How do you build trust to share valuable information and data?
 - What can policy-makers and practice actors do in this regard?
- III. **Responding to mental models to change general attitudes towards the circular (construction) economy:**
 - What needs to happen for building clients, construction professionals, investors, as well as citizens to want to use resources in a more efficient and effective way?
 - How do you place 'circularity' (at the project level) and circular economy (at the ecosystem level) high on the agenda?

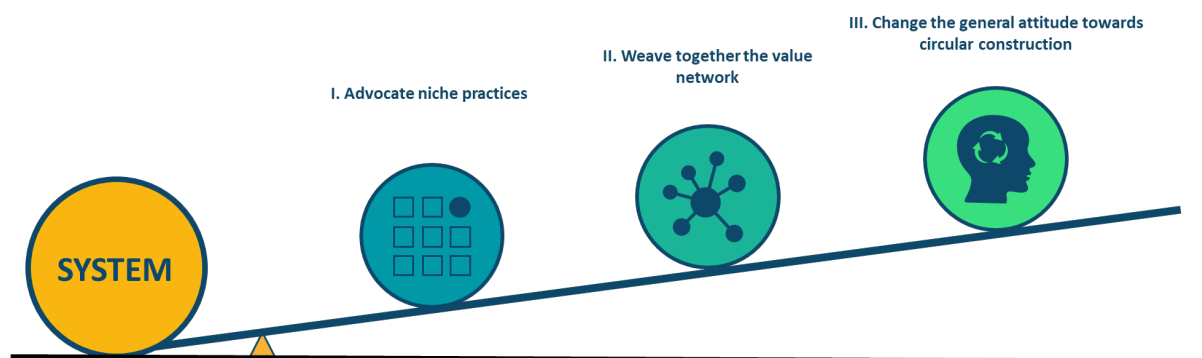


Figure 5: Lever principle: responding to more systemic changes (in terms of mentality, intentions, etc.) can generate greater impact than measures that are more operational in nature.

From strategies to recommended measures

The projects monitored, the research conducted within the framework of the practical tools and the discussions held with the Compass Group enabled us to formulate **23 measures**. These measures provide answers to the key questions formulated above and complement each other. They are grouped in the document "[Recommendations for \(re\)design for change](#)" (in Dutch) according to **six**

key messages and respond to all of the three strategies at once. Finally, **suggestions for further research** are also provided for each of the clusters of measures. What studies, experiments, research tasks are still needed to actually implement the proposed measures? The document itself describes this in detail. Below is an overview of all recommended measures, grouped by key message and in relation to the strategies to accelerate the integration of (re)design for change into construction practice and policy in Flanders.

A. Inspire and guide designers, contractors and building clients in making sustainable circular choices

- 1. Continue to inspire one other by sharing good and bad practices;
- 2. Work out (context) focused solutions instead of copy-and-paste approach;
- 3. Create (inter)nationally benchmarked workable consideration frameworks, with established determination methods for supporting tools.
- 4. Do not make circularity mandatory in regulations, but do impose ambitious targets stating quality of use, environmental impact and financial cost over the entire life cycle.

B. Experiment in the field to learn from it

- 1. Dare to experiment in the field and work together to share risks;
- 2. Guide designers and contractors in experimentation;
- 3. Organise or join Communities of Practice and related activities and keep them active;
- 4. Create a 'knowledge action centre' concerning circular construction.

C. Organise the network towards effective solutions

- 1. Align a value chain to achieve integrated building and business solutions;
- 2. Allow small and innovative players to organise themselves in order to be involved in standardisation, policy, and working bodies;
- 3. Facilitate and promote collaboration within procurement;
- 4. Supervise 'pacesetters' within organisations to create internal support and focus corporate culture on (social) innovation;
- 5. As a Flemish government, develop a regional approach together with (supra)local governments.

D. Create funding opportunities for circular construction initiatives

- 1. Coach and educate financiers on sustainability assessment;

- 2. Set up real-life experiments relating to long-term investments, learn and share with others;
- 3. Encourage long-term sustainable investments in construction and (continue to) eliminate tax concessions on building ownership.

E. Facilitate data and information exchange and open systems construction in practice

- 1. Share valuable information and reliable data directly or through an independent platform;
- 2. Standardise the minimum information and data format of material, element and building passports;
- 3. Make carefully considered arrangements throughout the construction industry concerning sizing and the use of dry joints to promote product reuse.

F. Embrace change at all levels

- 1. Regard buildings as material banks;
- 2. As a policymaker, aim for added social value;
- 3. As a market player, make circular business attractive;
- 4. As a citizen (movement), let your voice be heard.

6. Conclusion

The Living Lab is over, but the transition is in full swing!

Over the past four years, Flanders has had a wealth of opportunity to experiment and learn, thanks to the support of Circular Flanders, VLAIO and OVAM, and partly due to the enthusiasm of experts and the courage of frontrunners in the field. The Living Lab captured lessons learned from more than 50 projects and compiled them, along with research findings, into 4 practical tools to make it easier to progress from theory to practice. The lessons learned and research findings also resulted in some specific recommendations for building and renovation practice and policy.

Although the mission of the Living Lab is coming to an end, the transition to a circular construction sector is in full swing. The task now is to activate increasing numbers of companies, principals, (supra)local governments, and users to create a snowball effect. In parallel, policy will provide sufficient direction, raise awareness and provide support where necessary with effective policy measures. With the **legacy of the Circular Construction Living Lab**, including a strong network of forerunners, Communities of Practice to share learning lessons and publications that can help the various actors in their practice move forward, **the Flemish construction sector has all the assets** it needs to accelerate the transition.