Creation of a Workshop to Engage End-users in Developing Circular School Buildings

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Preface

In this research three main subjects are combined: school buildings, circularity and a focus on engagement. Personally, I think there is not enough input from end-users in real estate development projects. They are the people that have to be in that building (almost) every day, so I think their opinion matters, don't you? Therefore it is the main focus of this research. It is combined with circularity and school buildings, as both quite literally define our future.

This research is part of my Master Graduation of the Management in the Built Environment track at the TU Delft.

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I hope you enjoy reading this research report.

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Abstract

Keywords | Engagement, Participation, End-users, Workshop, Circularity, School Buildings.

Abstract | This research investigates a way to engage end-users in creating circular school buildings as a bottom-up approach is needed to create a more circular built environment. This is important as the goals of the Paris Agreement are not reached if we are not doubling global circularity.
This research is executed based on the following research question: ***How to create a workshop that engages end-users of schools in developing a circular school building?*** This research question is answered through literature review, interviews and a design phase. It concludes by stating that the workshop that is designed through this research is engaging for end-users of schools to develop a circular school building.

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Glossary

Definitions of the most commonly used concepts to prevent misinterpretation throughout this research.

CIRCULARITY

"High quality reuse of building materials and elements in a building"
This definition is based on literature research and interviews in chapter 2.3.3

CIRCULAR BUILDING

"The manifestation of processes, materials and stakeholders that accommodate circular flows of building materials and products at optimal rates and utilities in a temporary configuration."
- (Hamida et al., 2022)

CIRCULAR ECONOMY

"An emerging economic and development paradigm that is aimed at realising economic prosperity and environmental quality using the principles of the R-strategies such as reduction, reuse, and recycling."
- (Hamida et al., 2022)

CIRCULARITY VS. CIRCULAR ECONOMY

Circularity is an essential element to reach a circular economy. It takes place on a smaller scale and in a shorter timeframe. Circular economy is the change of an economic system.

END-USER

The end-users are the people that are influenced most by the design of the school building: students, teachers and support staff.
This definition is based on literature research and interviews in chapter 2.3.1.
In this research, the term end-user is normally used to describe end-users of schools, unless otherwise is indicated.

END-USER PARTICIPATION

End-user participation is a process that enhances a collaborative way of working between end-users and authorities and can be executed on different levels of power.
This definition is based on literature research in chapter 2.1.1.

PARTICIPATION VS. ENGAGEMENT VS. INVOLVEMENT

Participation is a collaborative way of working and can be executed on different levels of power, such as engagement and involvement. Involvement is a level on which the participants are being informed and can share their stance on certain matters. On the level of engagement, the participants have an advisory role and they are able to negotiate about their wishes.
This definition is based on literature research in sub-chapter 2.1.2.

WORKSHOP

"A usually brief, intensive educational program for a relatively small group of people in a given field that emphasizes participation in problem solving efforts"
- (Steinert, 1992) & (Steinert et al., 2008)

1 | Opening

The focus of this research is on designing a workshop that engages end-users of schools to develop a circular school building. In the context of the Paris Agreement that is not being achieved, this research elaborates on designing a tool to implement end-user participation to increase circularity in school buildings in order to decrease their impact on the global environment.

Based on the subjects of end-user participation, circularity and built environment, this chapter introduces the problem and that results in a problem statement. After the problem statement, the relevance of this study is stated regarding the following three fields: Scientific, societal and personal. Finally, the research questions, research methods, research output and the research plan are stated.

1.1 | Introduction

End-user participation

End-user participation is, as defined in chapter 2.1.1, *a process that enhances a collaborative way of working between end-users and authorities and can be executed on different levels of power*. According to this definition, there are different levels on which participation can be executed. However, this research aims at achieving the engagement level, as stated in chapter 2.1.2, through the design of a workshop, as concluded in part I of chapter 2.

Chapter 2.1.1 also elaborates on the beneficial aspects of a participation process. It describes the reasons that make it a popular concept to be implemented in the development of policies, ideas or products. Additionally, it is the way to achieve the change from a linear to a circular economy, as mentioned by Schönwälder (2020):

"[the transition from a linear to a circular economy] is a fundamental transformation that requires profound changes in underlying lifestyles and forms of behaviour by individuals, groups and organisations."

…

"such changes cannot be simply legislated or imposed from above: they need to be accepted, embraced and even promoted by citizens themselves."

- Schönwälder (2020, p. 484)

Circularity

This change is needed because, as mentioned in chapter 2.3.3, the goals of the Paris Agreement will not be met. However, the Paris Agreement goal can be achieved through decreasing carbon emissions. This decrease can be arranged by increasing the global circularity. Global circularity is the percentage of materials that enter the global economy and are recycled after use (Chapter 2.3.3). If the goal is to achieve the Paris Agreement goals, the global circularity has to be doubled (Chapter 2.3.3).

Built environment

The construction sector is the biggest consumer of materials in the Netherlands (Chapter 2.3.2). So recycling those materials after use would positively impact the global circularity. Furthermore, looking at global carbon emissions, 11% is derived from embodied carbon (materials and construction of new buildings) as mentioned in chapter 2.3.2. By implementing more circular ways of building, the percentage of embodied carbon will decrease. However, since the impact of embodied carbon is not regulated in most countries, the implementation of circular ways of building is depending on a bottom-up approach. This corresponds with the theory of Schönwälder that "mission-oriented innovation cannot be top-down" (Chapter 2.3.2).

School buildings
However, the focus will not be on the total construction sector. Within the built environment, the focus will be on the development of school buildings. As mentioned in chapter 2 this has several reasons. Firstly, it is very valuable to create a circular environment to teach children from a young age about circularity (2.3.1) and one of the benefits of doing so through participation are the educational benefits (2.1.1). But the most important reason in regards to the Paris Agreement is the fact that schools are developed by public money (2.3.1).

Problem statement
The engagement of end-users is needed to increase circularity in school buildings. According to Schönwälder (2020) “dedicated mechanisms, tools and approaches” are needed to implement participation. However, there is no systematic research available in which these are defined for participation in real estate, let alone for participation in developing circular buildings. It is striking that there are not really tools at hand to use in these kind of projects, while concepts such as citizen participation seem quite successful. That is why this research will focus on designing a workshop that engages end-users of schools to develop a circular school building.

Relevance
Scientific
There are multiple researches available in which participation plays a part during a real estate development. However, a systematic research about participation in real estate development is lacking. This research will focus on a way to implement participation in the development of real estate. This way it can be a contribution to systematic research on this topic in the future. Furthermore, there is not yet any research available that focuses on end-users participating on the subject of circularity. Even though this is a subject that would benefit from end-user participation, as mentioned by Schönwälder (2020).

Societal
From a societal point of view, this research is aimed at designing a participation tool that enhances real participation. In contrary to a tool that results in a form of fake participation, as is mentioned to be one of the pitfalls according to Schönwälder (2020). This research will focus on a form of participation in which the input of the participants is really taken into consideration instead of a participation process that is used to give participants a feeling of participating. In Latortue et al. (2015) Kaya (2004) mentions that the needs of clients in the construction industry are insufficiently met. Another societal aspect that is touched on is working on reaching the goals of the Paris Agreement. As climate change is counteracted through the implementation of circularity measures, this will be the content for the participation process.

Personal
The personal relevance is on the planes of end-user participation and circularity. Since real estate is built for an end-user, I personally think that this is the actor where the research should start and where the input for the development should come from. That is why I think that end-user participation is a great way to develop real estate, instead of making as much money from a set amount of square meters. Through this research I would like to learn more about the best ways to perform end-user participation or engagement. Regarding circularity, as shown in the sources mentioned in the background information, circularity is the only way to reach the goals of the Paris agreement. Furthermore, I think that the perception of circular ways of building should change and become more attractive to the bigger crowd. In this thesis, I would like to become more aware of the more charming ways to implement circularity in the built environment.

1.2 | Research Questions

This chapter defines the research question and the sub-questions to solve the problem as stated in the previous chapter. The conceptual model (Figure 3) will clear-up the connection between the questions and the set-up of the research.

Main Research Question
Based on the problem statement, the following research question will be answered:

How to create a workshop that engages end-users of schools in developing a circular school building?

Chapter 1.3 elaborates on the research methods to answer this research question through the sub-questions.

Sub-Questions
The research question will be investigated through answering several sub-questions. The relation between these sub-questions and the different subjects is shown in the conceptual model (Figure 1). As can be seen, each part answers one of the following sub-questions.

Q1. *Why is a workshop most fitting to engage end-users during a development process?*

Q2. *What are general properties of a workshop?*

Q3. *What circularity aspects are relevant for the end-users of schools?*

Q4. *How is the initial design of the workshop adapted through practical application?*

The first question, to be answered in chapter 2.1, is the base of the research and focuses on the definitions of end-user participation and engagement. Focusing on the forms and moment to engage end-users, it will conclude the reasons why a workshop is the most fitting method to engage end-users during a development process.

The second part of the research is about defining the input for the the workshop design. Information for the *Workshop Layout* and for the *Workshop Content* are investigated simultaneously, through answering sub-questions 2 and 3. To answer question 2, the typical set-up of a workshop and its positives and pitfalls are discussed. These are in short the general properties of a workshop. Question 3 focuses on connecting the following three aspects: ‘end-users’, ‘school buildings’ and ‘circularity’. Chapter 2 finishes with the design of a filter to select fitting workshop forms on specific properties that a circularity workshop for end-users of schools should possess.

The information gathered in chapter 2 is input for the first version of the workshop design in chapter 3, the *Workshop Design*. As designing is an iterative process, the workshop design will be adjusted according to the feedback in response to the tests. The last sub-question puts the focus on this iterative process, so chapter 4 mainly focuses on the changes in the workshop design and therefore answers Question 4.

The answers to these sub-questions will eventually result in the final version of the workshop, being an answer to the research question.

Research Model

The way that all questions are related is depicted in Figure 1, the research model. It shows the division in research questions related to the four parts as mentioned earlier. The research methods are also to recognize in this model.

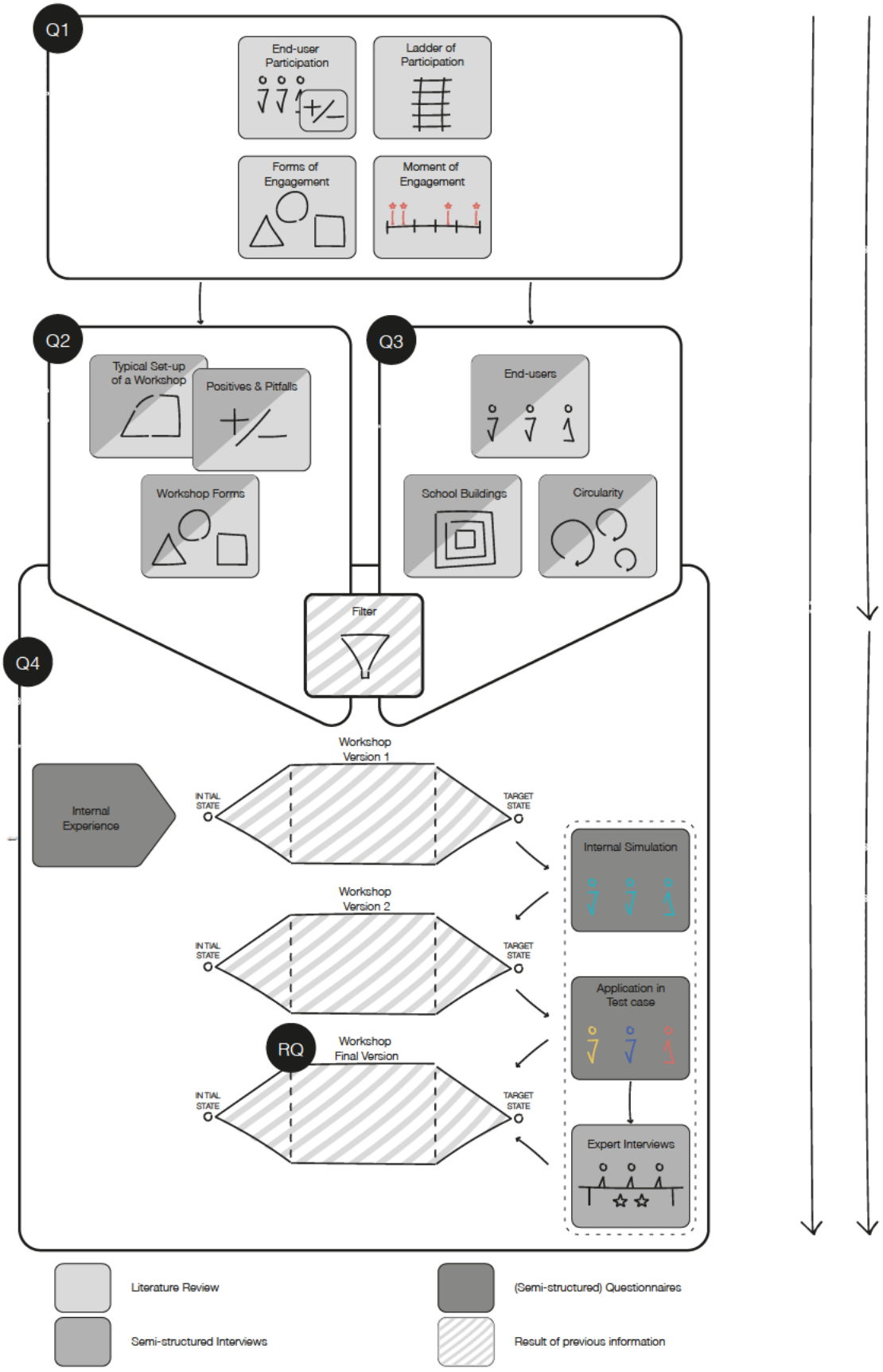


Figure 1 | Conceptual model (own image)

1.3 | Research Method

This chapter starts with a broad set-up of the research. Thereafter, it illustrates the reason why the sub-questions are of interest, followed by the specific method to answer the sub-questions. This is also visualised in Figure 3.

Set-up of the research

This research takes on an inductive approach. The aim of the inductive strategy is "To establish universal generalizations to be used as pattern explanations" (Blaikie, 2000, p. 101). As there are no workshops based on systematic research that focus on the implementation of end-user engagement to develop circular school buildings, literature on this specific subject is lacking. Therefore, a theory will be created based on information on different subjects in this research. This leads to the first half of the research being an exploratory study. Through the use of literature on other forms of participation, circularity and end-users a theory will be constructed for this specific subject. In this research the theory is made explicit through the design of a workshop.

The total research, as depicted in Figure 3, can be split up into two parts. The first half of the research (part I&II) is *research **for** design*. Its goal is to be "helping, guiding and developing design practice" (Godin and Zahedi, 2014). In order to gather qualitative data for this part an extensive literature review and multiple semi-structured interviews will be conducted. The literature review will provide the general guidelines, whereas the semi-structured interviews with colleagues at ICSAdviseurs will provide more specific and practical knowledge.
The second half of the research (part III) is *research **through** design*. This is "the closest to the actual design practice, recasting the design aspect of creation as research" (Godin and Zahedi, 2014). In this part, the initial workshop design is created based on previous theories. As mentioned in chapter 1.2, the design is an iterative process in which the initial design is tested, evaluated through test cases. Part of this design approach is the feedback-loop after the every test-case to improve the design. The feedback is gathered through semi-structured questionnaires. The feedback on the final version of the workshop will be discussed with experts in semi-structured interviews. Not only is this a possibility to look at the workshop design with fresh eyes, it will also engage the experts in the design of the workshop. Either directly implementing their comments or processing the comments in the recommendations.

Methods per Sub-Question

The following table shows, next to the purpose of each question, the methods or techniques that will be used per sub-question per aspect of the research as shown in Figure 3. This will be followed by a brief explanation per method.

	Question	Purpose	Method
Q1	*Why is a workshop most fitting to engage end-users during a development process?*	To determine the reasons why a workshop is the most fitting method to engage end-users during a development process.	Literature Review.
Q2	*What are general properties of a workshop?*	To define the layout of a workshop.	Literature Review; Semi-structured Interviews.
Q3	*What circularity aspects are relevant for the end-users of schools?*	To define the content for the workshop.	Literature Review; Semi-structured Interviews.
Q4	*How is the initial design of the workshop adapted through practical application?*	To create the most engaging circularity workshop for the end-users of school buildings.	(Semi-)structured Questionnaires; Semi-structured Interviews.

Table 1 | Methods per sub-question (Own table)

Literature review
According to Blaikie (2000), the main goal of a literature review is to define the background information and to bring current knowledge into the research. As systematic research on end-user engagement in real estate development is lacking, this literature review initially focuses on these elements individually to define the current knowledge. Further in the research, it aids in connecting the different subjects. Overall, the literature review aims at providing the general guidelines for the initial workshop design.

Semi-structured interviews
There are different ways to interview in research and some are a way of collecting quantitative data, other forms of interview are to collect qualitative data (Blaikie, 2000). To answer several research questions a qualitative interview will be conducted. By this is meant to interview employees of ICSAdviseurs, the company that also contributes to this research. These interviews will be semi-structured, meaning that there will be room for individual input during the interview, however the overall structure of the different interviews will be similar (Appendix A). The transcripts of these interviews can be obtained from the author and Appendix B contains a table with the summarized answers. The interviews provide the practical side of knowledge for the research and are therefore included throughout the study as a counterpart or addition to the knowledge based on literature. The interviews are recognized by the grey box that they are in.

(Semi-)structured Questionnaires
In this research, two kinds of questionnaires are used. The first is a structured questionnaire to determine the internal experience on circularity and the way that circularity is currently implemented at ICSAdviseurs (Appendix C). The other are semi-structured questionnaires to gather the experiences of participants during the tests in part III of the research (Appendix E&G). Semi-structured questionnaires are mostly shaped like normal questionnaires, so consisting of a fixed set of questions to be able to compare the answers. However, there is also room for extra comments next to the general questions. This takes place in the form of post-its that can be used already during the workshop to write down feedback. This is a way to collect comparable qualitative data as well as allowing the participants to reflect on their experience, during and after the test-workshop.

Data Plan
During the research, a lot of data will be retrieved. To make sure that this data can be accessed and (re)used after the research, it will be treated following the FAIR guiding principles. These principles are based on four pillars: (1) Findability, (2) Accessibility, (3) Interoperability and (4) Reusability.
These will be implemented in the research through the following actions:
1. Through the use of key-words and by uploading the research into the TU Delft repository, the research will be able to be found by future researchers.
2. As the research will be uploaded in the TU Delft repository, it will be accessible to everyone with acces to the repository.
3. Interoperability will be achieved by writing the thesis in understandable English and with adding a reference list.
4. Since the data will be provided in combination with the thesis, the data can be put into context and improve the reusability of the acquired data. (Wilkinson et al., 2016)

Ethical Considerations
During the research, data is collected by conducting the semi-structured interviews with employees of ICSAdviseurs and some external experts, as well as through the feedback of participants of the test-workshops. To make sure that the privacy of these people will not be violated, some guidelines are implemented. Before any data collection, the contributors are informed that their input will be used for this research and the interviewees have to give consent for recording the interview before the recording of the interview can be started. All questionnaires are anonymous, however the interviewees are asked if they grant permission to mention their names.

1.4 | Research Output

The intended outcome of this research is a finished workshop to engage end-users in developing a circular school building. Part of the finished product is also a collection of recommendations as a result of the expert interviews at the end of the research. This chapter elaborates on the goals and objectives and the dissemination and audiences of this research

Goals and Objectives

The problem, as stated in chapter 1.1, is that end-users are usually **not** engaged in the process of developing circular social real estate. However, their engagement could create the needed support base to achieve the goals of the Paris Agreement. This means that the main goal of this research is to create a workshop to engage end-users in the development of a circular school building.

To reach this goal, several objectives are set out to be achieved. Even though most of these objectives are implicit in Figure 3, the following table shows the goal and objective per part of the research.

	Goal	Objective
I	To determine the reasons why a workshop is the most fitting method to engage end-users during a development process.	Researching commonly-used methods to engage end-users and deciding on the most fitting method through examining their properties.
IIa	Defining the layout of a workshop.	Researching the possible layouts for a workshop and their positives and pitfalls. Followed by extra knowledge through semi-structured interviews to cover the practical side.
IIb	Defining the content for the workshop.	Bringing together the three main aspects of the research, end-users, circularity and school buildings to make sure that the content matches the target group.
III	Creating the most engaging circularity workshop for the end-users of school buildings.	Testing the workshop multiple times with different participants to improve the workshop according to the gathered feedback.

Table 2 | Objective per research part (Own table)

Dissemination and audiences

This research is aimed at actors that work with end-users in the development of real estate. This research will be the base of a workshop that can be used in end-user participation trajectories and to increase end-user engagement. Although the content is focussed on implementing circularity measures in social real estate, the set up of the workshop could be used in other fields as well.

2 | Research for Design

As becomes clear in the research model, the research consists of several parts. Part I, IIa and IIb from the research model are explored through literature research and semi-structured interviews. Chapter 2 covers these parts through answering sub-questions 1, 2 and 3 in respectively chapter 2.1, 2.2 and 2.3. The theme of inform, explore, conclude is recognized in this chapter through the structure of the chapter. First a general theory is explained as starting point (inform). This theory then is explored through other theories or application (explore). Finally, a conclusion is drawn, based on this input (conclude).

2.1 | Workshop

The first part of this research is about workshops in general. Based on four components, the reason to choose a workshop to engage end-users is explained. The chapter starts with defining end-user participation and discussing its benefits and pitfalls. The second sub-chapter defines the different levels of power on which end-user participation can be executed and the participation-level that is to be achieved will be determined. The third sub-chapter is about ways to reach this participation-level, engagement. Finally, the last sub-chapter of the first part explores the timeline of participation processes and defines the best moment to let end-users participate during the process. This results in answering sub-question 1: *Why is a workshop most fitting to engage end-users during a development process?.*

2.1.1 | End-user Participation

To get a grip on the term end-user participation, this research starts with a focus on citizen participation, as literature provides a lot of different descriptions on this concept. This results in a definition of end-user participation based on these descriptions. This chapter also shines a light on the benefits and pitfalls of end-user participation.

The first description is by Sherry R. Arnstein, as she is one of the founders of theories on citizen participation. “Citizen participation is a categorical term for citizen power. It is the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future” (Arnstein, 1969, p. 216). She implies that citizen participation is a strategy to include “have-nots” in processes. “Have-nots” are groups with little to no power, and can vary from citizens to for example students. In her theory, citizen participation is an overarching term to describe different levels of power.
Irvin and Stansbury (2004, p. 56) describe citizen participation as “incorporating citizens into democratic decision making”. With explicitly mentioning the term “democratic”, they insinuate citizen participation being at a certain level of citizen power.
The following description adds: “citizen participation is a new and collaborative way of working between citizens and local authorities” (Kaikittipoom, 2019, p. 7). This definition focuses on the relationship between citizens and local authorities.
A definition of participation is “A process during which individuals, groups and organisations are consulted about or have the opportunity to become actively involved in a project or programme of activity” (Wilcox, 2004, p. 50). In the case of end-user participation, the individuals, groups or organisations can be replaced with the term end-users.

Based on these descriptions, a description of end-user participation can be determined. During this research the following description will be used:
***End-user participation is a process that enhances a collaborative way of working between end-users and authorities and can be executed on different levels of power*.**

Benefits of participation

As mentioned before, a participation process has several beneficial aspects and in literature a lot of different reasons are mentioned to use forms of citizen or end-user participation. The reason to implement participation that is mentioned most often is the fact that **policies, ideas or products are better grounded** with citizens or end-users when doing so (Irvin & Stansbury, 2004) (Schönwälder, 2020) (Kaikittipoom, 2019). This makes the policy, idea or product **more relevant** and will help to **increase its impact** (Schönwälder, 2020). In addition to this, Irvin & Stansbury (2004) mention that it helps in **creating a more democratic and effective governance**. This can also be translated to an increased effectiveness of a policy, idea or product.
Secondly, participation leads to the **increase of satisfaction, acceptance and sense of community and ownership** by the participants (Kaikittipoom, 2019). Furthermore, the **quality of the project and the credibility of the authorities increase** with implementing a participation process (Kaikittipoom, 2019).
Other reasons to use citizen participation according to Irvin and Stansbury (2004) are that it can be used as a tool to **enhance social change**, as it has educational benefits. This connects to chapter 2.3.2 of this research, the reason to focus on school buildings during this research. It also helps in **creating better decisions**, which **benefits efficiency** (Irvin & Stansbury, 2004). They also mention **increased acceptance** through participation processes, which leads to smoother and less costly implementation (Irvin & Stansbury, 2004). Lastly, they claim that “informed and involved citizens become **citizen-experts, understanding technically difficult situations and seeing holistic, community-wide solutions**” (Irvin & Stansbury, 2004, p. 56).
Latortue et al. (2015) mention multiple reasons to implement end-user participation specifically. The first reason is that the end-users can state their **exact requirements**, which then leads to a **higher quality** of the product (Latortue et al., 2015). The second reason is that end-user participation **increases the level of acceptance** (Latortue et al., 2015). Finally, the end-users share **responsibility** of the design of the product, so they cannot complain afterwards about the design (Latortue et al., 2015).

Pitfalls of participation

Even though participation processes ensure a lot of advantages, there are also some pitfalls to overcome. This paragraph discusses a couple of these pitfalls mentioned in literature and tries to provide solutions on how to prevent them.

Schönwälder (2020) mentions two important challenges or pitfalls of participation. The first challenge is the **difference in "power, access and resources"** between the participants and the authorities, this is important to be addressed so that the participants "are actually being heard" (Schönwälder, 2020, p. 487). The other challenge according to Schönwälder (2020) is that the **participation process needs to be legitimate**. Meaning that it should not just take place for the looks of it, but really be used to create a better product. These challenges can be prevented by providing a beneficial environment, through giving the participants enough time and resources to come together and create elaborate visions, ideas and wishes (Schönwälder, 2020).
According to Irvin and Stansbury (2004) one of the disadvantages of citizen participation is the fact that it is **time-consuming**. This disadvantage leads to other disadvantages as well. Firstly, it results in **high costs**, however it also results in high social-capital value (Irvin & Stansbury, 2004). Secondly, low-income citizens often need to work full-time to provide for their family, this doesn't allow them to take part during the participation process, as it would take too much of their time (Irvin & Stansbury, 2004). This then results in **inequality in the group of participants** and thus **misrepresentation** of the low-income citizens. This can lead to a group of "nonelected elite [that] can dominate the participatory process" (Irvin & Stansbury, 2004, p. 59). For possible solutions a look is taken at the citizen juries in the United States, working with a random selection of citizens, however this also isn't a perfect model (Irvin & Stansbury, 2004). Another important pitfall is the **size of the group**. According to Irvin and Stansbury (2004) decisions should be made with a small group, preferably 10 to 20 representatives. The final pitfall of a participation process is the fact that often the **expectations of the participants are too high** (Irvin & Stansbury, 2004). This should be prevented by good expectation management by the mediator. Irvin and Stansbury (2004) also mention that this can be prevented by not ignoring the decision resulting from the participation process.
Latortue et al. (2015) mention several pitfalls of end-user participation during architectural projects. First of all, it should **not replace the architect**. Furthermore, it gives the **professionals more work** to do, increasing the time they spend on a project (Latortue et al., 2015). This can be caused by the fact that end-users are less experienced and lack knowledge, resulting in breaking the routines of conventional design projects (Latortue et al., 2015). This all can make the **design team less motivated** (Latortue et al., 2015). To prevent these pitfalls, Latortue et al. (2015) advise to make sure that all participants and authorities agree on implementing a participation process, maybe even creating a designated team to represent or actively involve end-users, and that they know the implications on the design process.

Properties of Participation

This research focuses on end-user participation to create circular school buildings, as mentioned in the introduction. Throughout the research the following explanation for end-user participation based on different theories is used: *A process that enhances a collaborative way of working between end-users and authorities and can be executed on different levels of power*. The reasons for implementing a form of end-user participation are multiple. In short, a participation process is beneficial in policy, idea or product design because it helps in aligning the design with the wishes of the participants, making it more relevant, effective and efficient, this all helps to increase the quality of the product. Also, it increases the knowledge of the participants which in turn causes to create more integrated solutions. The final beneficial aspect of a participation process is the increased level of acceptance towards the product by the participants, especially if fundamental and/or social changes are needed. However, there are some pitfalls that should be kept in mind when implementing a participation process. These pitfalls mostly touch on the aspects of time, money, the selection of participants and expectations. The pitfalls are avoided by aforementioned solutions and are also discussed during the interviews.

2.1.2 | Ladder of Participation

According to the definition of end-user participation as mentioned in the previous chapter, it can be executed on different levels of power. This sub-chapter determines the level of end-user participation that is desired during the participation process to create circular school buildings. It does so through explaining the different levels by comparing different theories on participation.

A ladder of citizen participation by Arnstein (1969)

Arnstein (1969) writes about citizen participation as a way for citizens to regain power, for example from the government, and to be included and benefited in plans for the future. However, she states that participation processes are now often hollow and initiated to stand out. So she created the ladder of citizen participation, a simplified image to determine the level or type of participation, thus the level of citizen power (Figure 2).

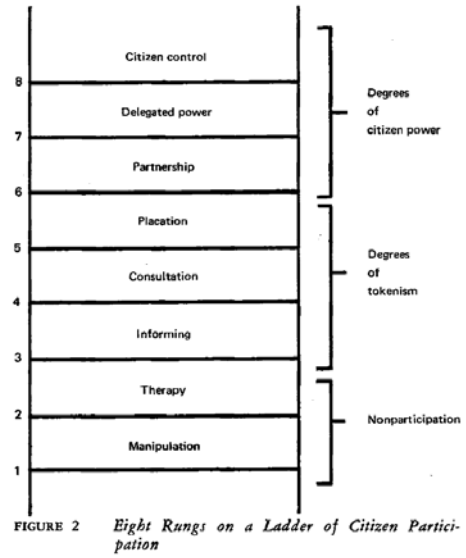


Figure 2 | Ladder of Citizen Participation, according to Arnstein (1969)

Since this theory is the base of participation-theories, it will be explained shortly on the basis of Figure 2: The first two rungs, *Manipulation* and *Therapy*, are forms of *non-participation* (Arnstein, 1969). In other words, forms of fake-participation, just for the looks of it. The next two rungs, *Informing* and *Consultation*, are the base levels of actual participation. “Citizens may indeed hear and be heard. But they lack the power to insure that their views will be heeded by the powerful” (Arnstein, 1969, p. 217). Rung 5, *Placation*, allows citizens to advise, but the power is still not theirs, so they don’t have the right to decide (Arnstein, 1969). However, rung 6, *Partnership*, gives citizens the possibility to negotiate about their views (Arnstein, 1969). The two highest rungs, *Delegated power* and *Citizen control*, describe the (biggest part of) power being with the citizens (Arnstein, 1969).

Participation Matrix

Besides Arnstein’s ladder of participation, there are many other theories on levels of participation. Therefore, a matrix (Figure 4) is created to give insight into how the different theories are related to Arnstein’s theory.

The starting point of this matrix is the ladder of citizen participation by Arnstein. Thereafter, the other theories are analyzed and classified according to the similarities with her ladder (and the different theories among each other). As she mentions, there are way more levels of participation and the ladder is a just a simplification of the real world (Arnstein, 1969). This results in different ways of categorizing per theory and thus an overlap/shift in levels between different theories.

Based on the classifications of all theories in Figure 4, a division is made that will be used during this research in the most-right column ('*Level of Participation*'). This division is briefly explained in the following paragraph, supported by Figure 3, based on the different sources in Figure 4.

'*Non-participation*' is the lowest level of participation, there is no collaboration between participants and authorities. This is often used by authorities to pretend that participation is employed when it most certainly is not. Moreover, the authorities mis-inform or try to persuade the participants to implement their own views. It could also be called 'pretend-participation'.
The second level of participation is '*Involvement*', however this is the first level in which there is a form of collaboration between the participants and the authorities. The definition of involvement is as follows: *Involvement is a level of participation on which there is a 1-way flow of information, from authorities to participants*. On this level, participants are informed about decisions that will be or have been made. Sometimes they are asked about their opinion and they can choose between a couple of options offered by the authorities. However, referring to Arnstein's theory, the power is still with the authorities.
The third level is '*Engagement*': *Engagement is a level of participation on which there is a 2-way flow of information between authorities and participants*. This level implies that the input of participants and authorities is equal and they have conversations about what ideas or views to implement. The participants can also make suggestions and there is room for them to explain their preferences. However, the power of decision-making is still at the authorities.

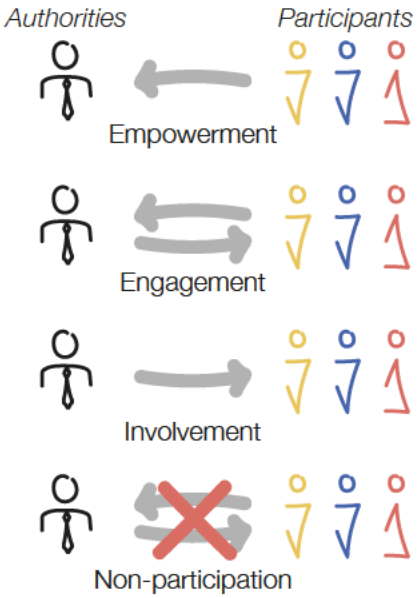


Figure 3 | Levels of participation (own image)

The top-level of participation will be called '*Empowerment*' for the length of this research. At this level there is a 1-way flow of information from participants to authorities. In this case the participants make the decisions and have full responsibility on those decisions, the authorities provide them with resources to implement the decisions. Even-though this is the top-level, it doesn't mean that it is the best level. Pitfalls of this level of participation are, among others, that it supports separatism and allows a small group to take the power (Arnstein, 1969). This would for example be a group of "nonelected elite" (Irvin & Standsbury, 2004, p. 59) as mentioned earlier. In the three upper levels of Figure 3, the theme inform, explore, conclude is reflected as well.

This research applies the 'Engagement'-level. According to Schönwälder (2020), citizen engagement has to be **inclusive**, **deliberate** and **influential**. Meaning that the target group should be well represented in its **diversity** and should be provided with enough **time** and **resources** (Shönwälder, 2020). Finally, their impact has to be **concrete**, meaning that the authorities should at least commit to look at the input and let them know any next steps that are going to be taken. However, not only should the engaged provide input, they also play an important role in **evaluating** the final outcome (Schönwälder, 2020). These are properties that the workshop design is tested on in the conclusion in chapter 5.

Engagement as Participation-level

In the introduction it became clear that a form of participation is necessary to be able to create circular school buildings. The previous sub-chapter concluded that participation takes place on different levels of power. Based on different theories, a division of these levels is made to define the preferred level of participation for this research.
To create a fair process, the participation must be on the '*Engagement*'-level. As one of the pitfalls of participation is a power-difference between authorities and end-users (chapter 2.1) the '*Involvement*'-level of participation is not sufficient. The '*Non-participation*'-level does not provide with the advantages of participation that are mentioned in chapter 2.1 and the '*Empowerment*'-level of participation is unfavourable because of the chances for separatism. With implementing the '*Engagement*'-level, a 2-way flow of information is achieved. This will allow the participants and the authorities to actually discuss their ideas and views. The (biggest part of the) power to make decisions and the responsibility of the project is still for the authorities.

Arnstein (1969)	Latortue et al. (2015)		Wilcox (1994)	May (2006)		Stanfield (2002)	Kaikittipoom (2019)	Level of Participation
	Wulz (1986)	Wandersman (1981		Star of Participation	Triangle of Engagement			
Citizen Control		Creation of the Plan	Supporting Indep. Comm. Interest	Supporting	Establishment	Full Responsibility	Empowerment	Empowerment
Delegated Power	Self-decision	Self-planning	Acting Together	Acting Together	Office Holder	Decision-making Authority	Collaboration	
Partnership	Co-decision	Choice			Activist	Implementation Responsibility		Engagement
Placation	Alternative		Deciding Together	Deciding Together		Input toward Decisions	Consultation	
Consultation	Dialogue	Feedback	Consultation	Consultation	Semi-Regular	Input toward Implementation		Involvement
	Regionalism							
Informing	Questionnaires		Information	Information	Ad hoc	Education	Information	
Therapy						Persuasion		Non-Participation
Manipulation								
	Representation	No Direct Participation				Information		

Figure 4 | Participation matrix based on literature (own image)

2.1.3 | Forms of Engagement

As determined in the previous sub-chapter, a level of engagement should be achieved in the participation process to create circular school buildings. Over the years, a lot of different approaches and methods of participation have been developed. This sub-chapter first distinguishes these two concepts and then creates an overview of approaches and methods. In combination with the timing of the engagement, as discussed in the next sub-chapter, the best way to engage end-users will be defined.

In Dulgeroglu's thesis on the role of user participation in design decisions, he casually mentions a distinction between attitudes and methods as he calls *Participatory Planning* an *Attitude* toward planning (Dulgeroglu, 1977). It appears that the attitude can also be seen as the *Approach* that will be used throughout an entire project. *Methods* on the other hand, are ways or techniques to achieve the selected approach during the project. A differentiation of multiple methods can be used in the duration of one project. This is visualised in Figure 5.

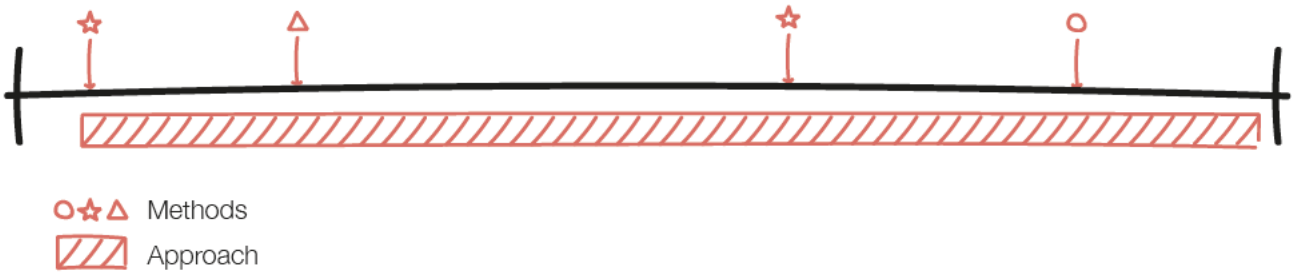


Figure 5 | Methods and Approach in relation to the Project Timeline (own image)

Approaches

In literature, several approaches towards design research are mentioned. Sanders (2006) created an overview of these approaches as can be seen in Figure 6. The vertical axis shows whether the approach is either more design-led (top) or research-led (bottom). The mindset of the researchers or designers is placed on the horizontal axis, with expert mindset on the left and participatory mindset on the right.

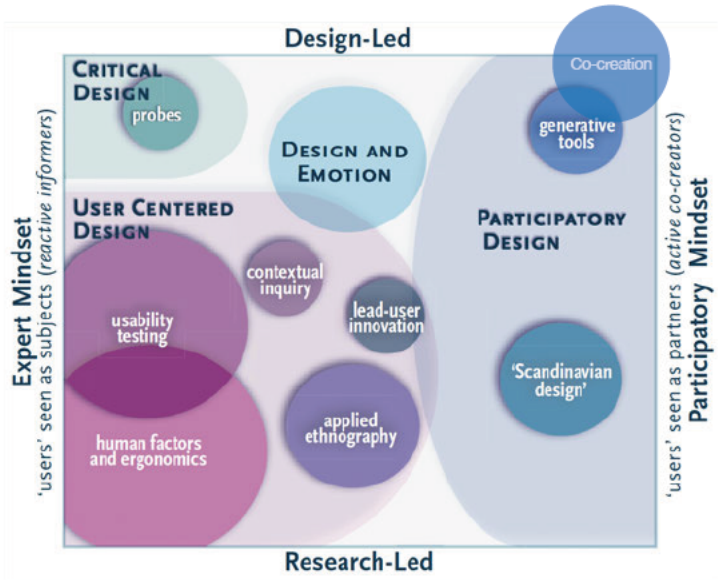


Figure 6 | A Cognitive collage of the design research space as it is in 2006 (own image, adapted from Sanders, 2006)

The participatory mindset suits the goal that is to be achieved during this research (creating a circular school building through the implementation of participation), so the approach that will be used will be on the right side of this overview, as a part of the participatory design area. According to Sanders (2006) participatory design is an approach in which the users are actively involved to make sure that the design matches their wishes.

In this area are two bubbles. Firstly, the '*Scandinavian design*' is more on the research-led side and makes use of physical objects (Sanders, 2006). It considers the user as an expert on their field and wants them to share their knowledge to create something that matches their needs (Sanders 2006). The other bubble, '*generative tools*', is more design-led and focuses on the beginning of the design process. It is about "the creation of a shared design language" (Sanders, 2006, p. 6). This approach can be used in multiple domains, however the contents of the toolbox will change depending on the domain it is used in (Sanders, 2006). Another bubble is added in the participatory design area by Sanders and Stappers (2008), namely the '*co-design*' (or co-creation) bubble.

Co-design and co-creation are often used interchangeably, but can be distinguished. Co-design is seen as a collaboration between designers and non-designers during a design process (Sanders & Stappers, 2008). Co-creation on the other hand is to "together make or produce something (new) to exist" (De Koning et al., 2016, p. 267). These definitions are consistent with the definition of engagement that is mentioned in chapter 2.1.2. There is no consensus on the hierarchy of these two concepts. Some sources see co-design as a part of co-creation and some see co-creation as a part of co-design. The distinction and the choice for interpretation will be explained a little further in the following figures.

Firstly, co-design can be seen as a form of co-creation, this is depicted in Figure 7. It has a high level of collaboration and takes place early in the co-creation process, the value that is directly created is therefore relatively low. Whatsoever, this does not say anything about the value created in the total length of the process.

Furthermore, Figure 8 shows how co-design (the lower sequence) can also be a part of a co-creation process (the upper sequence). This is the hierarchy and the way that these concepts will be interpreted for the length of this research.

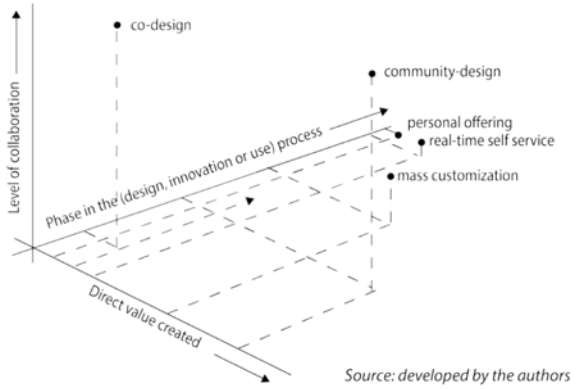


Figure 7 | Five types of co-creation (De Koning et al., 2016)

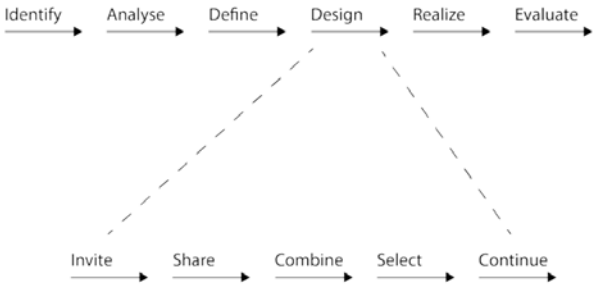


Figure 8 | Steps in a co-creation process (De Koning et al., 2016)

Finally, De Koning et al. (2016, p. 274) mention that "co-creation is the process of mutual firm-customer value creation". This results in the fact that firm and customer have an active interaction (De Koning et al., 2016). This interaction, or two-way flow of information, makes that co-creation fits well with the engagement-level of participation as defined in previous sub-chapter. The '*Scandinavian design*'-approach is not the approach that is fitting in this case, as the end-users will not be involved because of their specific expertise. The 'generative tools'-approach is not fitting as the participation process is not about creating a universal language to use during the development.

Methods

As mentioned in the introduction of this sub-chapter, methods are ways or techniques to achieve the selected approach during the project. In this case, the selected approach is co-creation as this is a *participatory design* approach on the engagement-level. To define the methods that are supportive of this approach, several sources that use a co-creation approach and/or make use of participation on the engagement-level have been analyzed.

Figure 9 is an inventory of different methods and the goals that these methods have been used for by five different sources. The first two sources, Kaikittipoom (2019) and Wilcox (1994), are also mentioned in Figure 4 and define methods that are fitting for participation processes. Defining these methods, Kaikittipoom doesn't make a distinction in the different levels of engagement, but Wilcox does. His stance of *Deciding Together* is on the engagement level, and thus the methods that are mentioned to achieve this level are used in Figure 9. The other three sources describe case-studies in which co-creation or participation on the engagement-level has been used. For these sources applies that only the methods in which end-users or citizens have participated are included in the figure.

Methods	Kaikittipoom (2019)	Wilcox (1994)	Nevmerzhitskaya (2020)	Latortue et al. (2015)	Amenta et al. (2019)
Action Planning		Decide on next step			
Brainstorming		Develop options			
Cost/Benefit Analysis		Make choices			
Design Challenge			Receive ideas & proposals		
In-depth Interviews			Empathize with users		
(Informal / Formal) Meeting	Inform on data or process			Find customers Register project candidates *Collective design meetings* Individual design meetings	
Information Giving		Start the process			
Mock-up Testing			Gather feedback		
Nominal Group Technique		Develop options			
Observation / Shadowing			Empathize with users		
Open Innovation Camp			Develop concept Identify opportunities Co-create ideas		
Planning for Real		Simulation as overall technique			
Real-life Testing			Collect attitudes & feedback		
SAST		Decide on next step			
Stakeholder Analysis		Identify people to be involved			
Storyboard			Gather feedback		
Strategic Choice		Simulation as overall technique			
Surveys / Questionnaires		Develop options	Collect attitudes & feedback	Express desires about flat	Assess effectiveness of meetings Collect specific information
SWOT Analysis		Define postition			
User Personas			User-understanding		
Workshop	Define core problem Design a building	Develop options Decide actions	Understand & Define challenges Develop concepts / solutions Prototyping the solution Evaluate prototype Collect preferences & attitudes		Build shared knowledge Develop solutions Identify challenges Define objectives of stakeholders
Note:			Most activities executed with end-users were done through a workshop		

Figure 9 | Methods and their goals per source (own image, based on Kaikittipoom (2019), Wilcox (1994), Nevmerzhitskaya (2020), Latortue et al. (2015) and Amenta et al. (2019))

In this overview the most popular methods are informal or formal meetings, surveys or questionnaires and workshops, as these are used in multiple sources. The method that aligns best with the goals of the participation-process is the workshop as it is used to design a building, develop concepts and solution, to collect preferences and to define objectives (Figure 9).

Co-creation through Workshops

There are a lot of different approaches and methods to apply participation. This sub-chapter focuses on defining the methods that are available on the 'Engagement'-level of participation. It does through determining the approach first. After comparisons, co-creation is most aligned with the engagement-level of participation because of the two-way flow of information. That is the reason that co-creation is the approach for this development process. Based on several sources, different methods can be used to engage end-users, such as informal or formal meetings, questionnaires or surveys and workshops. A workshop is preferred as this aligns the most with the goal of the participation-process.

2.1.4 | Moment of Engagement

Not only the way of engagement is important, also the moment of engagement plays a crucial role in the success of a participation process and can be different in every building design project (Latortue et al., 2015). In this sub-chapter, the best moment to engage end-users is researched based on different sources. To do so, the sub-chapter starts with a short explanation of a typical real estate life cycle. This is then be compared with the steps of a co-creation process and result in a simplified timeline of co-creation and the relation of tasks, stakeholders and methods.

Real Estate Life Cycle

Almost all real estate has a life cycle as depicted in Figure 10. Every real estate project starts with the *Initiative phase* in which first the initiative comes up to build a new building and after that the program of requirements or the brief is created. During the *Preparation phase* the brief is shaped into a preliminary design and later into a final design, this is then used in the *Execution phase*. During the this phase the preparations for the build are made and subsequently the build is executed and finished. Finally the *Maintain phase* will start. This is normally the longest phase as this is the period the building will be used. At the moment that a (big) problem arises, the cycle starts over and an initiative that solves the problem will be taken, and so on.

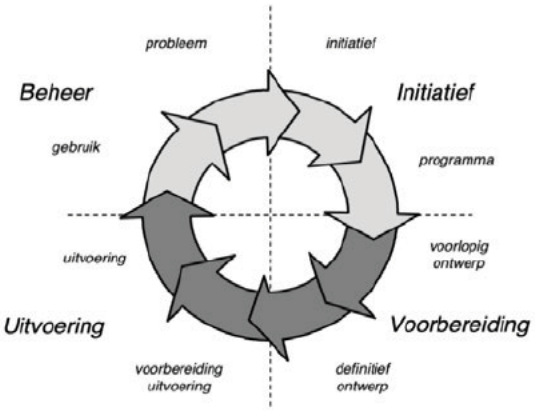


Figure 10 | Real Estate Life Cycle (Den Heijer & Van der Voordt, 2015)

To be able to use this cycle during this research, that is only about one project life cycle, it is cut at the top and unrolled. This way a timeline is created as shown in the following figure (Figure 11).

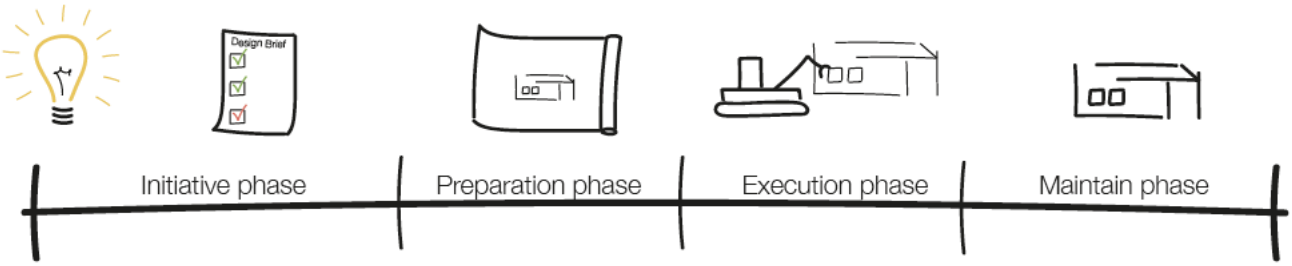


Figure 11 | Real Estate Timeline (own image, based on Den Heijer & Van der Voordt, 2015)

Co-creation in real estate

As determined in the previous sub-chapter, the approach that fits the goal of the development process is co-creation. When comparing the steps of a co-creation process (Figure 8) to this timeline, the following timeline can be made (Figure 12). The first three steps, *Identify*, *Analyze* and *Define*, will be taken during the *Initiative phase*. The fourth step, *Design*, is parallel to the preparation phase. The *Execution phase* matches with the *Realize* step and the *Evaluate* step would take place during the *Maintain phase*.

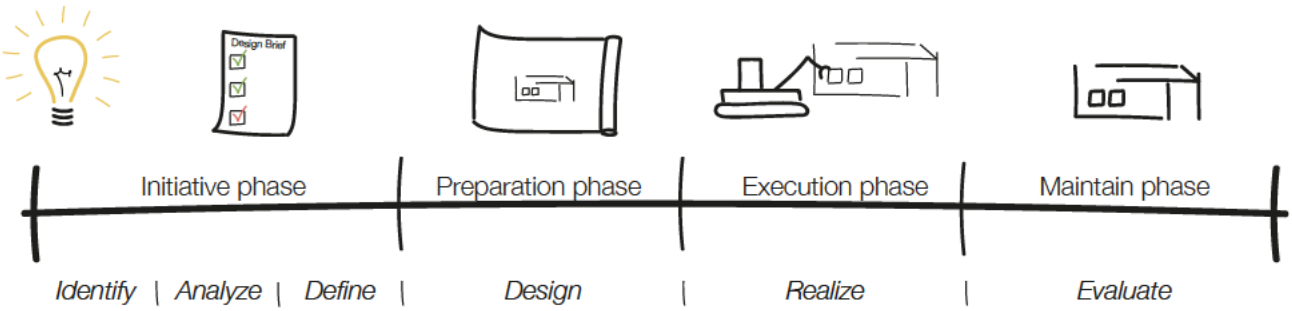


Figure 12 | The steps of Co-creation related to the Real Estate Timeline (own image, based on Den Heijer & Van der Voordt, 2015 and De Koning et al., 2016)

The following timeline (Figure 13) can be created with the starting point being Figure 12. The events (*what*), stakeholders (*who*) and methods of co-creation (*how*) by two sources have been used to get an idea of what tasks will be done at what moment in the process (regarding real estate development).

Real Estate Timeline Phase	Co-creation Step	What?	Who?	How?
Initiative Phase	Identify	Initiate	Initiator, Investor, Project owner, Experts	Meeting, Workshop, Open Innovation Camp
	Analyze	Discover possibilities	Public/Citizens, Experts	Workshop
	Define	Set up brief	Public/Citizens, Initiator, Mediator, Authorities	Meeting, Workshop
Preparation Phase	Design	Co-design	Public/Citizens, Designer, Planning authorites	Meeting, Workshop, Design Challenge
		Evaluating, Ranking/Voting	Super mediator, Public/Citizens	Survey
		Integrating	Designer	
		Approving	Initiator, Investor, Project owner	
Execution Phase	Realize	Build	Expert	
Maintain Phase	Evaluate	Evaluating	Public/Citizens, Initiator	Meeting, Survey, Real life testing, Workshop

Figure 13 | Co-creation Timeline (own image, based on Kaikittipoom, 2019 and Nevmerzhitskaya, 2020)

The *Public/Citizens* is the stakeholder that is most resembling the end-users of a building. They are involved during the 'Analyze', 'Define', 'Design' and 'Evaluate' step of a co-creation process. It is remarkable that there are no tasks involving *Public/Citizens* performed in the *Execution* phase, or during the *Realize* step. This step of co-creation might not be as applicable in building processes as in other design processes since heavy machinery will be involved in this case. Furthermore, *Public/Citizens* are not part of the stakeholders at play in the *Identify* step. In practice this is a stakeholder that could identify shortcomings in the building that they are using, as they are also involved in the evaluation of the building during the *Maintain* phase.

Moment of engagement

Latortue et al. (2015) compare building design with product design. About product design they mention as follows: *"user involvement is most efficient in the early stages of system development as the cost involved in making changes increases during system development"* (Latortue et al., 2015, p. 4). The case-study that they executed was on a building process. During this building process, they engaged the end-users in the initiative phase and the preparation phase, as can be seen in Figure 14.

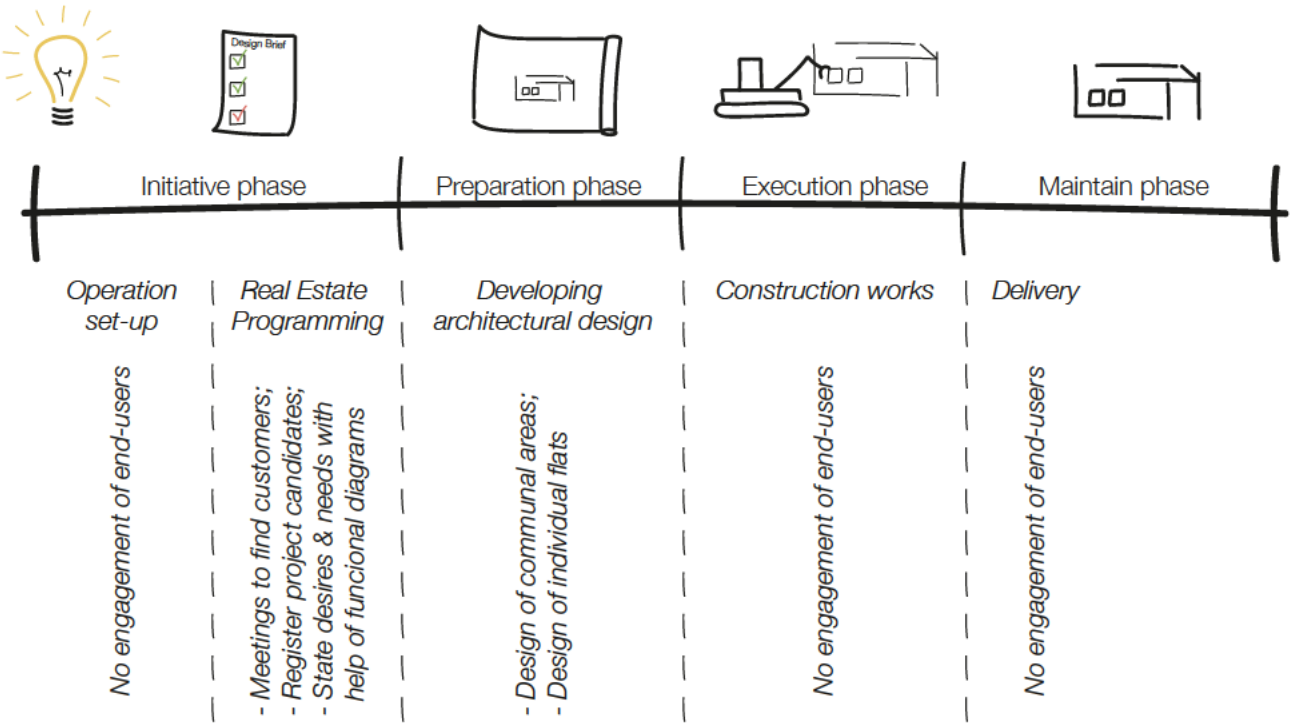


Figure 14 | Timeline of end-user engagement in case-study by Latortue et al. (own image, based on Latortue et al., 2015)

Similarly, the previous paragraph shows the center of gravity of co-creation with end-users at the beginning of a building process, after the initiation of the project. About the moment of participation Nevmerzhitskaya et al. (2020) mention the following: It is essential to start the participation process early-on. By doing this, all stakeholders will be on the same line regarding goals and requirements (Nevmerzhitskaya et al., 2020). Another reason to engage end-users at the beginning of a building process is that the most impactful forms of co-design take place at the beginning of the process (Kaikittipoom, 2019). She also mentions that the most crucial step for co-creation is the set-up of the brief (Kaikittipoom, 2019). So it is important to engage end-users early in the process. However, this does not mean that they should not be engaged towards the end of a participation process, as also shown in Figure 13.

MacLeamy Curve

In 2004, MacLeamy constructed the curve that is depicted in Figure 15. It shows that the possibility to impact a design declines during a process (blue line) and that the cost of changes inclines towards the end of the process (bright-red line). Furthermore, the black line indicates the traditional design process, in which the effort is high during the construction documentation phase, resulting in high costs for possible design changes. However, he constructed an alternative design process (dark-red line) in which most effort takes place earlier in the process. This way the design can easily be changed if necessary and the costs for these changes are relatively low.

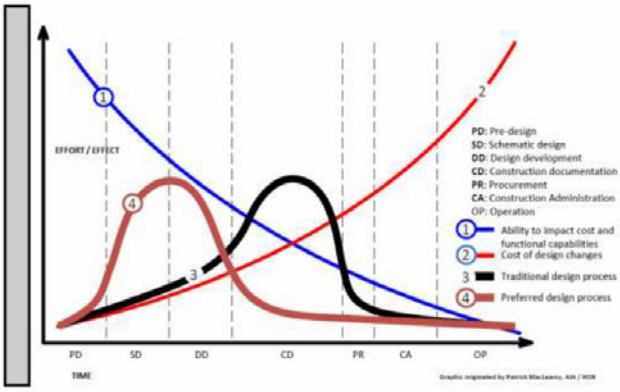


Figure 15| MacLeamy Curve (MacLeamy, 2004)

Regarding the engagement of end-users, it would be useful to do so in the beginning of the process, as their ability to impact the “functional capabilities” is highest based on the MacLeamy Curve. This results in choices by the end-users at that moment having the biggest impact on the design of the project.

Engagement at the Beginning of the Process

To be able to conclude on the most fitting method to engage end-users the best moment to do so must be defined. The engagement of end-users during co-creation processes often takes place at the beginning of a project, right after the initiation of that project. This ensures everyone to be on the same page about goals and requirements and the choices to be made are the most impactful in the beginning of a building process. Furthermore, as shown through the MacLeamy curve and as mentioned by Latortue et al. (2015) costs to change certain aspects of a design increase as a project develops. Finally, Kaikittipoom (2019) mentions that the brief is the most crucial step for co-creation.
So, even though end-users will be engaged throughout the whole process, based on literature there is a moment on the project timeline at which end-users can make the biggest impact on the design, being during the brief definition. Therefore this research focuses on a method that is to generate input for the brief (or program of requirements). This is fitting with the choice for the method being a workshop as defined in 2.1.3, looking at the methods in Figure 13.

2.1.5 | Engaging End-users through a workshop

In this concluding overview, the outlines of the participation process with end-users are stated as completion of chapter 2.1, answering sub-question 1: *Why is a workshop most fitting to engage end-users during a development process?*

Firstly, end-user participation is a process that enhances a collaborative way of working between end-users and authorities and can be executed on different levels of power. This is needed to create circular school buildings. There are multiple reasons for the popularity of (end-user) participation:

1) It increases the relevance, effectiveness and efficiency, resulting in higher quality of the product through taking the wishes of the end-users into consideration during the design.
2) Problems can be solved integrally through increasing and benefitting from the knowledge of the participants.
3) Participants will easier accept the new product. However, there are pitfalls of participation in regard to time, money, expectations and selection of participants. These can be resolved through expectation management and should be taken into consideration during the design phase.

As mentioned before, a participation process can be executed on different levels of power. So the participation levels as mentioned in several sources are evaluated and compared. This results in the following overview of levels of participation (Figure 16). Empowerment seems the highest achievable level, but the chances of separatism make that this is not a desired level. Other pitfalls, such as the power-difference between authorities and participants, rule out the use of the 'Non-participation'-level and the 'Involvement'-level. The 'Engagement'-level ensures a 2-way flow of information which allows all parties to present and defend their ideas and views. In the end, the power to make the decision is still for the authorities.

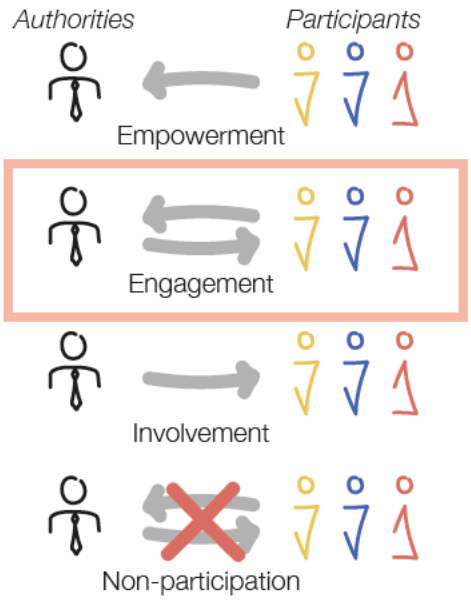


Figure 16 | Levels of participation (own image)

To apply participation, several approaches and methods are available. However, not all approaches and methods are compliant with the 'Engagement'-level. After comparing, it appears that co-creation is most aligned with the engagement-level of participation because of the two-way flow of information. Based on the goal of the participation-process and the methods mentioned in Figure 9 a workshop is most fitting to engage end-users during a development process.

The moment of engagement also needs to be defined. As a result of comparing different theories and case-studies, it appears to be most impactful to engage end-users at the beginning of a process during the definition of the brief (or program of requirements). Therefore the method should be able to generate input for the brief, this aligns with the choice for a workshop.

In short, the reason to choose a workshop to engage end-users during a development process is the fact that it is an engaging . It is concluded after determining that the best moment to engage end-users is during the definition of the brief. Therefore, this research focuses on engaging end-users in defining the brief through a workshop about circularity.

2.2 | Workshop Layout

As previously defined, a workshop is used to engage end-users in creating a circular school building. The second part of this literature research is about the layout of this workshop. This part answers the second sub-question: *What are general properties of a workshop?* Therefore it starts with defining a typical workshop set-up, followed by the positives and pitfalls of this set-up. This part finishes with the view of advisors from ICSAdviseurs on the different set-ups. All this is part of the input for initially the filter and eventually the workshop design in part III of the research.

As the concepts *workshop*, *workshop set-up*, *workshop forms* and *workshop design* are used throughout this part of the research, Figure 17 supports following explanation to clarify the distinction between these concepts as defined in this research.

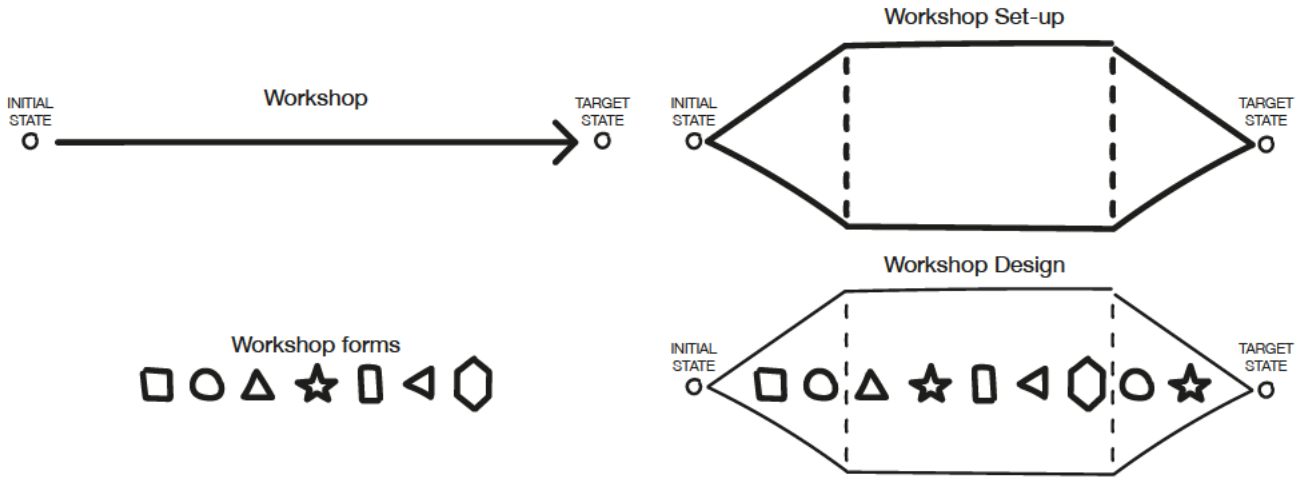


Figure 17 | Visual explanation of common terminology revolving around workshops (own image, based on Gray et al., 2010)

A workshop is a tool to get from initial state to target state. The workshop set-up are the guidelines that are set to create the tool. Workshop forms are exercises or activities that can be used to fill in a workshop set-up to create a workshop design. Finally, a workshop design is a specific order of exercises or activities within certain guidelines with the goal of achieving the target state.

2.2.1 | Typical Set-up of a Workshop

As determined in Part I, workshops are a good participation-tool when designing a building. Benefits of using a workshop are, among other things, the fact that participants are more creative, it works as a bonding experience and it results in an end-product (Stanfield, 2002). This sub-chapter explains the typical set-up of a workshop based on literature and interviews.

In literature, different definitions of workshops are given, but the main definition of a workshop is: "a usually brief, intensive educational program for a relatively small group of people in a given field that emphasizes participation in problem solving efforts" (Steinert, 1992) (Steinert et al., 2008) and are "often used to promote change in knowledge, attitudes and skills" (Steinert et al., 2008). These broad definitions are an indication for the amount of workshop forms. The 'Werkvormenboek' (Van den Ouden, 2016) for example, mentions 100 workshop forms, divided into 8 categories, but no general set-up of a workshop. Gray et al. (2010) also created a handbook in which they mention 78 forms that can be used in 'gamestorming'. Other than workshop forms, they explain a framework to design games for specific goals. The goal of 'gamestorming' is to create new views on the world and its possibilities, it is "a framework for exploration, experimentation, and trial and error" (Gray et al., 2010). As the goals of a workshop and 'gamestorming' are somehow similar, this framework will be used to create a workshop set-up that is adapted to the goal of the workshop from scratch.

General workshop set-up

Figure 18 shows the general set-up of a workshop based on the framework of Gray et al. (2010). The starting point of the workshop set-up is target state, followed by the initial state (Gray et al., 2010). The initial state is the starting point of the workshop. It has to be defined what the parameters are that will be started with, such as current knowledge of the team-members and the available resources (Figure 18). The target state is the goal of the workshop and gives a direction, but should not be too rigid to make sure that the creativity will be preserved (Gray et al., 2010). These two elements are fixed and eventually determine the workshop design (Gray et al., 2010). Steinert (1992) states that the goal and the audience of a workshop should be defined to be able to choose the right type of workshop. The 'audience' will be determined in sub-chapter 6.8.

The framework of Gray et al. (2010), and thus a typical set-up of a workshop, is a tripartite (Figure 18). The first (yellow) part is about opening: introducing the workshop and the participants, and to inform the participants on the subject (Gray et al., 2010). The second (blue) part is for the participants to explore the subject - *What are the possibilities?* - (Gray et al., 2010). This is also where their own expertise or frame of reference comes into play. The final (red) part of the workshop set-up is the closing part of the workshop (Gray et al., 2010). This is the moment in the set-up that is about making conclusions and decisions. The sub-goals of each phase are also mentioned in Figure 18.

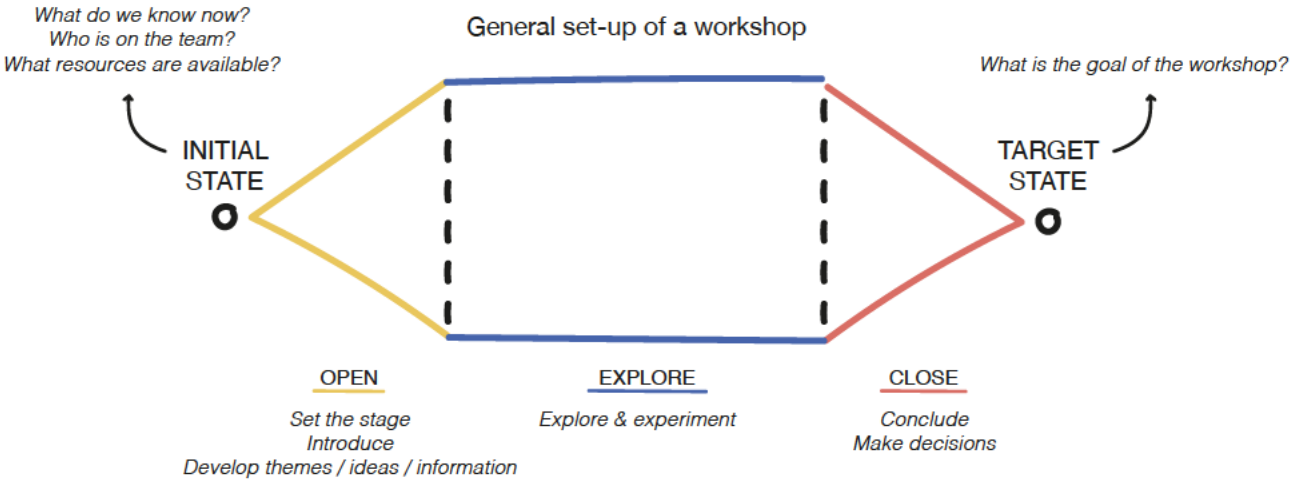


Figure 18 | General set-up of a workshop (own image altered from Gray et al., 2010)

Circularity workshop set-up

Moving towards Part III, the *Workshop Design*, the framework of Gray et al. (2010) will be filled in regarding circularity. The workshop set-up on circularity is depicted in Figure 19. Concerning the initial state, it is determined in chapter 2.3.1 that the participants are end-users of schools and it is assumed that they have little knowledge on circularity. However, the available resources are unknown at this moment, as this is dependent on the client. The target state, or the goal of the workshop, is creating a list of circular priorities in the school building.

The three parts of the set-up all have their specific goal that is somehow similar to the general set-up. The sub-goal of the opening is to inform the end-users on circularity. This helps in reducing the knowledge gap between the end-users and the experts, and its importance already has been mentioned earlier in this research. The explore phase is about exploring the possibilities for circularity in school buildings. Finally, the closing is about concluding and deciding on the priorities of the different possibilities of circularity measures to implement in the school building. This results in respectively the following sub-goals: Informing, exploring and concluding or deciding.

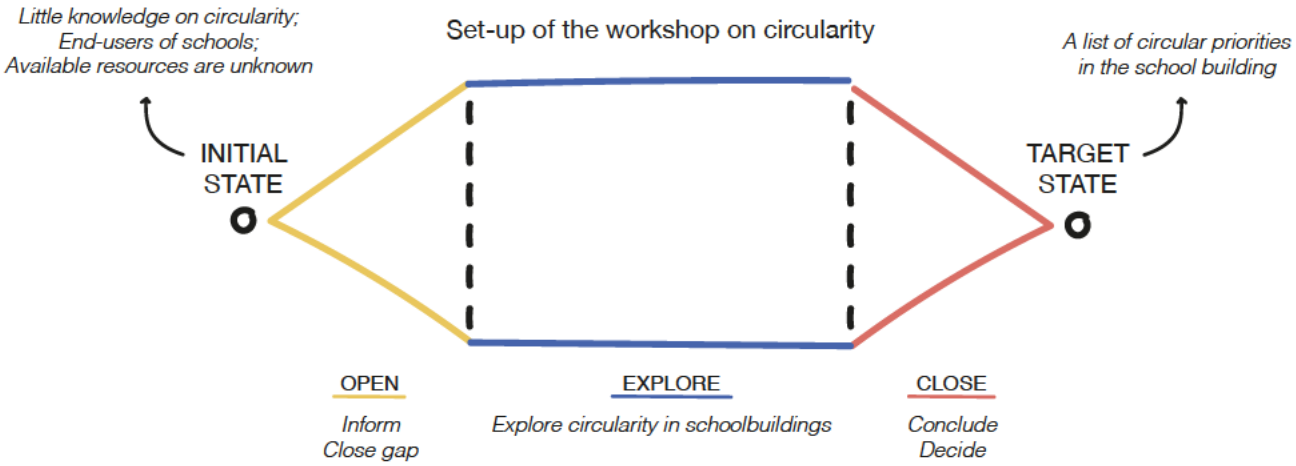


Figure 19 | Set-up of the participatory process on circularity (own image altered from Gray et al., 2010)

Inform, Explore and Conclude&Decide

Based on the framework of Gray et al. (2010), the typical workshop set-up consists of three parts: the opening, the explore phase and the closing. Each part is about reaching a different sub-goal to, in the end, get to the target state, the overall goal of the workshop.

This is a reoccurring theme throughout this research as it is the starting point for the workshop design, but it also appears in other parts of the research. For example the structure of each chapter and in the different levels of participation.

In order to be able to create an inventory of workshop forms later in this part of the research, already a set-up of the workshop on circularity in school buildings has been created. In this set-up specific sub-goals have been drawn up that fit the initial and the target state of the workshop. These sub-goals, informing, exploring and concluding or deciding, will be helpful in choosing potential workshop forms for the workshop design (part III).

2.2.2 | Positives and Pitfalls

In the previous sub-chapter, the typical workshop set-up has been defined. This sub-chapter will zoom in on the positives and the pitfalls of such a workshop set-up, resulting in an overview of pros and cons. Thereafter, this overview can be used to create some alternative options that take these issues into consideration. Finally, the alternatives can be discussed with some experts during interviews.

Some properties of the typical workshop set-up as defined in sub-chapter 2.2.1 are that it is one session with a beginning and an ending. In addition, it consists of three parts: Informing, exploring and concluding or deciding. First the positives will be mentioned, followed by the pitfalls.

Positives

The first positive is the fact that the workshop is designed to be **one session**. As Irvin and Stansbury (2004) mention, a decision process already is time consuming. By creating a workshop that consists of one session instead of multiple sessions, it will be a **less time consuming** process. Furthermore, it secures that a **consistent group of participants** is present during the different parts of the workshop. If the workshop would take place over multiple days, it is not assured that the same people will be able to join. This then leads to inefficiency as information or thought processes of previous sessions will have to be explained. Finally, practice shows that it is easier to plan one session compared to planning multiple sessions.

Another positive aspect about this set-up is the fact that it consists of an **informing part**. Latortue et al. (2015) mention that one of the problems of end-user participation is that they have a lack of knowledge. By starting with an informing part, this lack of knowledge (or knowledge gap), will be decreased. Irvin and Stansbury (2004) also mention that informing the participants is very beneficial, as this helps understanding the choices that are made during the process.

The fact that the workshop has a **beginning and ending** is the third positive aspect of this set-up. According to Gray et al. (2010) this concept is very important to create a successful workshop, as it **manages the energy and flow** of the group. Furthermore, they mention that every lead that is opened, should also be closed (Gray et al., 2010).

Pitfalls

One of the pitfalls about the set-up with just **one session** is the fact that there is **no time between sessions to process the outcomes**. This applies to both the participants and the facilitator. Schönwälder (2020) mentions that it is important to provide the participants with enough time and resources to be able to give valuable input. For the facilitator this could help to create and organize an overview of outcomes that can be used to kick-start the following session. Another pitfall of having just one session is the fact that **only the people can join that are available during this timeframe**. As Irvin and Stansbury (2004) point out, the participants should be a representative reflection of the target group to assure sincere participation. With multiple sessions, the chances are bigger that a representative cross section of the target group will have taken part in the participation process. However, if the sessions are consecutive, the participants are expected to participate in all sessions. The final pitfall of this set-up is the fact that during one session, **the same (amount of) people will take part**. Where a big group is great for brainstorming and exploring, it is better to conclude or decide with a smaller group (Irvin & Stansbury, 2004). When splitting up the set-up into different sessions, the group of participants can change according to the optimal number of participants. It will also allow specific people to join during specific sessions. For example, experts may benefit less from the informing phase than end-users that have zero to little knowledge about the subject. However, they might want to join during the exploring or deciding/concluding phase.

Alternatives

Looking at the pitfalls in previous paragraph, two alternatives have been made as depicted in Figure 20.

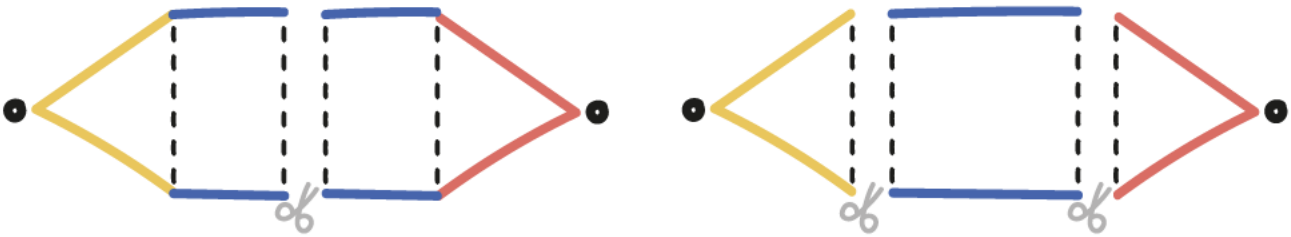


Figure 20 | Alternatives of the typical workshop set-up (own image)

The first alternative splits the set-up in half, resulting in two workshop-sessions that are complementary to each other. This creates time to process the outcomes of the first session and to prepare for the next, and it gives a possibility for different people to participate in the explore phase. However, of course some positive aspects of the initial set-up disappear by choosing this set-up. Such as a consistent group of participants and the fact that it is less time consuming. Finally, the set-up with a clear beginning and strong ending will not be achieved.

The other alternative splits the set-up per phase. The first workshop will be about informing the participants, the goal of the second workshop will be exploring and during the final workshop the conclusions and decisions will be made. This alternative set-up also gives time to process outcomes or to prepare for the follow up session. Furthermore, it allows experts to join the phase that is relevant for them and to regulate the amount of participants per phase.

Preferred workshop set-up according to interviews

During the interviews, the advisors that often execute workshops are asked about their preferred workshop set-up and factors influence their choice. They are presented with the set-up shown in Figure 19 and the alternatives in Figure 20. From the interviews is concluded that a workshop consisting of one session is preferred (Appendix B). Reasons for this are:

- Participants do not read the notes in between workshop sessions;
- At the start of the second session, it is not exactly clear what was discussed in the first session;
- It is satisfying to have the feeling to accomplish something during a workshop, this is ensured when the goal of the workshop is achieved;
- It is not balanced to execute multiple workshops on circularity regarding the other aspects that have to be part of a brief as circularity is a small part related to the other subjects that are part of a brief.

Finally, Teun van Wijk mentions that he designed a set-up as well and it touches on the same aspects as this set-up.

Points of Attention during the Workshop Design

This sub-chapter focuses on the positives and pitfalls of a typical workshop set-up. Several positive aspects of the typical workshop set-up as defined in the previous sub-chapter are showed, for example the fact that one session is less time-consuming than multiple sessions and that the energy and the flow of the workshop are better managed. These points also emerge from the interviews with advisors from ICSAdviseurs. However, there are also some pitfalls determined. These pitfalls are on the basis of two alternative workshop set-ups. Based on discussing the original set-up and the two the alternatives during the interviews, it is decided to design a workshop according to the framework of Gray et al. (2010) that takes place in one session. Besides this set-up, the positive and negative aspects of this workshop set-up are input for the workshop design in chapter 3.

2.2.3 | Starting point of the Workshop Design

In this part of the research the general properties of a workshop are defined through the definition of a typical workshop set-up and its positives and pitfalls. A typical workshop set-up exists of three parts: open, explore and close (Gray et al., 2010). With regards to the workshop about circularity, these three parts are themed as follows: inform, explore, conclude/decide (Figure 21). The informing part is important as the current knowledge of the participant is most likely not sufficient to create input for the brief. Then the theory will be explored for the case of a school building. Finally the participants will have to conclude and decide on the implementations with the highest priority for them.

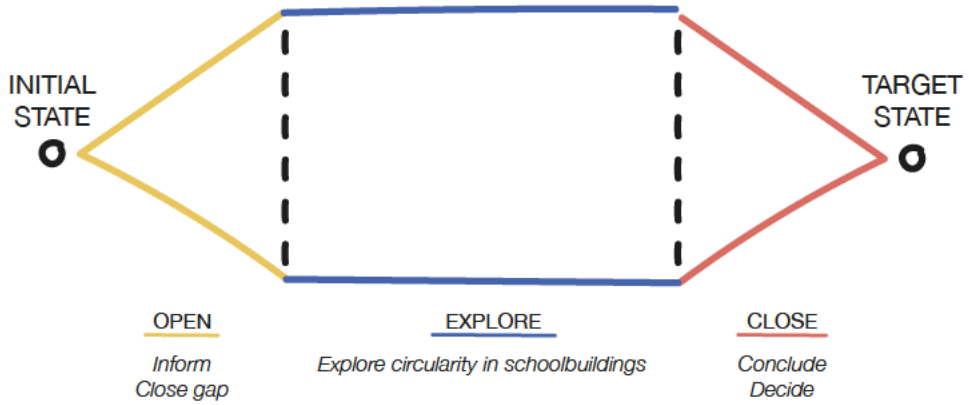


Figure 21 | Set-up of the circularity workshop (own image)

Through interviews it is decided that the workshop consists of one session based on the set-up as mentioned above. Reasons for this, based on literature and interviews, are that this set-up is efficient and creates a feeling of satisfaction for the participants. Therefore, this workshop set-up is the starting point for the design of the workshop in Part III of the research.

2.3 | Workshop Content

The third sub-chapter of chapter 2 is about defining the workshop content. On the basis of the following sub-question the input for the workshop design will be defined regarding workshop content: *What circularity aspects are relevant for the end-users of schools?* First the end-users of schools are defined and the parts of the building that are relevant to them are determined. Finally, the theories on circularity in a building is explained. This is input for the content of the workshop design.

2.3.1 | End-users

In literature, a lot is written about citizen participation in creating policies or large area developments. With translating this principle to the development of a school, citizen participation changes into end-user participation. As mentioned before by Gray et al. (2010), the people that are "on the team" have to be known to define the initial state of a workshop. This sub-chapter will focus on defining this new target group based on literature. It will start with a definition of stakeholders and end-users to clarify the difference. To take a look at the playing field, this is followed by a quick overview of stakeholders of schools. The sub-chapter will end with an overview of the actors that are meant with 'end-users of schools' to be used during the rest of this research.

Why school buildings?

Why focus on the development of school buildings? This has a couple of reasons. Firstly, a school environment influences its education (Pemsel et al., 2009). And it would be of incredible value to create a circular environment to teach children from a young age about circularity (Könings et al., 2017)(Pemsel et al., 2009). Secondly, given that schools are (mostly) developed by public money, it would be in line with the national ambitions to develop them as circular as possible (De Jong & Arkesteijn, 2013).

Definitions

Before the new target group 'end-users of schools' can be defined, a distinction between stakeholders and end-users has to be made to explain the difference. First of all, stakeholders are actors that "will incur direct benefits or losses from an action taken during a project" (Winch, 2010). These can be divided into internal and external stakeholders, with a sub-classification of demand- or supply-side and private or public (Figure 22). Internal stakeholders are directly related to the project, whereas external stakeholders are more indirectly related (Winch, 2010).

Table 4.1 Some project stakeholders.

Internal stakeholders		External stakeholders	
Demand side	*Supply side*	*Private*	*Public*
Client	Architects	Local residents	Regulatory agencies
Financiers	Engineers	Local landowners	Local government
Client's employees	Principal contractors	Environmentalists	National
Client's customers	Trade contractors	Conservationists	Government
Client's tenants	Materials suppliers	Archaeologists	
Client's suppliers		Non-governmental organisations (NGO)	

Figure 22 | Project stakeholders (Winch, 2010)

(End-)users on the other hand are defined as "people who will actually use the building once it is completed" (Van Meel & Størdal, 2017, p. 9). This implies that (end-)users are always internal stakeholders on the demand side during a development project.

Stakeholders of schools

To give an impression of the playing field of actors in the development of a school building, this paragraph will shine a light upon a handful of stakeholders, mentioned by two sources.

Könings et al. (2017) mention several stakeholders: "Teachers, students, architects, (young) professionals, architectural students, educational publishers, ICT specialists, and the community". In this research by Könings et al. it is remarkable that the collaboration among stakeholders that is facilitated during the research only includes four groups of stakeholders, namely: students, teachers, architects and educationalists.

De Jong and Arkesteijn (2013) write about two other stakeholders of schools, namely municipalities and school boards. These stakeholders are, among other things, responsible for providing the budget to construct and operate the building (De Jong & Arkesteijn, 2013).

Based on above-mentioned sources, it can be concluded that the stakeholders of schools consists of a varied group of actors. It is a mix of internal and external stakeholders and the size of the groups differs heavily.

End-users of schools
According to Van Meel and Størndal (2017) users are the most important stakeholders of a building. This paragraph will give an overview of the actors that are interpreted as end-users by several literature sources.

After their definition of users, Van Meel and Størdal (2017) mention some examples of which a couple apply to the end-users of schools. They start with **teachers** and **students**, but **support staff** (for example cleaners or maintenance staff) is also mentioned.

According to Şenyi̇ği̇t and Basri Memduhoğlu (2020), the end-users of school buildings are its **students** and they should be included in the design process. Especially because the school building effects the learning behaviours of the students, so a better learning environment will improve the education (Şenyi̇ği̇t & Basri Memduhoğlu, 2020).

Leung et al. (2005) researched key components of facility management of schools in Hong Kong. For their research, they defined 'end-users' as **teachers** and **students**. During this research it appeared that the designers and the end-users didn't agree on more than half of the components. This could be explained by the lack of knowledge on regulations, budget, site limitations and space available. This could result in a conflict between the wishes of the end-users and the final design. (Leung et al., 2005)

Regarding primary schools, Leung & Fung (2005) define **students** and **teachers** as the "typical end-users". They also mentioned that a lot of studies are focussed on improving school design and technology, but that there is not enough focus on the requirements of the end-users (Leung & Fung, 2005).

Steijns and Koutamanis (2005, p. 229) mention that during the design of a brief, "it is useful to involve **teachers**, **students** and the **school board"**. However, if the school board can be seen as an end-user is debatable.

A complete consensus has not been reached about the end-users of schools. The most mentioned actors being end-users are students, followed by teachers. However, Van Meel and Størndal also mention another actor: support staff. Adding this stakeholder to the list of end-users should be taken into consideration.

End-users of schools according to interviews
During the interviews, multiple colleagues at ICSAdviseurs are asked what they see as end-users of schools. In appendix B it is concluded that end-users are defined as "everyone that uses the building on a daily basis, this includes students, teachers and support staff". In the interviews is mentioned that it can be assumed that their knowledge on real estate and circularity is very little.

End-users as most important Stakeholder
The end-users according to this research are the people that are influenced most by the design of the school building: students, teachers and support staff. This makes that they are also one of the most important stakeholders. Even though not all sources agree completely on this selection, these people are seen as end-users for the length of this research. It is assumed that their knowledge-level on circularity is low.

2.3.2 | School Buildings

With the end-users of schools being mainly teachers, students and support staff, they are not professionals on the subject of developing buildings. However they have useful expertise on their surroundings. This sub-chapter determines the reason to focus on (schol) buildings. Furthermore, it defines what aspects of a building are relevant for the end-users so that the workshop can focus on those aspects. It does so by explaining the 6S-model by Brand as a starting point. Thereafter the end-users, as defined in previous sub-chapter, are connected to the different scales of the 6S-model.

Built Environment

Looking at global carbon emissions, 39% is derived from the built environment (Moncaster, 2021). This is the sum of 28% operational carbon (heating, lighting and cooling) and 11% embodied carbon (materials and construction of new buildings) (Moncaster, 2021). It is striking that even though the impact of operational carbon is regulated in most countries, the impact of embodied carbon is not (Moncaster, 2021). With implementing more circular ways of building, the percentage of embodied carbon will decrease. However, since the impact of embodied carbon is not regulated, the implementation of circular ways of building is depending on a bottom-up approach, possible through end-user participation. This corresponds with the theory of Schönwälder (2020, p. 488): “mission-oriented innovation cannot be top-down”.

The reason that this research focuses on engaging end-users to increase circularity within the construction sector of the Netherlands, is that the construction sector is the biggest contributor in the use of material mass and the third biggest emitter of greenhouse gases, as can be seen in Figure 23. Changing the current way of building to a more circular approach helps to decrease the amount of material mass and the emission of greenhouse gases (Circle Economy, 2021a) and thus take a step in the right direction to reach the Paris Agreement goal.

Figure 23 | Material consumption, added value and carbon emissions of different sectors in the Netherlands (Circle Economy, 2020)

The 6S-model

A concept that is often used when discussing circularity in buildings is the 6S model of Stewart Brand. The concept is that every layer has a different life expectancy and that these layers are not intertwined (Brand, 1994). So when a part of a building needs renewal, it can be changed without wasting the part of the building that is not at the end of life-expectancy. But as the layers are having different life expectancies, they are shearing and the building will eventually have to be taken apart (Brand, 1994), this however will not be taken into consideration during this research. An overview of the different layers is shown in Figure 24.

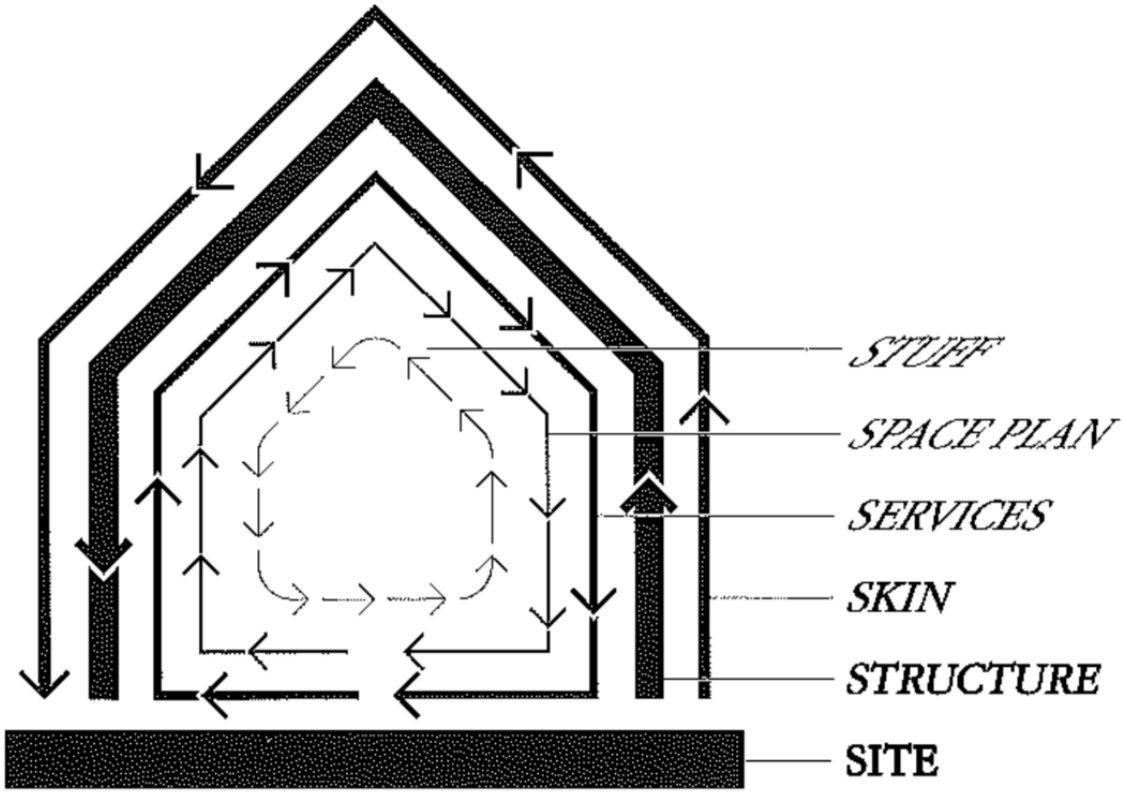


Figure 24 | Shearing layers of change (Brand, 1994)

The meaning of each layer is quite straight-forward, but they will be shortly explained. The site is the place where the building stands. The structure is the construction that supports the whole building. The skin is the outside finishing layer of the building. Services help the building functioning, such as air-conditioning or an elevator. Space plan is the lay-out of the building. Finally, stuff are the objects that are not directly connected to the building. Furthermore, the thickness of the lines indicate the life expectancy of the layer. The expectancy of the site is infinite and therefore has the longest life expectancy. The expectancy of the stuff on the other hand is between a day and a month and thus the layer with the shortest life expectancy.

End-users in the 6S model

As determined in sub-chapter 2.3.1, the end-users of school buildings are teachers, students and support staff. To determine the aspects of a building that are relevant for them, the layers of the 6S model by Brand will be matched with the stakeholder 'end-users'. By doing so, the end-users are given the opportunity to create a vision on the circularity level of those specific scales during the workshop. This will also help to protect those layers by Brand from intertwining.

Steigenga et al. (2015) have determined the responsible actors of the different layers by Brand in a housing project. However, this will be abstracted so that it can be used in this research. The responsibility shows the connection between a stakeholder and a building-scale and is abstracted into relevance. This is depicted in Figure 25.

The actor that is responsible for the first layer, *site*, has not been defined. The *structure* is the responsibility of the community or the landlord according to this figure. In school buildings this is a shared responsibility for the municipality and the school board (De Jong & Arkesteijn, 2013). The public, of which all stakeholders are a part of, is the responsible actor for the *skin*-layer. The landlord is responsible for the *services* of the building. However, De Jong and Arkesteijn (2013) mention that the school board is responsible for the operating costs, this also includes the use of services. The tenant is responsible for the *space plan*. In the case of a housing project, the tenant is the end-user, so *space plan* will also be relevant to the end-users of schools. Finally, stuff is connected to the individual, this also refers to the end-users.

Site			unlimited	Owner
Structure	Community/Landlord	The foundation and load-bearing elements are perilous and expensive to change, so people don't. These *are* the building.	30-300 years	Owner
Skin	Public	Façade, insulation, windows	20 years	Owner
Services	Landlord	Technical, ducts and shafts, electricity, plumbing, HVAC, elevators. Buildings are demolished if services system is too much integrated into the building.	7-15 years	Owner
				Client
Space plan	Tenant	Walls, ceilings, floors, doors. Turbulent commercial spaces every 3 years.	3-30 years	Client
Stuff	Individual	Furniture / mobilia	1-10 years	Client

Figure 25 | Responsible actors of different layers (own image, altered from Steigenga et al., 2015)

This results in the following three layers that are relevant for the end-users to form an opinion on: Skin, Space Plan and Stuff. These appear to be also be the layers that end-users experience on a day-to-day basis when using the building.

The scale and the shorter lifespan of the layers Space Plan and Stuff create the illusion that these layers have less impact on the global environment. However, over the time of 100 years, the space plan has been changed ten times more in comparison to the structure (Figure 25).

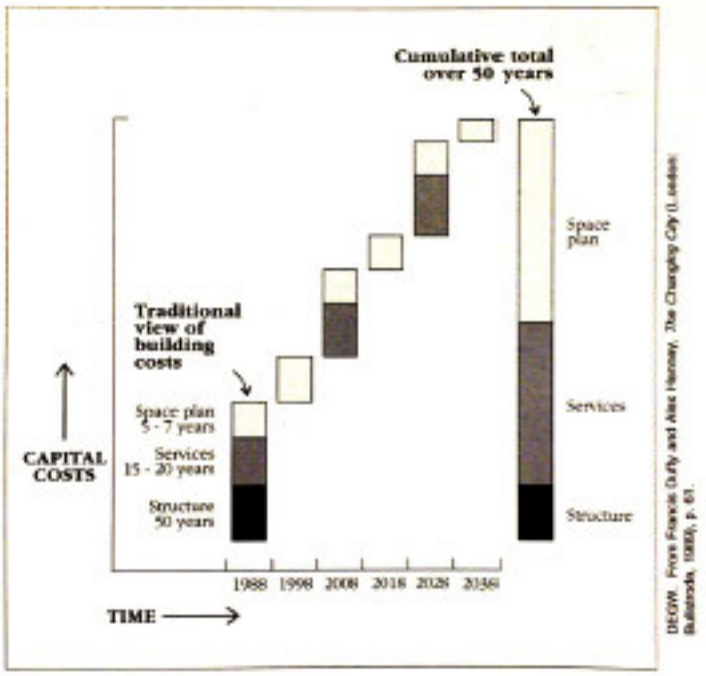


Figure 26 | Impact on costs of different layers (Steigenga et al., 2015)

Comparing this to the costs according to the following figure (Figure 26) by Steigenga et al. (2015) the *Space Plan* in total over 50 years has an eminent impact on the costs. With a relatively low life expectancy this layer adds up to have a bigger impact on costs in this case than S*ervices* or S*tructure*. This shows the influence that end-users can have over a longer period of time.

Relevant Scales according to Interviews
To determine relevant scales to the end-users of schoolbuildings, advisors from ICSAdviseurs are asked on their view during interviews (Appendix A). It appeared that the advisors are divided on this aspect (Appendix B). Although most advisors agree on the scales *Stuff* and *Space Plan* to be most relevant for the end-users to form an opinion on, the third scale is not unanimously determined.
Bram van der Kleij, one of the advisors of ICSAdviseurs, believes that *Skin* is relevant to end-users. However, Teun van Wijk, an advisor at ICSAdviseurs with knowledge on school buildings and participation techniques, states that the *Skin*-layer is often the showpiece of the architect, so the question is if the input of end-users will actually be used. Therefore, he adds *Site* and *Services* to the list of scales that are relevant to the end-users and believes that *Skin* and *Structure* are to be left for the experts to decide on.

Stuff, Space Plan and Site

In this sub-chapter the relation between the different scales of the 6S theory and the end-users of schools are researched. The building aspects that appear most relevant to them, according to literature, are the following three layers: Stuff, Space Plan and Skin. However, the interviews do not totally agree with this, as it is mentioned that even though the Skin is relevant for the end-users, they do not have a lot of input on this layer as it is often a way for the architect to profile themselves. Therefore is decided that the main scales during this research are: Stuff, Space Plan and Site. Even though these layers might seem to have little impact, their short life expectancy makes that their impact is big on the long term.

2.3.3 | Circularity

As defined in chapter 2.2.1, the target state or goal of the workshop is creating a list of circular priorities in the school building. After defining the reason to implement circularity, this chapter researches starting points of circularity and a way to make these explicit to the participants of the workshop.

The Paris Agreement

In the Paris Agreement it is established that the global temperature should not rise more than 1,5 to 2 ºC compared to the global temperature around 1900 (United Nations, 2015). However, research shows that this goal will not be met, even if the Nationally Determined Contributions (NDCs) of the Paris Agreement are followed (Circle Economy, 2021c)(United Nations, 2021) (Ministerie van Infrastructuur en Waterstaat, 2021), this is shown in Figure 27.

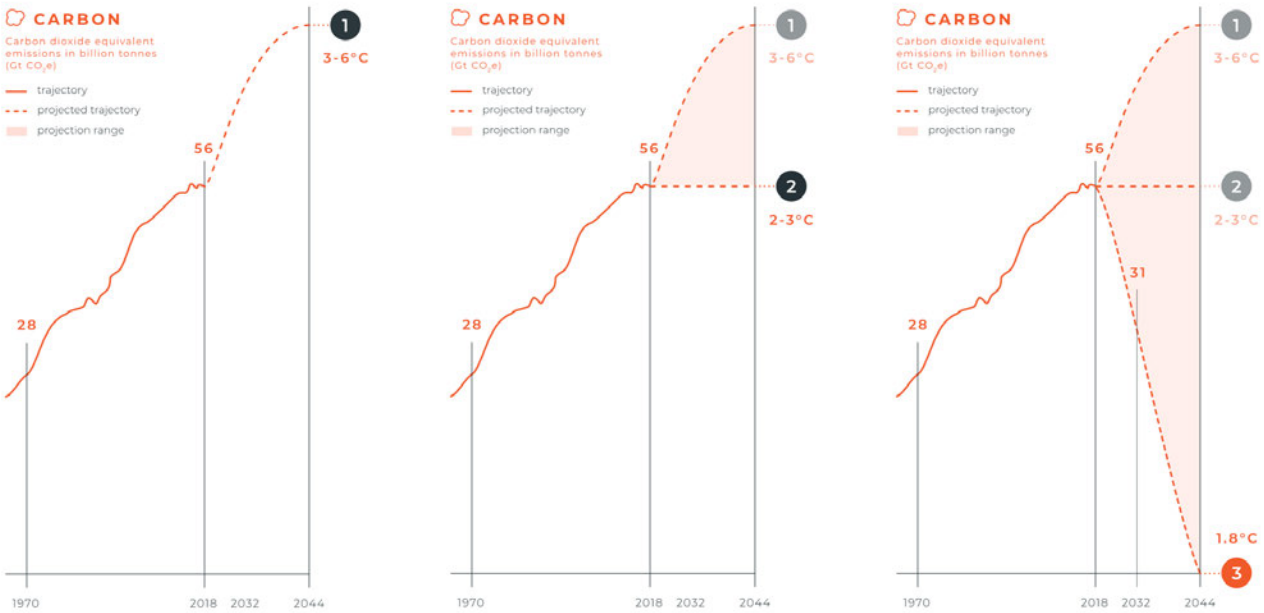


Figure 27 | Scenarios showing the effect of greenhouse gases on the rising temperature (Circle Economy, 2021a)

Figure 27 illustrates three scenarios regarding the temperature rise compared with pre-industrial temperatures. The first graph shows the trajectory if the Paris Agreement would not have been made. The second graph shows the projected situation when meeting the NDCs. The last graph shows the expected trajectory if the global circularity would be doubled. Global circularity is the percentage of materials that enter the global economy and are recycled after use. The third scenario is the only scenario in which the temperature stays below 2 ºC and thus, in which the goal of the Paris Agreement will be met.

So in order to reach the Paris Agreement goal, global circularity should be doubled. This might sound like a big task, but the following numbers will put this into perspective:
At this moment, the global circularity is 8,6%, so doubling means that it has to be raised to 17% (Circle Economy, 2021c). This is less than the circularity level of the Netherlands in 2020, as the Dutch economy was measured to be 24,5% circular (Circle Economy, 2020). However, the circularity level of the Netherlands could be increased up to 70% with the implementation of the proposed interventions by Circle Economy (2020).

Circularity Definition

Hamida et al. (2022) define circularity as *“The capacity to fulfill the loops “closed-reversible chains” for building materials through dynamics in the building configuration and operation”*. This definition suggests that materials are part of a chain and with implementing circularity those materials are not going to waste but become part of a looped system.

Circularity Definition according to Interviews
During the interviews and in the questionnaire all advisors of ICSAdviseurs are asked about their definition of circularity (Appendix B&C). In their answers, all advisors mention something along the lines of: "*High quality reuse of materials*". Some of the advisors also mention the reduction of waste to be an important factor of circularity. However, this is mentioned implicitly in the fact that the reuse is of high quality.

The definitions, on the one hand based on literature and on the other hand retrieved from the interviews, lead to the following definition: "High quality reuse of building materials and elements in a building". This definition is used during this research, and therefore also during the workshop.

Circularity Theories

The first theory is the 10R-ladder and is a way to provide insight in the circularity level of these loops. Figure 28 can be seen as a summary of this theory. The figure shows that the higher on the ladder (R0) the more circular the strategy is. These strategies, or approaches, can be used to define the circularity ambition level for a specific part or scale of the building.

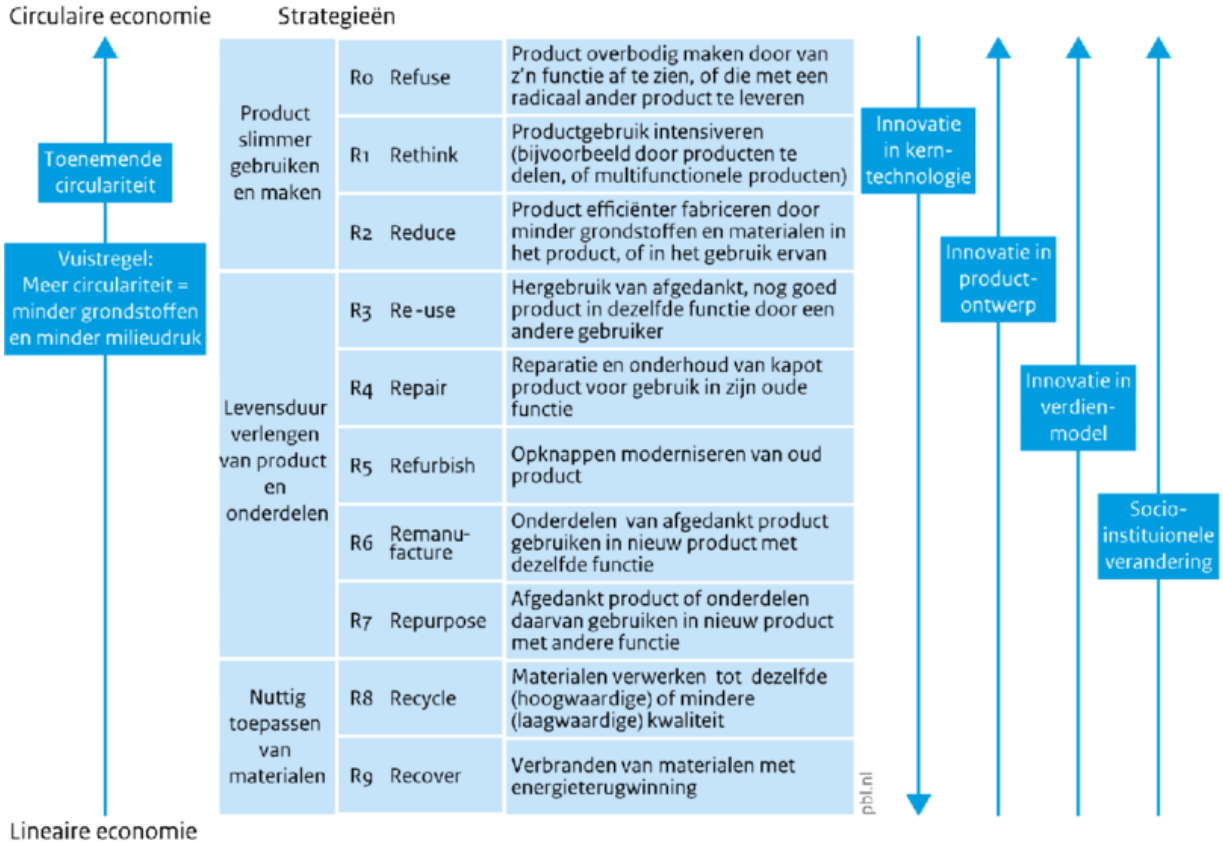


Figure 28 | 10R-ladder (Potting et al., 2016)

Another circularity theory is created by The Ellen MacArthur Foundation and is called the Butterfly diagram (Figure 29). Some concepts of the 10R-ladder can be recognized in the butterfly diagram in the blue cycles. However, the green cycles (renewables) are an addition to the 10R-ladder and therefore this model is introduced.

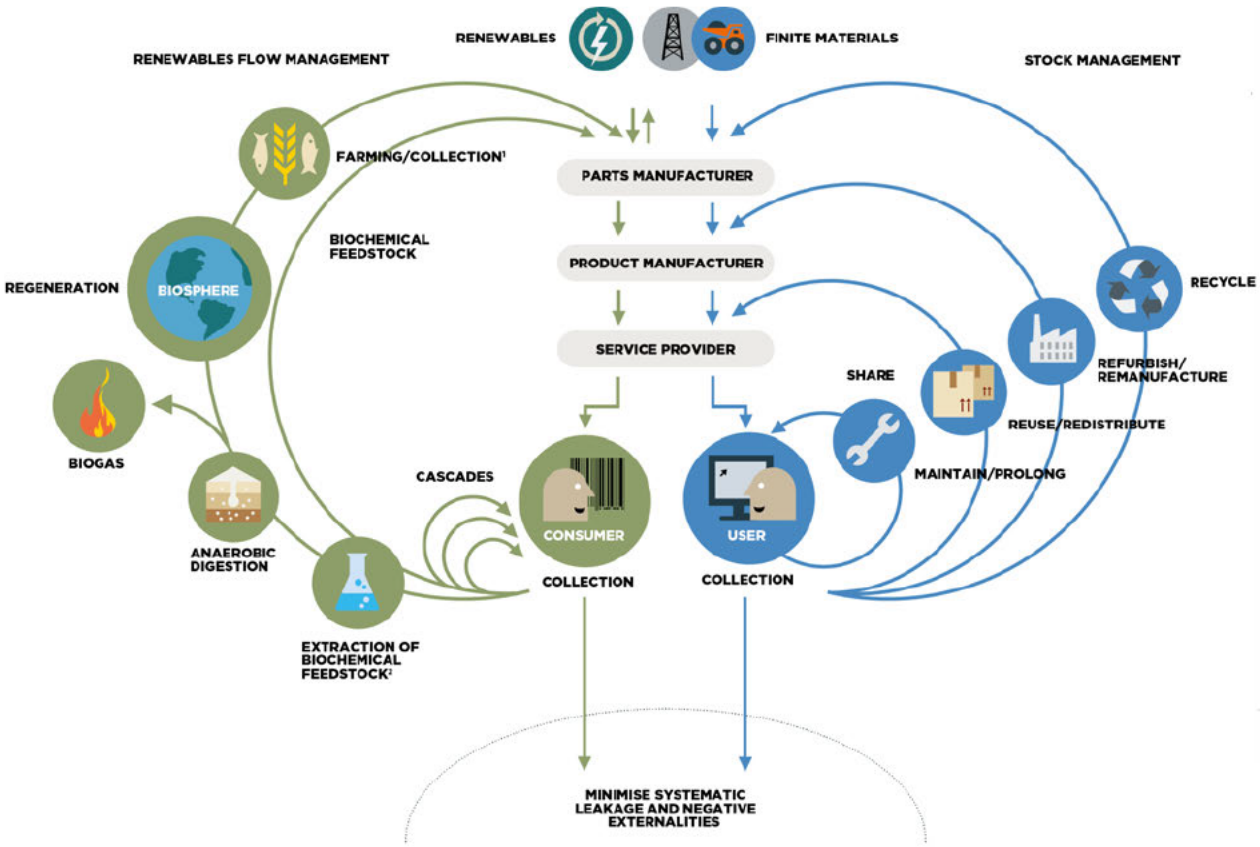


Figure 29 | Butterfly diagram (Ellen MacArthur Foundation, 2019)

Circularity in Practice according to Interviews

From the interview with Bram van der Kleij, one of the advisors on the sustainability team within ICSAdviseurs, it appears that they divide circularity into three categories (Figure 30): reused materials, reusable materials and bio-based materials (full interview transcripts can be obtained from the author). This is the starting point of the simplified theory that is used in this research.

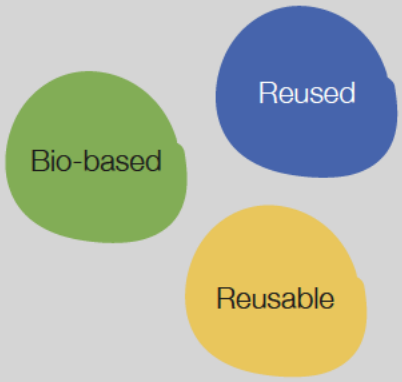


Figure 30 | Circularity Categories at ICSAdviseurs (own image, based on interview with Bram van der Kleij)

Circularity in the Workshop

The first two circularity theories do not match the knowledge level of the intended participants of the workshop (as they are determined in chapter 2.3.1). Therefore the two theories are simplified based on the categories that are used at ICSAdviseurs, as these better match the knowledge level of end-users of schools. This is presented in Figure 31, followed by a short explanation, based on

the different stances as described by Potting et al. (2016). Note that the refuse category is added in this simplification.

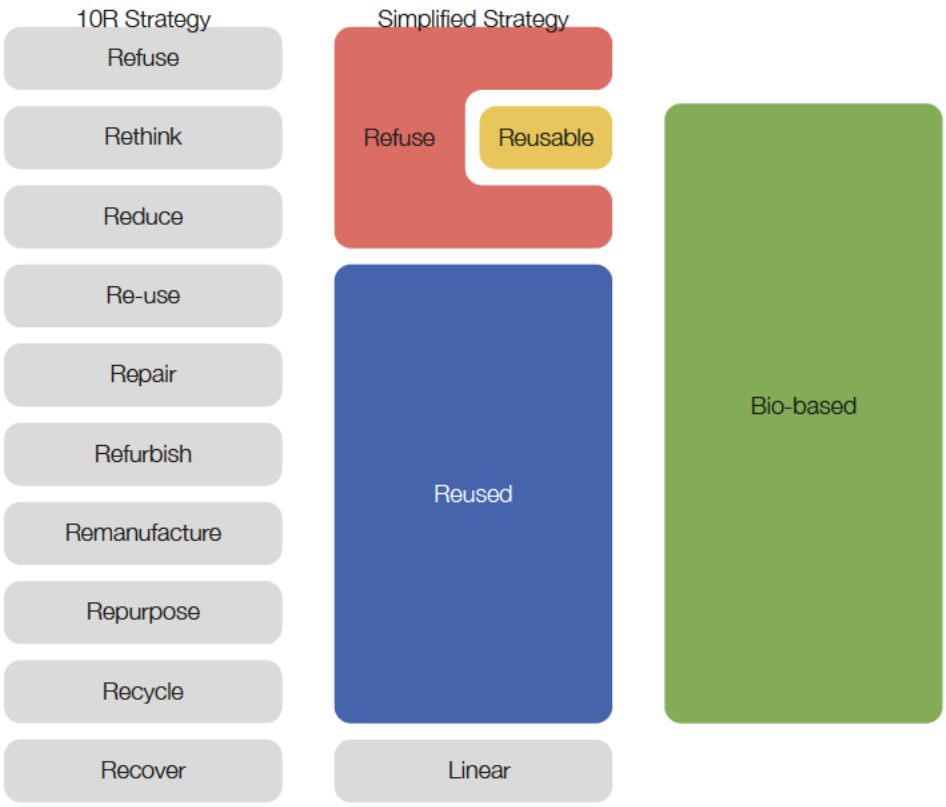


Figure 31 | Simplification of the Circularity Theories (own image, based on Potting et al. (2016), Ellen MacArthur Foundation (2019) and interview with Bram van der Kleij)

Through the *Refuse* step in the 10R strategy, a product is made unnecessary and therefore the materials to create the product are refused. The same goes for the *Reduce* step in the 10R strategy. *Reduce* is about a more efficient approach in using (raw) materials, this relates to *refusing* materials.

The stance *Rethink* is about *sharing* and *multifunctional products* (Potting et al., 2016) it is part of the *Refuse* **and** the *Reusable* stance in the simplified strategy. Following examples will clarify:

1. Through *rethinking* the spaceplan of a building, some rooms might be able to be combined, making the building more efficient. This enables to *refuse* unnecessary square meters.
2. By *rethinking* the design of furniture (before creating it) and designing new furniture with a more modular approach, it is *reusable* in the future.

The *Re-use*, *Repair*, *Refurbish*, *Remanufacture*, *Repurpose* and *Recycle* strategy are all about elongating the life-span of an already existing product through *Reusing* it. This may be after repairing, refurbishing or demounting the product.

In the last stance, *Recover*, the life-span of the product is ended and the product is used to create energy through burning the materials. This will be explained as a *Linear* approach of the product.

In the simplified strategy, the difference between *Reusable* and *Reused* is that reused products are already existing products, whereas reusable products are products that are designed to be transformable. An example of a such product is a modular housing module.

The *Bio-based* column on the right of Figure 31, reflects the renewables cycle in the theory of the Ellen MacArthur Foundation. This category relates to all steps, excluding Refuse and Recover, as it describes the heritage of the material. For example, a wooden table is bio-based and can be reused.

2.3.4 | Conclusion

This sub-chapter answers the sub-question *What circularity aspects are relevant for the end-users of schools?* through literature research and interviews.

The target audience of the workshop are the end-users of schools. Based on literature and interviews these are defined to be teachers, students and support staff. These stakeholders are most related to the building scales: Stuff, Space Plan and Site. That is why the workshop will mainly focus on those three building scales by Brand. Regarding the circularity aspect, the 10R ladder and the Butterfly model are used to define this during the workshop. With the end-users in mind, these theories are simplified through using the categories that ICSAdviseurs uses as a starting point: Bio-based, Reused and Reusable. This leads to a simplified strategy that consists of 5 elements: Linear, Reused, Reusable, Refuse and Bio-based (Figure 31).

2.4 | Filter

As visualised in the conceptual model, the final element of Part II of the research is a filter to create a selection of workshop forms based on the gathered information. With input about the workshop layout gathered in chapter 2.2, this filter is designed to determine the workshop forms that are best suitable for a circularity workshop with the end-users of schools. Based on the information gathered in chapter 2.3, about the end-users and circularity, this filter is shaped to filter the workshop forms to align with all previously researched aspects. In this part of the research the filter is designed and the assessment takes place. Finally, the most fitting workshop forms are mentioned. This is the input for part III, the workshop design.

Workshop Sources

As mentioned in chapter 2.2.1 there are a lot of workshop forms available. This sub-chapter mentions the sources of the workshop forms that are filtered trough the filter in part II and why these books are chosen.

To gain input for the workshop design, workshop forms are needed. Therefore this research consults three different books:

- *Delft Design Guide* (Boeijen et al., 2014)
- *Gamestorming* (Gray et al., 2010)
- *Werkvormenboek* (Van den Ouden, 2016)

The reason for choosing these books is that they are all aimed at another field of expertise and originating from different countries. So two books are written by Dutch authors and the third book is written by American authors. This ensures that the input is through a broad spectrum.

Several workshop forms are mentioned during the interviews as they are a part of the collection of ICSAdviseurs. These are not used as the three sources already provided a lot of different workshop forms.

Filter Design

Figure 27 shows the filter that is created on the basis of foregoing chapters. The left column shortly explains the reason to apply the filterstep that is mentioned in the middle column. The next page of this report elaborates on these explanations. The filtersteps, in the middle, are phrased in the form of a question. Through answering the question, the entered workshop form either goes through to the next question, or be dropped in the right column. The workshop forms that make it all the way through the filter are input for chapter 3.3, these are shown in Figure 27.

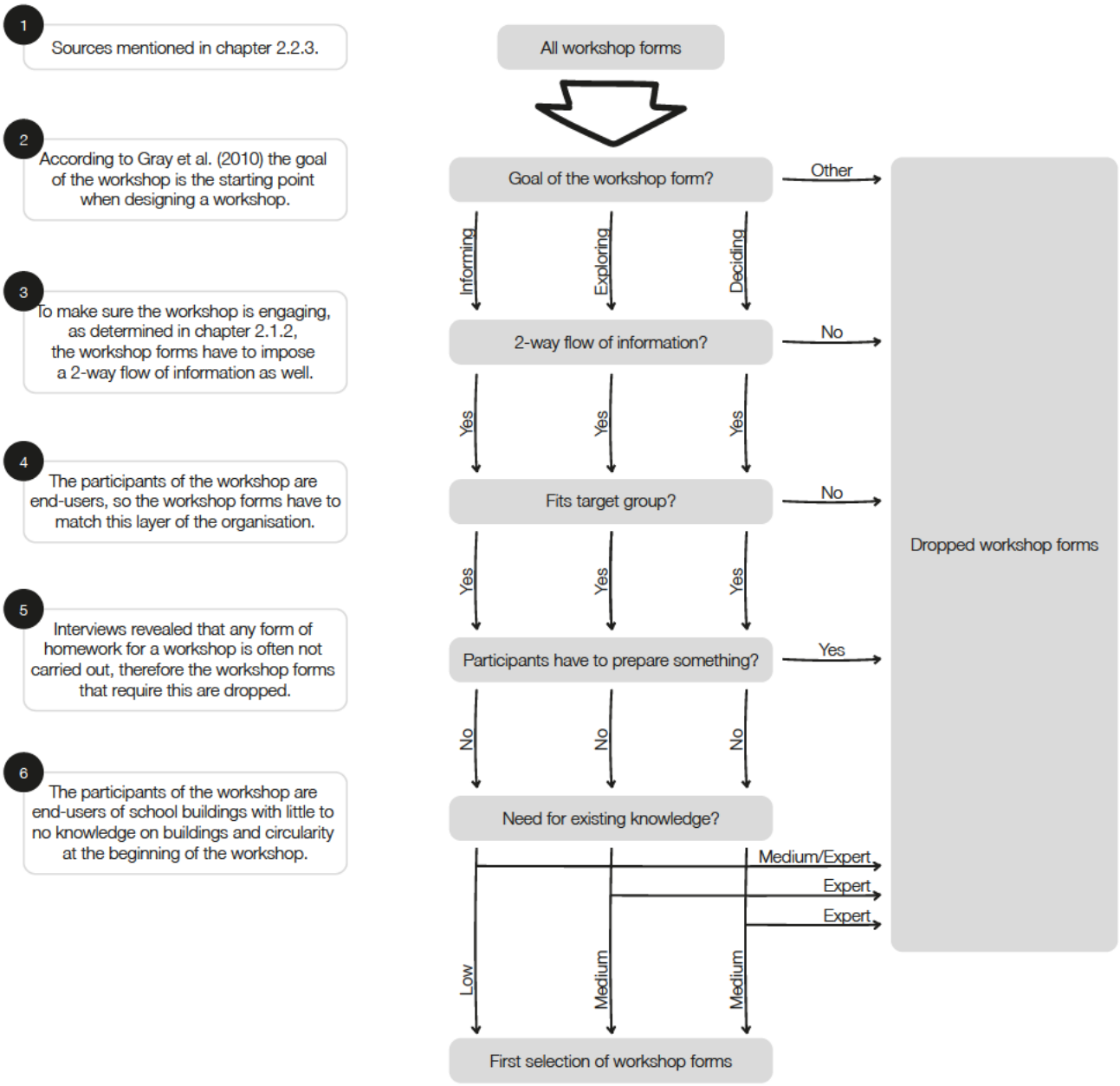


Figure 32 | Filter Design and Explanation (own image)

All explanations in Figure 32 are numbered, so following is a brief explanation per number.

1. Input for the filter are all workshop forms gathered from the sources as mentioned in chapter 2.2.3. All workshop forms go through the filter one by one and are kept organised by book when selected to keep a clear overview.
2. The first filter step is about the goal of the workshop form. This is decided to be the first step because Gray et al. (2010) describe the definition of the workshop goal as the first step of a workshop design. As concluded in chapter 2.2.1, the workshop exists of three parts, all with their own goal, respectively: informing, exploring and deciding. The workshop forms that match these goals go through to the next step. Once a workshop form proceeds being informing, it is not possible to switch the form to exploring for example.
3. The second step is a check if the workshop form meets the engagement-level as determined in chapter 2.1.2. As participation on the engagement-level is the reason for creating a workshop, this is chosen to be in the base of the filter to select matching workshop forms.
4. According to Gray et al. (2010), the second step in creating a workshop is to define the initial state (see chapter 2.2.1). Part of this is to define the participants of the workshop. Some workshop forms are targeted at participants that are, for example, part of the board of a big organisation and therefore less relevant for the target group of this workshop. Another example are workshop forms that are more relevant to designing parties.

5. Some workshop forms require a form of preparation from the participants prior to the workshop. Time is already a tricky point, as mentioned in chapter 2.1 and 2.2.

   In addition, the interview with Chantal Pieterse who is experienced with executing workshops, reveals that homework to prepare for a workshop is often not executed (Appendix B).

6. The final step of the filter is the need for existing knowledge of the participants. This is consistent with defining the initial state and answering the question "What do we know now" (Gray et al., 2010). Before the informing part, it is assumed that the knowledge level of the participants is low. This means that the workshop forms that can be used should not demand too much current knowledge. After informing the participants, they will have more knowledge about the subject. However, as the workshop is aimed at beginners and the goal of this workshop is not to create experts on circularity, all workshop forms that require knowledge on expert-level are dropped.

Assessment

The application of this filter is included in Appendix C. The outcome is shown in Figure 33 and this is the input for chapter 3.3. The outcome is organised per goal (columns) and per source (colours).

Figure 33 | Outcome of the Filter (own image)

* *Not the workshop form on itself, but its concept is interesting for the design of the workshop.*

3 | Design of the workshop

This chapter is about the design of the workshop, based on the information and research in previous chapters. The workshop set-up is determined on the basis of the case and workshop outlines. This is followed by the content of the workshop, what aspects of real estate and circularity have to be part of the workshop. The set-up and the content together lead to the first version of the workshop.

3.1 | Case

As mentioned in the introduction, this research focuses on the development of school buildings. To make this more concrete, this chapter focuses on the set-up of a case. This helps in creating the workshop and enabling to test it under comparable circumstances.

Type of school

This workshop aims to engage all end-users of schools. According to chapter 2.3.1, this includes the students that attend the school of which the building has to be developed.

> It appears from the interviews with Nora Hartman and Teun van Wijk, both experienced with executing workshops, that students from all ages can be engaged during a workshop. However, Nora Hartman mentions that younger students need alternative methods or workshop forms to be engaged, whereas older students can be engaged through the same workshop forms as adults. Teun van Wijk mentions that on the other hand, the experience is that students at a university or 'hogeschool' often need an incentive to participate in these kind of projects, such as credits for their studies.

Therefore, it is decided to design a circularity workshop for a secondary school. The ages of the students attending are between 12 and 18 years old. This gives the possibility to design one workshop in which everyone is able to participate.

Type of development

When a building is not sufficient anymore, different types of development are possible. The existing building can be renovated, extended, sold or demolished. In case of the latter two, a replacing building either has to be bought or to be built. Choosing for demolishment of the existing building and developing a new building is not necessarily the most sustainable choice, but it has some benefits. Firstly, it offers a white canvas, meaning that no existing buildings have to be taken into account regarding the possible circularity interventions. This is the case when renovating or adding to the existing building and when buying a new building. The consequences for the design of the workshop are that it is not guided by any existing situation and therefore can be used in different projects that fit this case-description. Furthermore, the fact that the existing building will be demolished allows the chance for reusing materials from this building into the new building. This case makes the circularity workshop extra relevant. Therefore this type of development is chosen in this research.

Context

The context in which the workshop will be executed is depicted in Figure 34. It shows the timeline from initiative to final brief. As previous research described, the initiative is often from a owner or investor (Figure 13). Regarding school buildings, the initiative comes often from the board or municipality. The end-users are invited to engage in the workshop with ICSAdviseurs. After the workshop, delegates of the participants bring the outcome of the workshop to a board room meeting in which input for the brief will be discussed. In this board room meeting, the delegates can present their proposal and this then can be discussed with the board-members. This is followed by the creation of a draft of the brief by ICSAdviseurs. After the members of the board and the end-users that participated in the workshop have provided the advisors with feedback, a final brief is created.

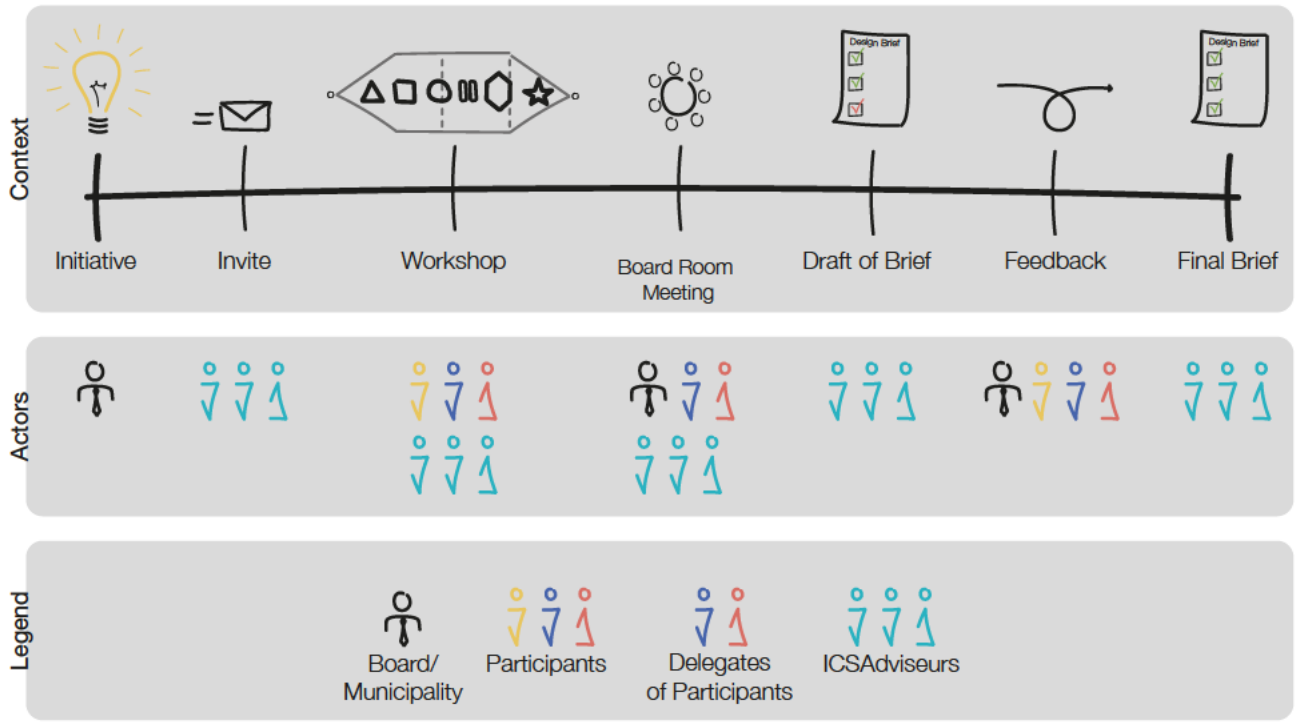


Figure 34 | Context of the workshop (own image)

Case Guidelines

To be able to design and test the workshop, guidelines for a case are defined. It is decided to choose for the case of a secondary school that needs a new school building because of demolishment of the existing building. The choice is based on the intended participants, the applicability and the relevance of the workshop.

3.2 | Workshop Outlines

In order to design the workshop certain outlines are defined. This sub-chapter describes these outlines and explains the reason behind the choices. These outlines are used to further select the workshop forms to use in the workshop design.

Number of participants

There is not an exclusive answer regarding the amount of participants during a workshop. It varies from workshop forms for one participant (Gray et al., 2010) (Stanfield, 2002) to more than 100 participants (Stanfield, 2002).

> Teun van Wijk, experienced with executing workshops, mentions during his interview that he actually conducted a workshop that engaged 200 participants.

Most important is to create a group that is diverse (Schönwälder, 2020) and that is representing for all end-users. With the end-users being students, teachers and support staff, all three groups should be represented by the participants. So in theory a group of three participants would be sufficient. However, to promote interaction the minimum for this research is set on six participants.

Interaction

Different workshop forms have different ways of interacting. Some workshop forms are executed individually and discussed afterwards, whereas other workshop forms are to be carried out by the group as a whole or in multiple sub-groups.

> As becomes clear from the interviews (Appendix B), some participants prefer working alone, others love working in groups to discuss their ideas.

A variety of interaction throughout the workshop ensures that everyone has the chance to give input in a way that suits them best.

Activity-level

It emerges from the interviews that changes of activity-levels are recommended.

> Chantal Pieterse mentions that the energy-level of the participants is often higher at the beginning of a workshop, due to enthusiasm. She recommends to trade a long presentation at the beginning of the workshop for a workshop form that responds to this through being on a higher activity-level.

Duration

During the interviews is has emerged that this circularity workshop has an optimal length of around two hours. This is for different reasons that are all somehow intertwined.

> Jan Willem van Kasteel, expertise on sustainability, mentions that circularity is (currently) more of a side issue in the program of requirements and therefore the time spent on the subject should be in proportion to the other subjects that are to be discussed.

Furthermore, as workshops (or services) cost money, longer or extra workshops are more expensive for the client. This might make a longer workshop or multiple workshops less attractive. On that note, a longer workshop asks more time from the participants, which they often don't have. So a relatively shorter workshop is easier to implement. This might also lead to the shorter workshop being implemented more often than a longer one, resulting in a broader effect (8 x 2 hours versus 3 x 4 hours). Finally, as mentioned in chapter 2.2.2, the fact that the workshop is just 1 session makes it more likely to find enough participants. If the workshop would be split up into multiple consecutive sessions, the participants would have to be available on multiple days.

Workshop Starting Points

So, based on interviews and information gathered in previous chapters, the workshop needs to facilitate at least six people through a variety of interaction and activity-levels for a maximum duration of two hours.

3.3 | Workshop Set-up

This chapter creates an overview of the workshop forms that resulted from the filter in 2.4, related to the workshop outlines in the previous chapter. It is followed by a workshop set-up based on, among other things, the workshop outlines as mentioned before.

Overview of filtered workshop forms

Figure 35 shows an overview of the filtered workshop forms and their properties as they relate to the workshop outlines mentioned in 3.2. The number of participants and duration of a workshop form are given by the source that the workshop form is taken from, the interaction and activity-level are based on the information about the workshop form as mentioned in the source. However, this information is not given in the Delft Design Guide, therefore this is not included in the figure.

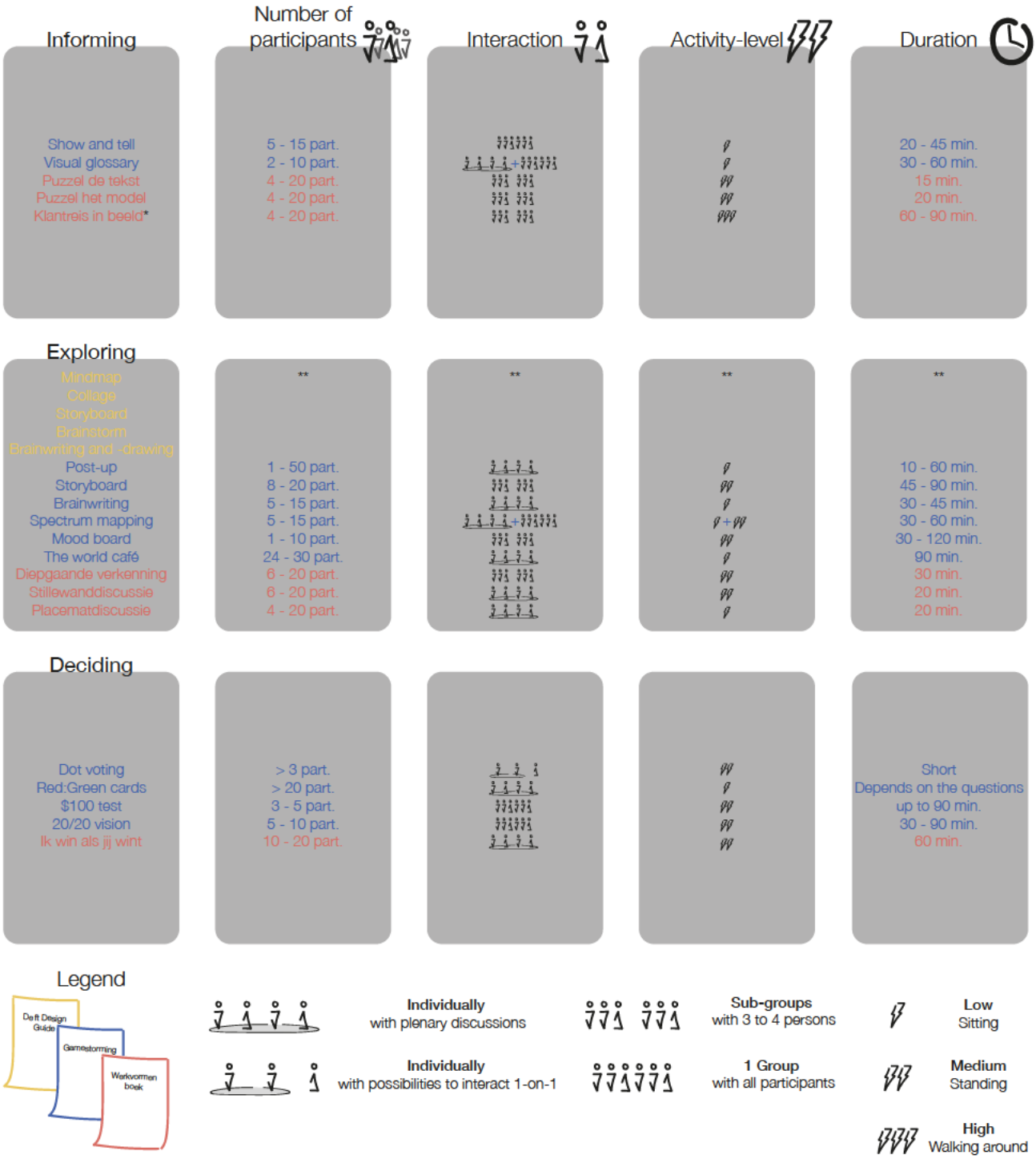


*Figure 35 | Filtered workshop forms and their properties (own image, based on Gray et al., 2010 and Van den Ouden, 2016**)*

Choices of selected workshop forms

Nora Hartman and Jan Willem van Kasteel, both part of the sustainability team at ICSAdviseurs, mention that the emphasis of the workshop should be on the informing of the participants.

Therefore, relative to the other goals, a bigger part of the total time of the workshop is dedicated tot informing.
To ensure that the workshop starts with a workshop form on a high activity-level, the form 'Klantreis in beeld' is chosen for the informing part of the workshop. In combination with a mix of 'Puzzel de tekst' and 'Puzzel het model' it is sure that the necessary information about circularity is transferred and discussed. These workshop forms all take place in sub-groups and have medium to high activity-level. The duration of the workshop form 'Klantreis in beeld' is actually too long to fit in a workshop of two hours, but as the form is filtered for its concept (2.4) the duration is disregarded.
In order to alternate the interaction and activity-level, the next workshop form has to be more individually and on a low level of activity. Multiple workshop forms of the exploring category are eligible, but it is decided to use the 'Post-up' form. With this form it is easy to alternate between individual and plenary moments around different subjects. It is also an alternative to the 'Brainstorm' and 'Brainwriting' workshop forms that are also filtered to use in this part of the workshop. To explore in a more visual way, the participants are asked to make a 'Collage' or 'Mood board'. These workshop forms are part of Figure 36 as well.
Finally, the deciding part of the workshop is shaped by the 'Dot voting' workshop form. On the basis of duration and the number of participants, the other filtered workshop forms do not qualify for the workshop. The 'Dot voting' takes place on the collages/mood boards that are created during the exploring phase of the workshop. This makes is engaging, because of the two-way flow of information.

This leads to the following workshop forms:

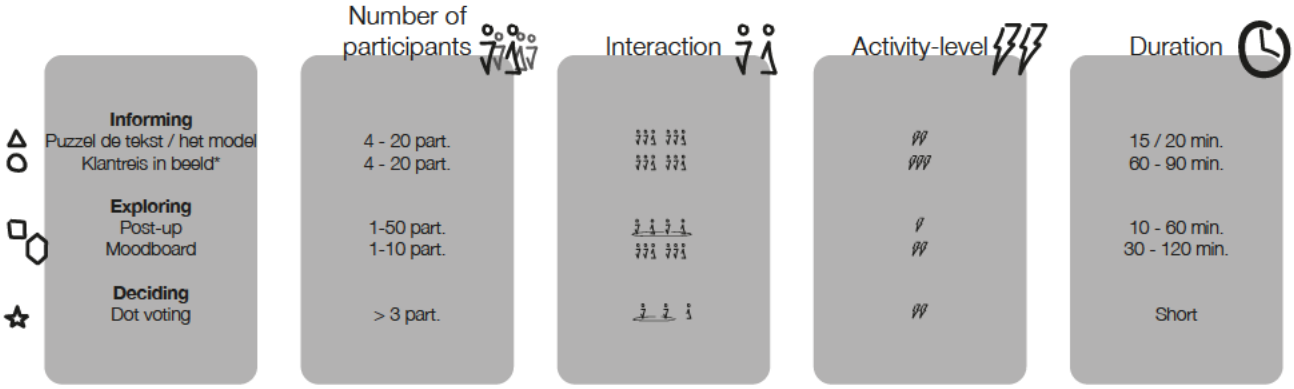


*Figure 36 | Selected workshop forms and their properties (own image, based on Gray et al., 2010 and Van den Ouden, 2016**)*

Initial workshop set-up

The selected workshop forms together create the following workshop design (Figure 37). This is the initial design and the starting point for the remainder of this research.

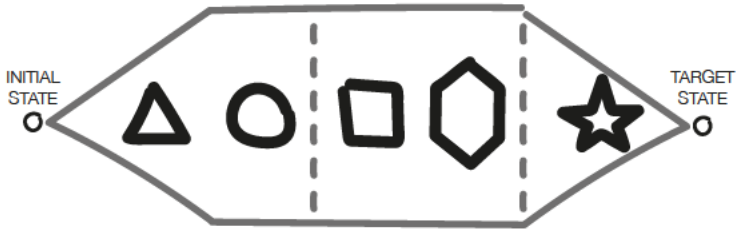


Figure 37 | Initial workshop design (own image)

3.4 | Workshop Content

The end-users of schools typically do not have a lot of knowledge on real estate and circularity as it is discussed in 2.3.2 and 2.3.3. This chapter focuses on simplifying the existing theories to be able to educate the participants in a comprehensible way.

Real Estate

Chapter 2.3 explains that not all layers as mentioned in the 6S-model, based on the Shearing Layers theory by Brand (1994), are relevant to the end-users of school buildings. The layers that are actually relevant to the end-users are determined to be *Stuff*, *Space plan* and *Site*. Therefore the focus is on these layers. However, the other three layers do play a part in the workshop, just to be sure that there is room for any input about these layers. Furthermore, as the terminology might be too abstract, the layers are translated and renamed if necessary.

Circularity

Based on the simplified theory in chapter 2.3.3, the following graphs (Figure 38) are made to illustrate the different categories for the participants during the workshop. The blue arrow is Linear, the orange arrow is Reusable and Reused, the green arrow is Bio-based and the red cross is Refuse.

Figure 38 | Simplified theory as graphs (own image)

Examples according to Interviews

From the interviews (Appendix B) it appears that examples of circular (school) buildings are a good way to enthuse the participants about circularity. On the other hand, the examples can also be too steering and they need good expectation management to not disappoint the participants when choices cannot be lived up to. There should be enough examples to pick from and there has to be emphasis on the fact that not everything will be realised.

3.5 | First Workshop Design

As a conclusion to this chapter, the first workshop design is presented, based on the information in this chapter. First an overview is be shown, followed by a brief explanation per workshop part.

Overview

Figure 39 is an abstract image of the first workshop design. Different workshop forms are chosen to create a variation of interaction and activity-level for the duration of 110 minutes. This leaves some space for an introduction. The first two workshop forms are aimed at informing the participants, as is the first part of the post-it brainstorm. After the break the exploring part begins and the workshop ends with deciding though Dot voting. The total powerpoint of this workshop is added in Appendix K.

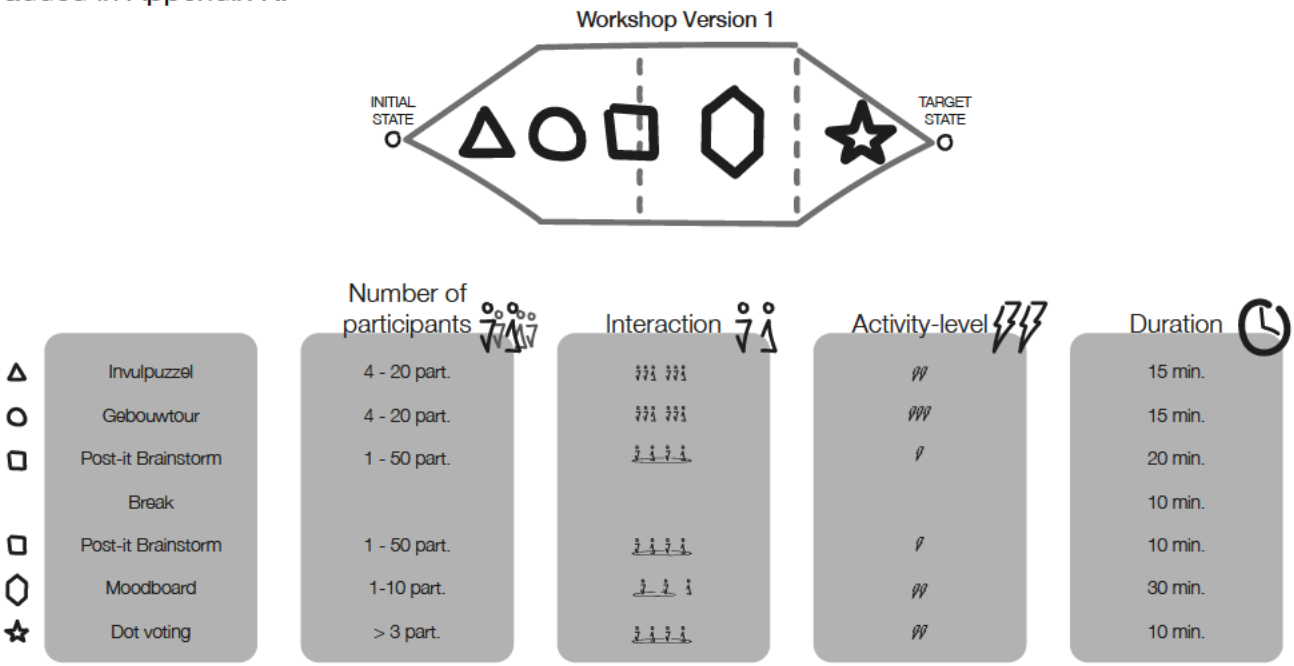


Figure 39 | Workshop Version 1 (own image)

Fill-in

Introduction

The introduction shows the goal of the workshop itself, the goal of the test and the applications because of the test. The program is also shortly discussed.

Invulpuzzel

The goal is to interactively gain knowledge on circularity in buildings. This is achieved by learning by doing through filling a puzzle in sub-groups (Figure 40). The words that need to be filled in the template are given and they need to be glued on the sheet of paper. There will be no additional presentation on beforehand, assuming that the figures are sufficient to guide the participants. The invulpuzzel brings the theories that are discussed in 3.4 together. On the one axis is the simplified 10R theory, with two figures based on the theory of the Ellen MacArthur Foundation. The other axis allows room for the different scales of the 6S theory by Brand.

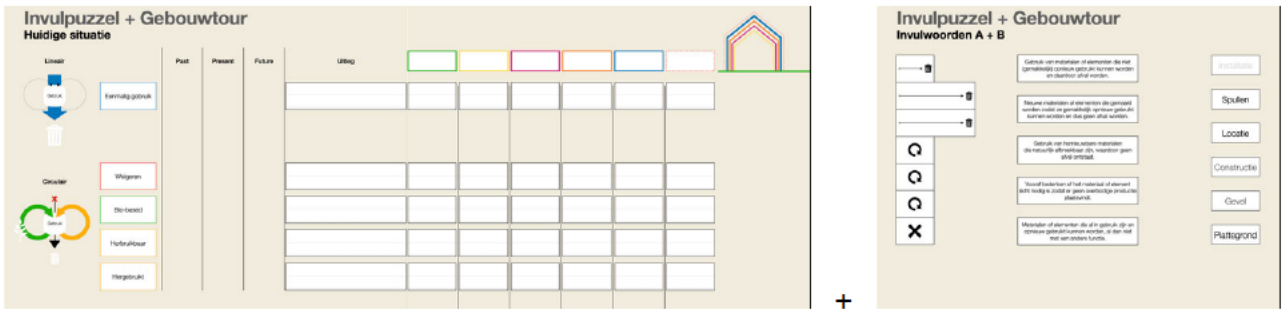


Figure 40 | Invulpuzzel (own image)

Gebouwtour

The goal of the gebouwtour is also to make the participants inform themselves on circularity in an active way. After the invulpuzzel is finished, the sub-groups use their sheet to go though the building and explore the building through the template (Figure 41). In 15 minutes they have to try to fill in at least one square in each row and column. The sheet is absolutely not intended to be totally filled in! This exercise is about assessing their current building on circularity and informing themselves by experiencing the theory in practice.

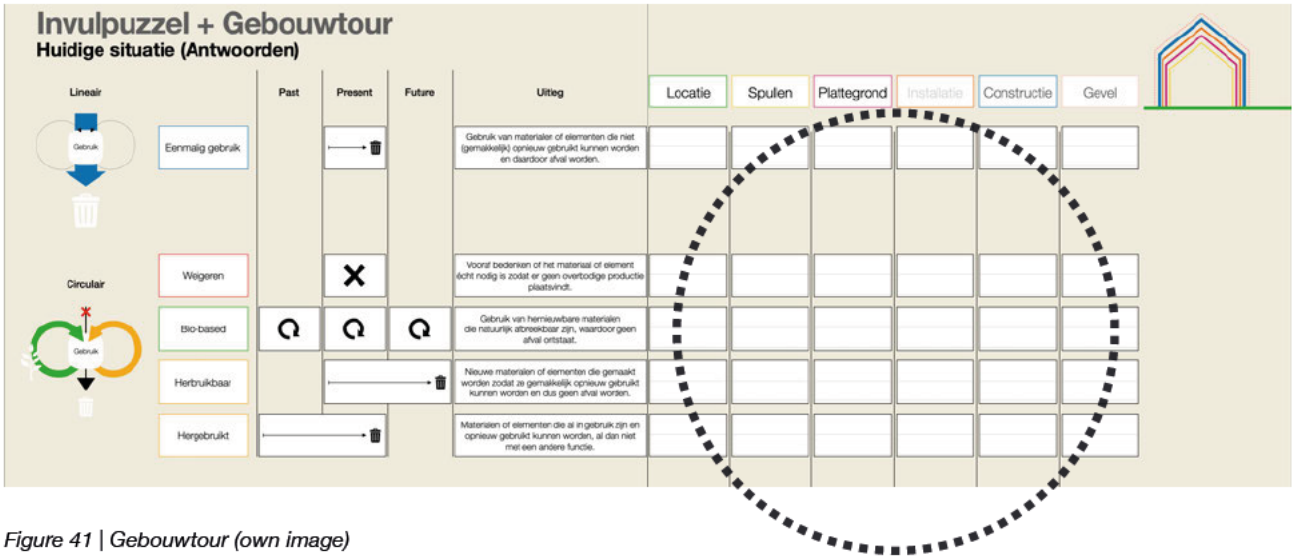


Figure 41 | Gebouwtour (own image)

By executing the first two exercises in sub-groups, the participants can also work together and exchange knowledge to get a grip on the subjects.

Post-it Brainstorm

For the post-it brainstorm, the goal is to share individual knowledge on circularity. After creating a base on the subject of circularity and creating a feeling for buildings, the participant are given a stack of post-its for the next workshop form. On the base of different slides, they are supposed to quickly write down words that they associate with the word or question presented (Figure 42). It makes the participants think about the questions, what is circularity? and why is it important? After the third sheet, all post-its can be sticked on a big sheet that looks like the third sheet.

During the break, everyone can read the post-its of the other participants to gain answers on these questions and the answers can be briefly discussed.

After the break the final question is asked: *Why [do we want] a circular schoolbuilding?* The answers to this question are written down as well and discussed in a plenary session. This is the fist step towards the exploration phase.

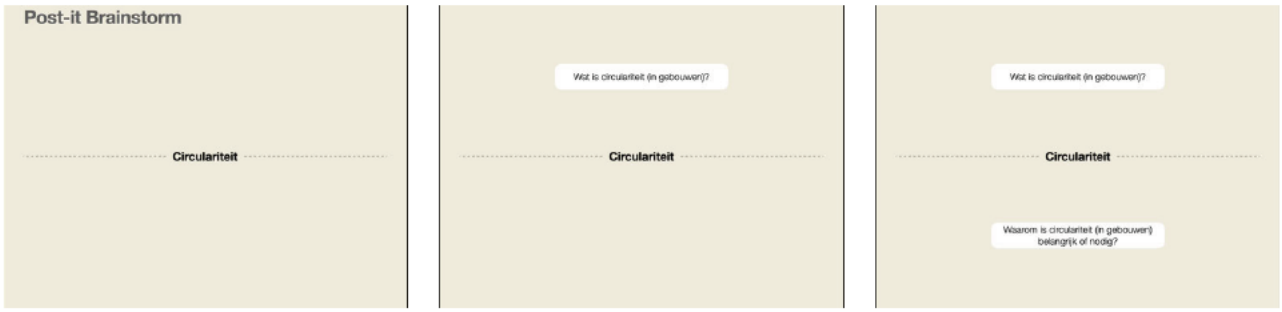


Figure 42 | Post-it Brainstorm (own image)

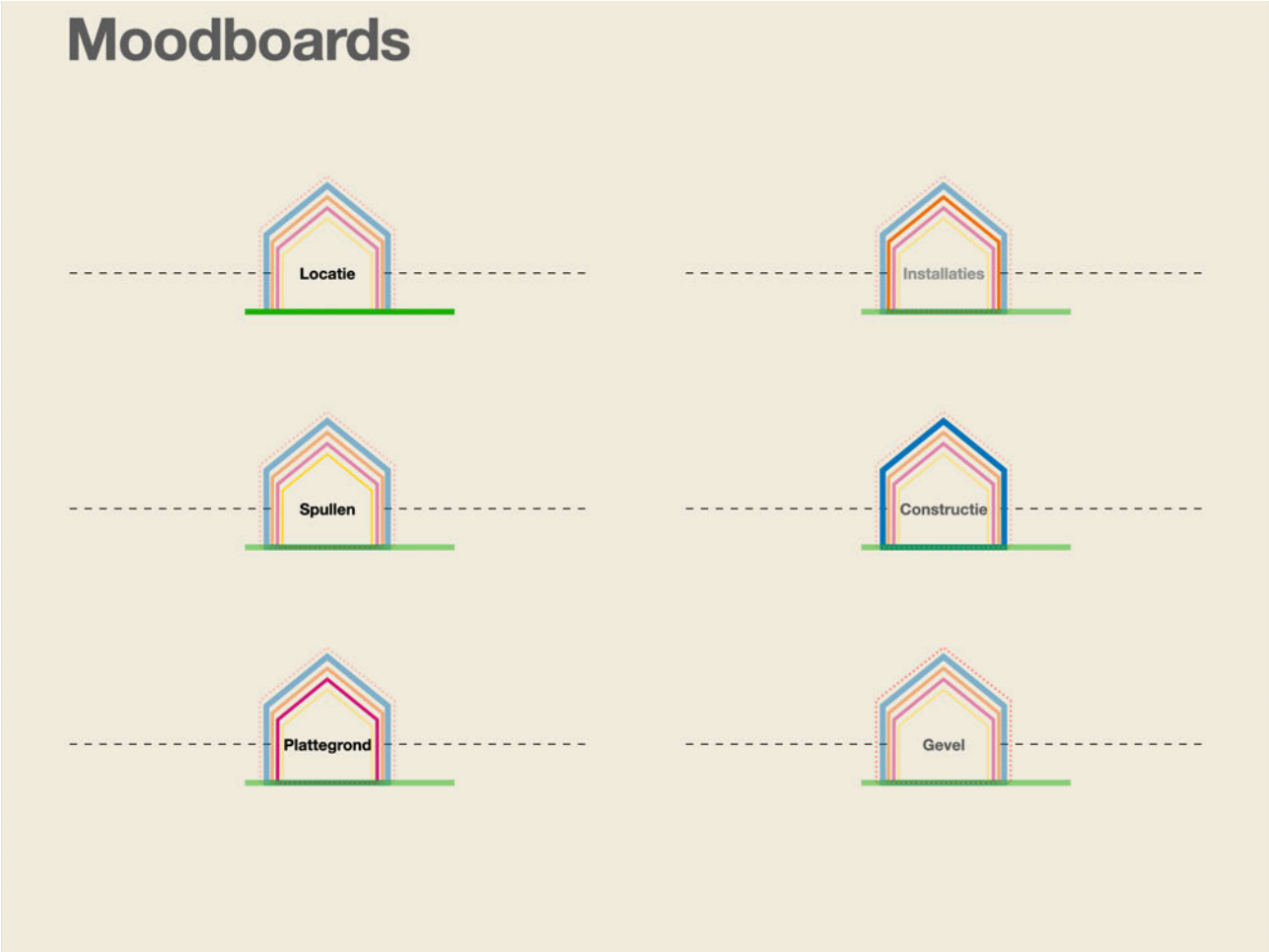


Figure 43 | Post-it Brainstorm (own image)

Moodboard
To explore the subject of circularity, the participants will together be creating six moodboards, based on the different scales of the 6S model by Brand (Figure 43). The goal is to explore opportunities related to circularity and visualise the vision of the future building. A diverse collection of pictures is available to the participants to visualise their ideas about the future building on the subject of circularity. The pictures can be interpreted by the participants how they want, so there is no right or wrong. Furthermore, the provided pictures are not only of circular applications. This gives the participants the freedom to actually choose for circularity, based on their gained knowledge. The only condition is that they have to explain why they chose a certain picture by writing a short note on a post-it.
This workshop form is individual, but it gives the possibility to talk 1-on-1 with other participants about their ideas. As everyone works individually on the same sheets, there can also be discussed or reacted on certain ideas on the paper.

Dot voting
The goal of this workshop form is to decide on the priority of the different ideas that are gathered through the moodboards. All participants get seven stickers with which they can vote on pictures or post-it notes on the moodboards. This allows to inventory the aspects that the participants think are important to implement in their future building.

4 | Reflection on workshop

As becomes clear from the conceptual model, part of the workshop design are the feedback-loops. These loops are created to test and thereafter improve the workshop, according to the feedback from the participants through questionnaires and personal feedback from the designer. The last feedback-loop is based on the input from experts through interviews about the workshop set-up and the feedback from the participants. This chapter focuses on the set-up of these feedback-loops. It finishes with an overview of the different versions of the workshop and how these are influenced by the feedback and finally answers the fourth subquestion: *How is the initial design of the workshop adapted through practical application?.*

4.1 | Feedback set-up

The first two rounds of feedback are conducted with the participants of the test-workshops. The feedback-loops are not identical though. This is due to the difference in participants, as explained in this sub-chapter.

Feedback-loop 1 | Internal simulation

The first workshop design, workshop version 1, is tested with colleagues from ICSAdviseurs. The expertise of this company is in engaging end-users through workshops. Therefore, the participants of this test-workshop all often facilitate workshops, so they can offer a first view on the different workshop aspects and advise on the difficulty-level, as well as provide with tips on how to improve the dynamics of the workshop and to make the workshop more engaging.

The first test takes place in the Van Nelle Fabriek at the office of ICSAdviseurs and is scheduled to be on a Friday-afternoon from 3 to 5 pm. To test the workshop, the colleagues are asked to look through the eyes of the end-users of a secondary school for the length of the test. To not disrupt the workshop for feedback, all participants are provided with post-its to write down feedback during the session. The session starts off rough, as the first exercise is too hard. But regarding time-management and variation of workshop forms, the workshop set-up is right. After the workshop, everyone is handed a questionnaire (Appendix E) on paper to fill in right away to ensure responses. These responses are incorporated in Appendix F. The conclusions/summary of the answers are mentioned per question in the first column of the overview. It is called a semi-structured questionnaire as all copies contain the same questions, but there is a lot of room for notes or personal input by the participants, for example through the post-its. Chapter 4.3 shows how the feedback is taken into consideration to design the second version of the workshop. The powerpoint that is used during this workshop is added in Appendix K.

An important aspect for this feedback-loop is the fact that the workshop should be executable for all advisors at ICSAdviseurs, not just the employees that are experts on circularity. Therefore it is necessary to gain insight on the fact if they could execute the workshop by themselves.

Feedback-loop 2 | Application in Test case

Workshop Version 2 is tested with participants that have similar knowledge to the intended participants. This test mainly focuses on the actual difficulty-level and engagement of the workshop after the adjustments, as mentioned in chapter 4.3.

This test takes place in the Bouwkunde Faculty at the TU Delft and is scheduled on Friday from 4 to 6 pm, similarly to the previous test. During this test-case, the participants also received a set of post-it notes to write down comments during the workshop. After explaining the case, the workshop starts and is taken very seriously by the participants. The flow of the workshop is more naturally and everyone seems to be really engaged during the workshop. Right after the workshop, all participants fill in the questionnaire added in Appendix G. This questionnaire closely resembles the questionnaire in Appendix E, but some questions are tweaked as a result of the answers that are given in the first questionnaire. The answers to this questionnaire can be found in Appendix H and are incorporated in the changelog in chapter 4.3. The powerpoint that is used during this workshop is added in Appendix L.

4.2 | Expert interviews set-up

The final round of feedback takes place through expert interviews. During these interviews, experts on the subject of participation and of circularity are interviewed. Different aspects are discussed: the changes between version 1 and version 2 and the feedback after the different tests. These expert interviews are, together with the feedback from the second test, input for the final workshop design.

The reason to include expert interviews in this research is the extra pair(s) of fresh eyes that take a look at the workshop set-up and workshop content.

In order to set up the expert interviews, a document that contains all the information on the workshop set-up, the workshop-tests and the feedback on the workshop is communicated with the expert on beforehand of the interview (Appendix I). In total three expert interviews are executed, interviewing a total of 5 experts. During the expert interview the document is discussed and several questions are asked. The outcomes of the expert interviews are gathered in Appendix J. Per interviewee the questions differ regarding their expertise. This causes that the answers of the experts cannot be compared literally. Furthermore, it is decided to integrate certain remarks into the final version of the workshop and to leave other remarks as recommendations. This is due to the impact of the remark on the total workshop design. Also the experts were not present during the execution of the workshops, therefore the comments are taken into consideration. Chapter 4.3 will elaborate on the remarks that are processed into the final workshop design.

4.3 | Workshop Versions

This chapter focuses on the different versions of the workshops and how these have been established on the basis of all given feedback. It will provide a total overview of the changes through the research, the changelog. It is presumed that only the changes that are made, are described in this chapter.

Workshop Version 1

The first version of the workshop is designed as described in chapter 3.5 and tested with colleagues from ICSAdviseurs as described in chapter 4.1. An abstract image of the first design is shown in Figure 44.

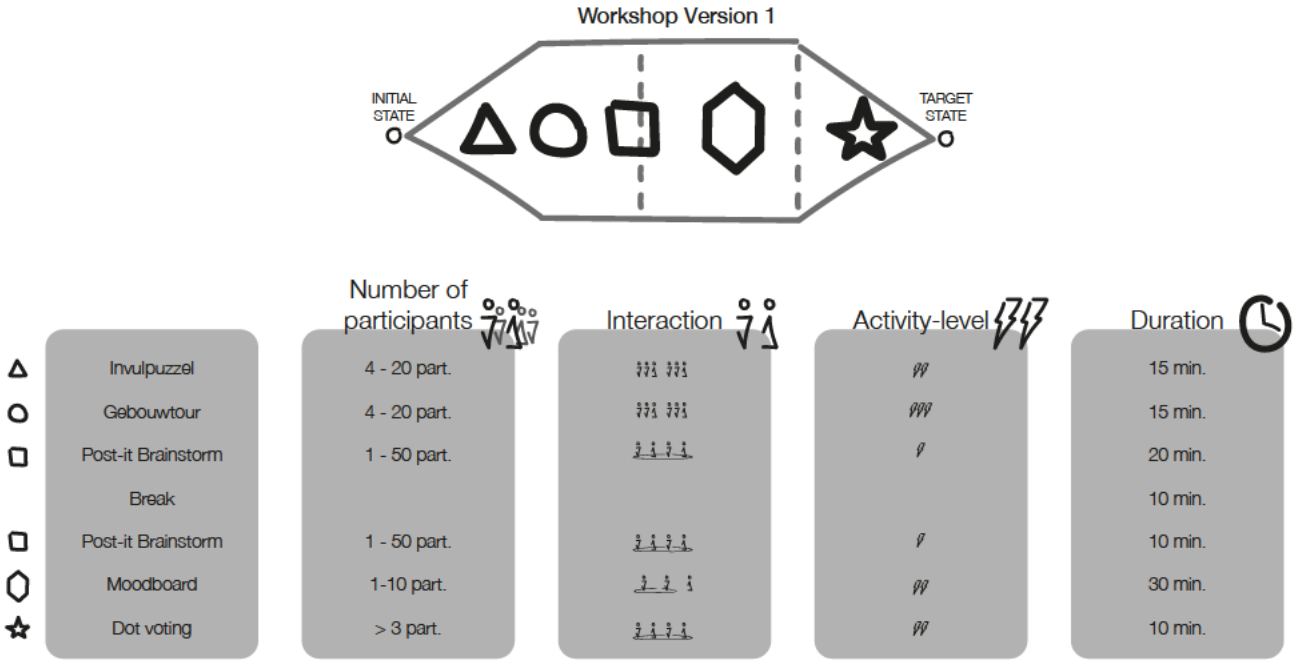


Figure 44 | Workshop Version 1 (own image)

Execution of Workshop Version 1 (own images)

Feedback on Version 1

The most notable points of feedback on this version are described below and this will be the input of the changes to this workshop version, resulting in version 2. The feedback is divided into the different aspects that they relate to, either the content, the set-up or the elaboration.

The set-up of the workshop got the following feedback:

- Good variation of workshop forms;
- Change the order of gebouwtour and the post-it brainstorm;
- Change the order of invulpuzzel and the post-it brainstorm;
- Two hours is a good duration.

Looking at the content of the workshop, the following notes are made:

- Knowledge level of invulpuzzel and gebouwtour is too high;
- Give examples;
- How to assess the pictures for the moodboards;
- Mention what we see on the pictures for the moodboards;
- Divide the references in do's and don'ts;
- Hand out less stickers per participant, maybe 1 red and 3 green.

Regarding the elaboration, the most important aspects that are mentioned by a lot of participants are the following:

- Goal and expectation were not clear;
- Give feedback after the exercise;
- Impact of choices was not always clear.

Furthermore, some individual notes that are good to take into consideration are:

- Make sure that the stuff in the middle of a table are readable for everyone;
- Prepare everything (cutting the cards for the participants);
- Share the solutions on a big screen.

Workshop Version 2

These points of feedback result in the following set-up of the workshop (Figure 45):

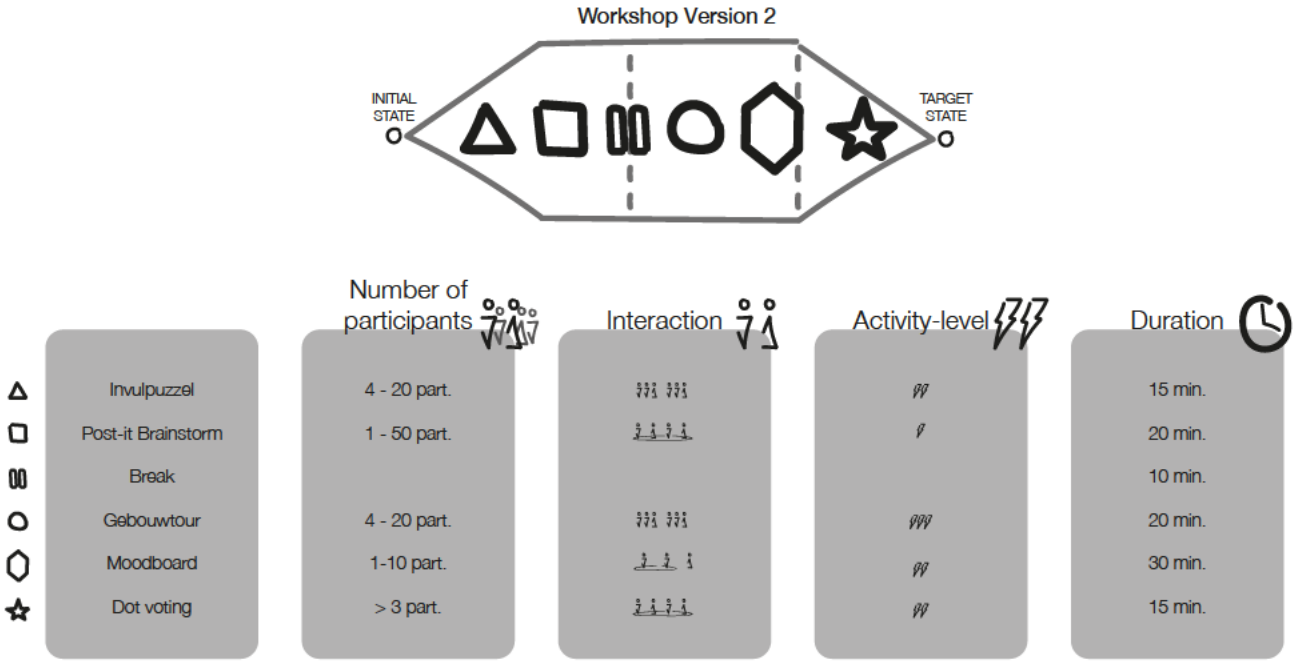


Figure 45 | Workshop Version 2 (own image)

The gebouwtour is changed with the post-it brainstorm. Not only do participants have more background information before doing the tour, the variation in interaction and activity-level are more balanced as well. However, the gebouwtour is now more of an exploring nature.

The content of the workshop has changed in the following parts:

1. In an effort to lower the knowledge level of the invulpuzzel and the gebouwtour, the focus on the 6 scales is changed into focussing on only 3 parts of the building. These parts are selected, based on the information in chapter 2.3.2. These appear in the invulpuzzel, the gebouwtour and the moodboards (Figure 46).
2. The invulpuzzel is changed to make sure it is easier and contains examples, in writing and as pictures, however efforts have been made to keep the information-level on the same level (Figure 46). The template can be used as a giant cheat sheet during the rest of the workshop.
3. The pictures for the moodboards however have stayed the same. By explaining what is on the pictures, they cannot be interpreted in another way. And by dividing them in good or bad, the choice of the participants is influenced.
4. For the dot voting, the participants have received 1 red and 3 green stickers, as proposed by the feedback.

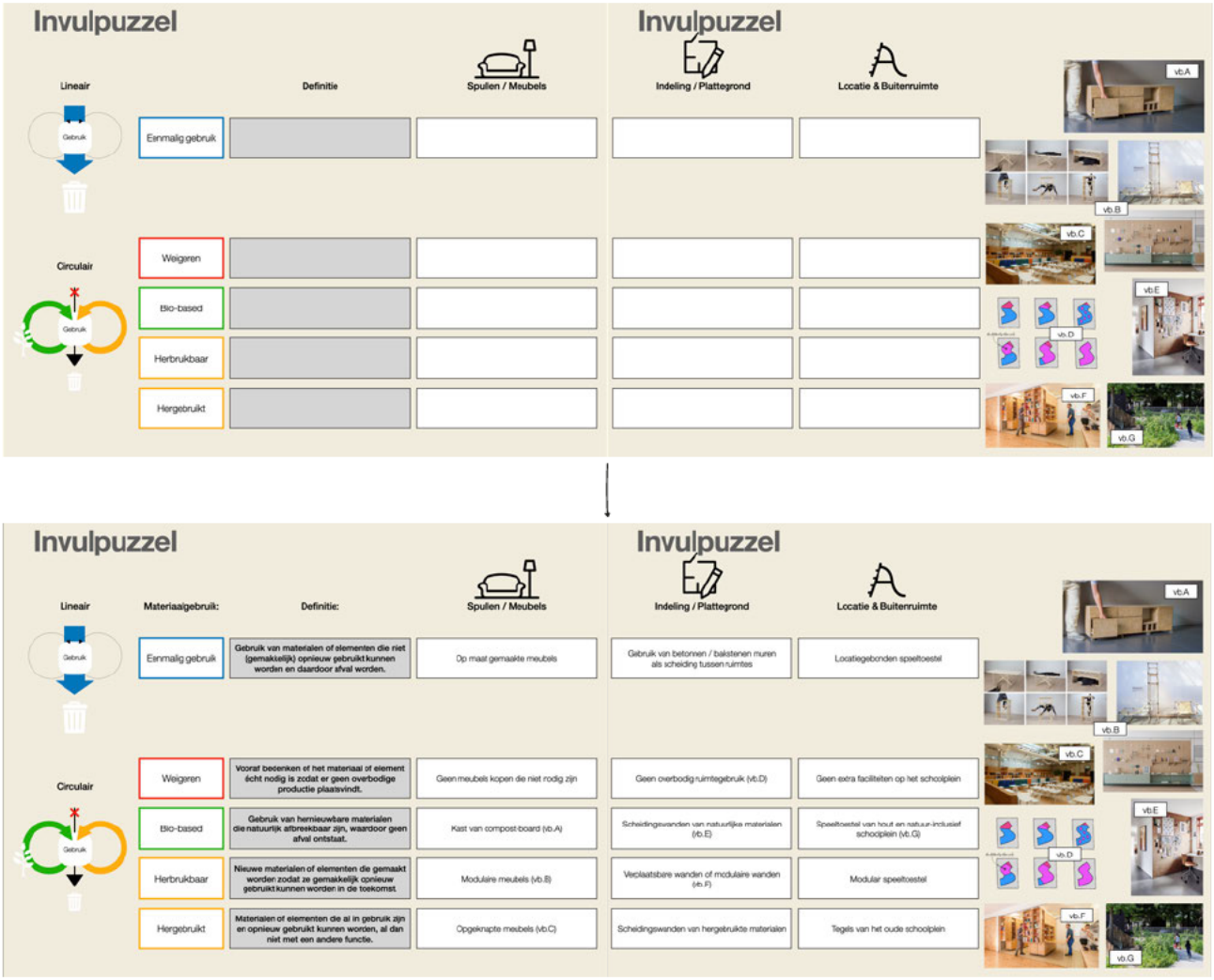


Figure 46 | Improved invulpuzzel, with only 3 scales (own image)

The other notes of feedback, regarding the elaboration, are to be taken into consideration when executing the test of the second workshop version. For example, the introduction is expanded a little bit, to give a bit more context. Furthermore, the emphasis is more on the determining the current situation during the gebouwtour, to use it as input for the moodboards.

Execution of Workshop Version 2

Feedback on Version 2

Most of the feedback on the second version of the workshop is very positive. The main take-aways from the feedback of the participants are:

- The knowledge-level is okay, if the introduction gets elaborated, maybe start with a little bit of back-up information in the introduction (sustainability vs circularity);
- Explain the figures in the invulpuzzel before starting the workshop form;
- More explanation about the goal of the exercise before starting the invulpuzzel;
- Gebouwtour should be better integrated in the workshop;
- Check the terminology of the puzzle to make it clearer;
- Make sure that you take time to explain the workshop form;
- Write down the conclusions during the discussion after dot voting;
- Add an icebreaker in the beginning of the workshop to get in the flow.

An external bystander joined the workshop as a fly on the wall and has also provided feedback (Appendix N). His feedback focuses on the comprehensibility of the workshop and is quite literal, so this will easily be changed in the presentation.

As mentioned before, the input for the final version of the workshop consists also of the feedback through expert interviews (Appendix J). These are the comments that are selected as input for the final workshop, based on their relevance:

- Add a short informative introduction
  - Why are participants doing this workshop?,
  - Explain context (7 pillar strategy),
  - Explain all layers and why the focus is only on these 3 during the workshop,
  - Explain the connection between the workshop forms.
- Plan the gebouwtour before the break to create a buffer;
- Change ‘weigeren’ into ‘weigeren/verminderen’

Workshop Final Version

Based on the feedback mentioned above, the final workshop design is created (Figure 47). In this set-up the gebouwtour and the break have switched places. This is not only logical for the reasons given by the experts, but it also makes sense as the break takes place a little later in the workshop.

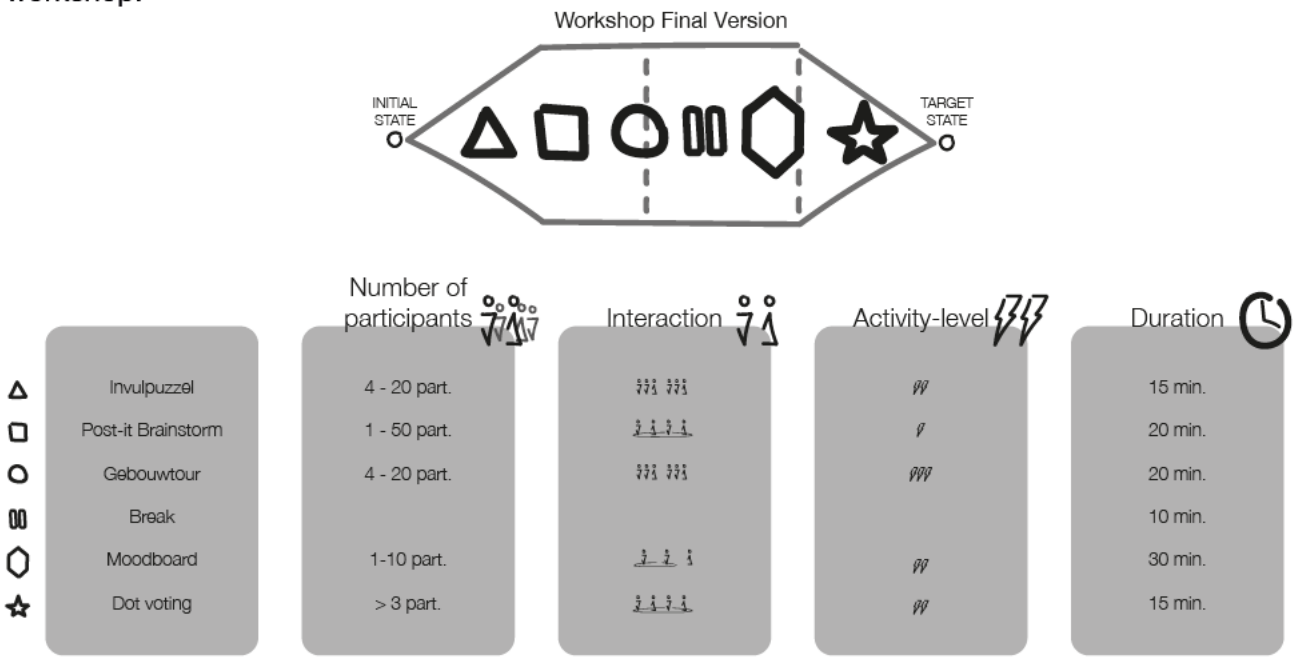
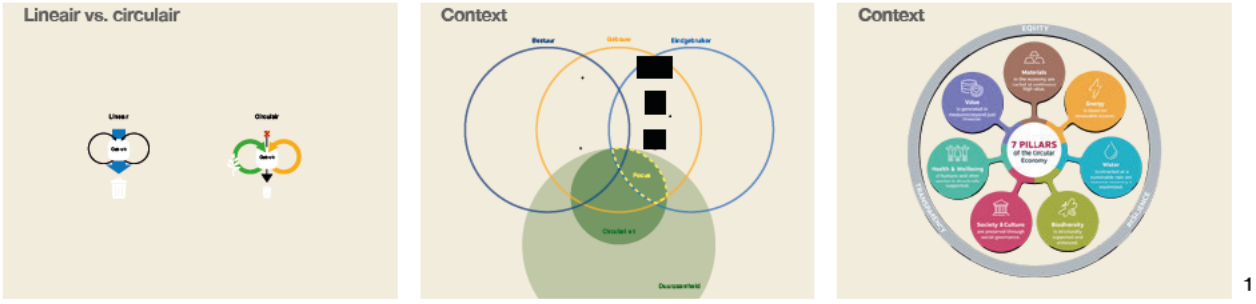


Figure 47 | Workshop Final Version (own image)

The following changes are applied:

1. Information about circularity is added to the introduction as well as an extended overview with the focus of the workshop (Figure 48).
2. Some definitions are cleared up in the invulpuzzel through using different wording (Figure 49). Therefore the template for the gebouwtour is also modified;
3. There are created sheets to gather the 'bijvangst': extra information that is not asked but might be (appear) relevant at another moment.



[1]

Figure 48 | Extended introduction (own image)

[1] https://www.metabolic.nl/news/the-seven-pillars-of-the-circular-economy/

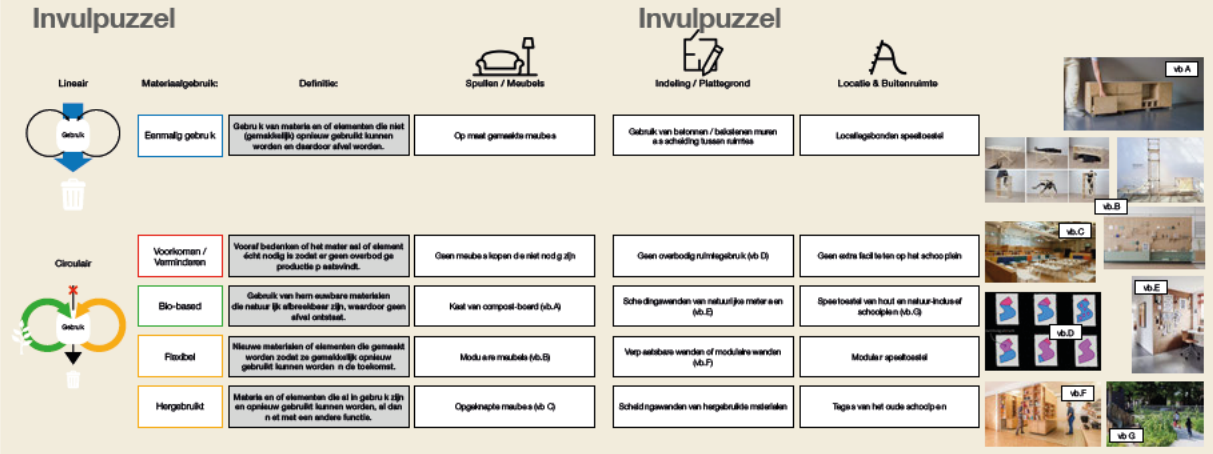


Figure 49 | Adapted version of the invulpuzzel (own image)

Recommendations

Some of the comments from the experts during the expert-interviews are good to keep in mind for future alterations or as alternative for this workshop if that is necessary. These recommendations are based on the feedback in Appendix J:

- The 7 pillar strategy by Metabolic can be used as a starting point to either expand this workshop or to create six other workshops that are related to this one;
- Use the no-wonder workshop instead of the post-it brainstorm, this way it becomes clear what knowledge is already available in the group;
- If time allows it, it could be interesting to add other questions to the post-it brainstorm, such as:
  - "What circularity aspects can we influence within our building?"
  - "What choices have the most impact?";
- By letting someone from inside the organisation select the participants, it is ensured to have enough participants. Naturally, the selection must be varied (age, gender, etc.).

The expert interviews did not provide a conclusion on the dilemma about adding an explanation or explanatory words. It could help in informing and enthusing the participants, but it could also create an overwhelmed feeling. Therefore it is not changed in the final workshop, but it should be taken into consideration after more use of the workshop.

4.4 | Conclusion

Through chapter 4, the following question is answered: How is the initial design of the workshop adapted through practical application? Through testing the workshop in two different settings en asking feedback from different angles the workshop changes considerably. To answer the sub-question, first the changes in the set-up of the workshop are summarised, followed by the changes in the content.

Changes in the set-up

Looking at the following images it appears that the workshop set-up of the first version is different from the final version of the workshop (Figure 50). After shifting the different workshop forms, it leads to a varied program regarding interaction and activity-level. These are significantly improved in the final version.

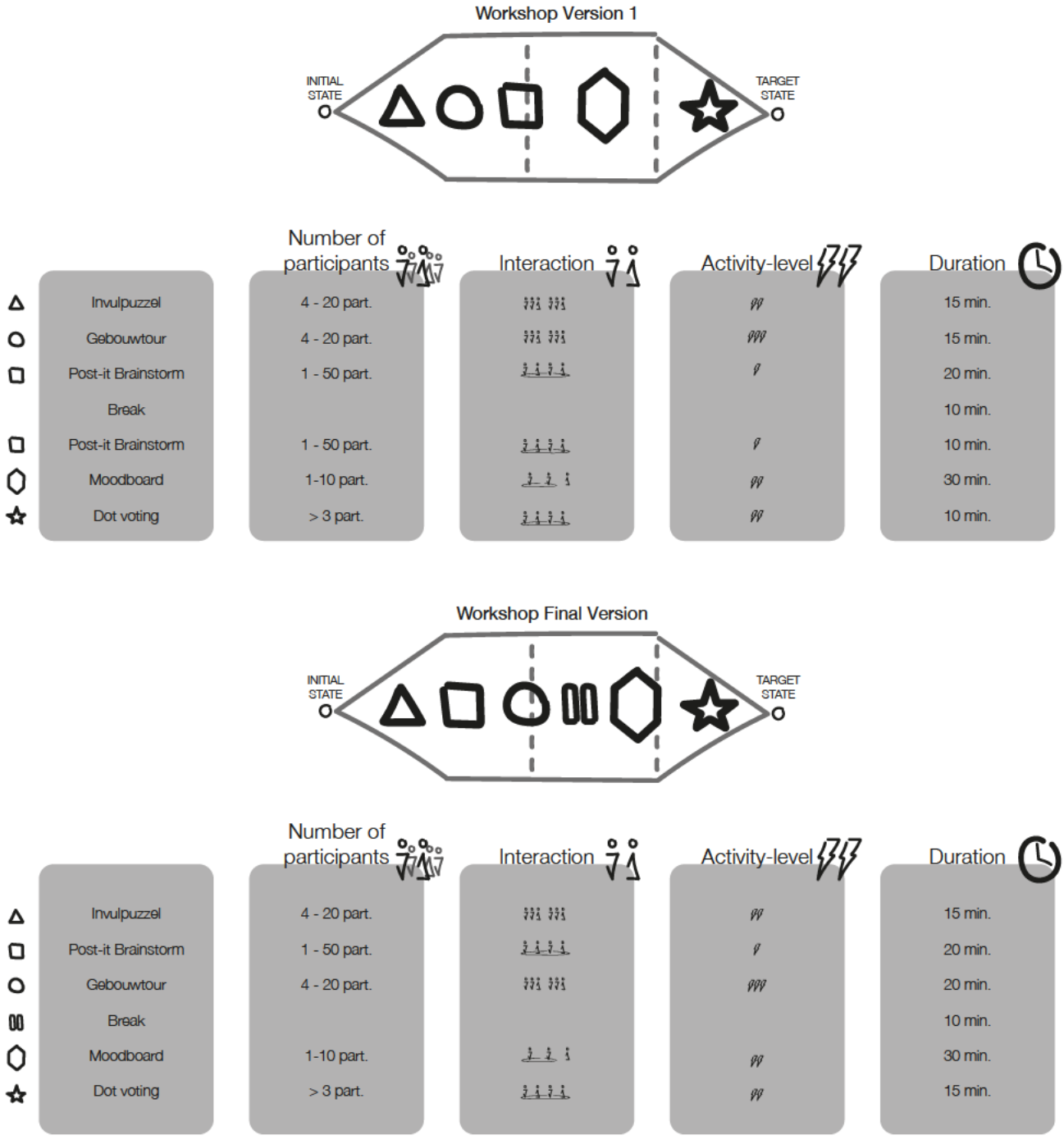


Figure 50 | Workshop Version 1 versus Workshop Final Version (own image)

In theory this variety of interaction and activity-level should also improve the engagement of the participants, as determined in this research. However, as the final version is not yet tested this cannot be concluded for the final version of the workshop. It can be concluded from the feedback after the second workshop version though.

Changes in the content

Regarding changes in the content, the most evident changes are in the beginning of the workshop. An introduction is added to give some context and some background information. Furthermore, the invulpuzzel has changed shape (Figure 51), but the basis of information is still present and presented in a way that is understandable for the participants of the workshop.

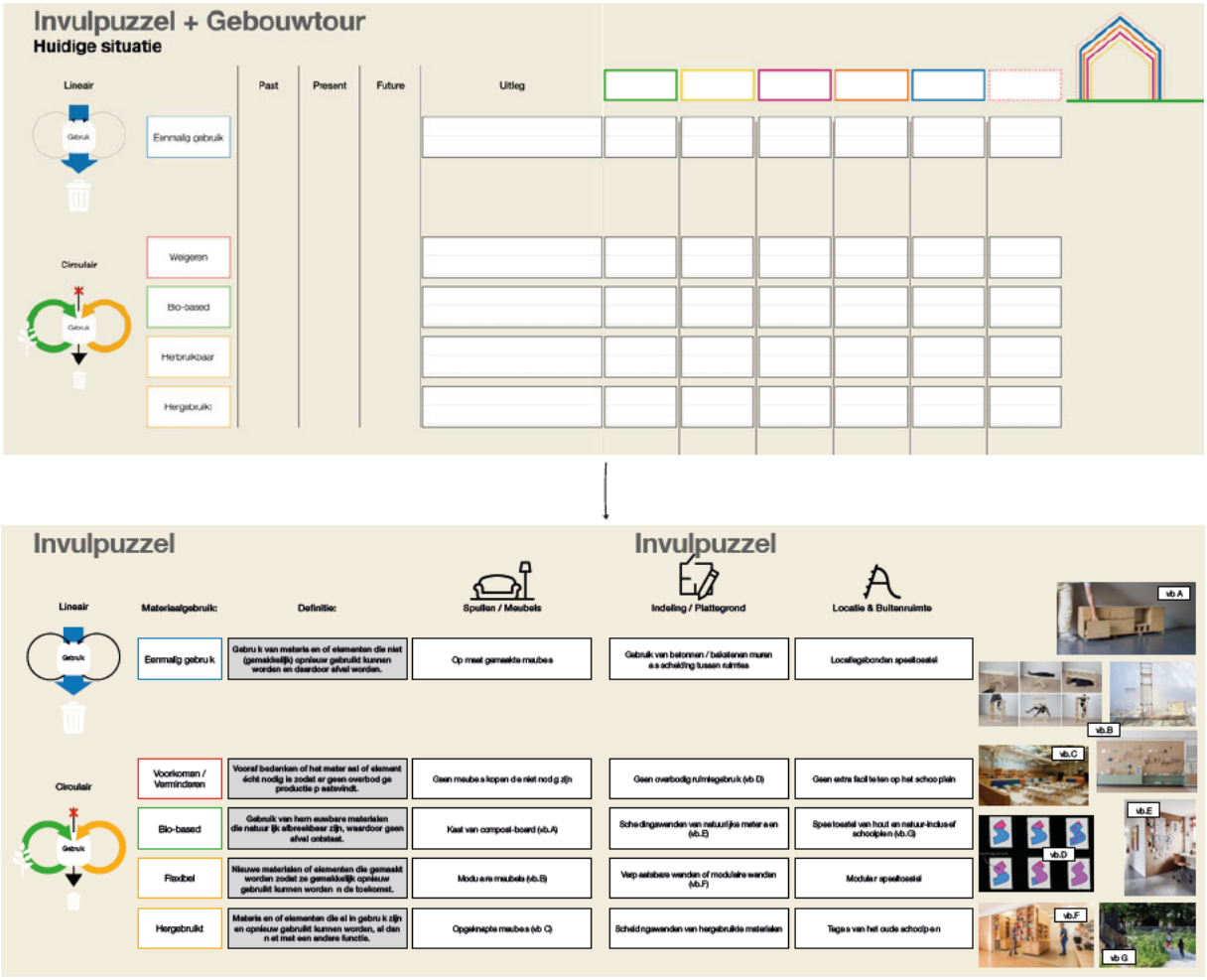


Figure 51 | Invulpuzzel of Workshop Version 1 versus invulpuzzel of Workshop Final Version (own image)

5 | Closing

To close this research, this chapter answers the main research question in the conclusion. This is followed by a discussion that focuses on the limitations, possibilities and recommendations in response to this research. The closing finishes with an academic reflection.

5.1 | Conclusion

In the beginning of this research it is stated that engaging end-users is necessary to create circular school buildings. But ***How to create a workshop that engages end-users of schools in developing a circular school building?*** *The research is shortly summarised before answering this main research question.*

Based on the following definition of engagement: *A level of participation on which there is a 2-way flow of information between authorities and participants* a fitting engagement method is established. Comparison between different sources leads to deciding why a workshop is the best method to engage end-users and this matches the best moment to engage, namely during the definition of the brief (Kaikittipoom, 2019). During the brief definition, the participants have the most impact on the design of a project (MacLeamy, 2004), as nothing is set in stone yet.

In order to design a workshop, the general properties of a workshop are investigated. According to Gray et al. (2010) a workshop always consists of three parts: opening, exploring and closing, and aims at achieving a goal, the target state. This is the starting point of the design of the workshop. Defining the initial state is the next step, according to Gray et al. (2010). Through inventorizing the positives and pitfalls, well-founded choices about the workshop design can be made. A typical set up, consisting of one session, takes less time and secures a consistent group of participants. On the other hand, it does not provide any time between sessions to process the outcomes. Based on the interviews with colleagues from ICSAdviseurs it is decided to create a workshop dat consists of one session, as circularity is a small part related to the other subjects that are part of a brief. The goal of the workshop in this research is to create a list of circular priorities in the school building.

Regarding the content of the workshop, it is to be designed for the end-users of schools, being students, teachers and support staff. These target groups do presumably not have any knowledge on real estate and circularity, this is something that is taken into account during the design of the workshop. Based on the 6S model of Brand (1994), three scales are defined to be relevant for these end-users: Stuff, Space Plan and Site. For the circularity aspect, this research uses two theories to inform the end-users, the 10R-model and the Butterfly diagram.

The variety of research is input for the created filter that is designed to filter workshop forms that fit the goals of the workshop parts. Through filtering the workshop forms derived from three different sources, a first selection of workshop forms is created. These are input for the design of the workshop.

Through setting up a case and outlines for the workshop, five of the filtered workshop forms are selected for the workshop design. Requirements are a 2-hour workshop with variation in energy-level and interaction. The content for the workshop consists of the two circularity theories, but simplified.

As part of this research, the workshop is tested and redesigned in response to the feedback that is provided by the participants. The improved workshop is tested again these participants also provide with feedback. Before implementing the second round of feedback, the two versions and their feedback are introduced to experts in the field of either circularity or participation. With a lot of experience and fresh pairs of eyes, the experts indicate their proposed changes. Some of these changes, in combination with the second round of feedback are implemented to create the final version of the workshop, Figure 52.

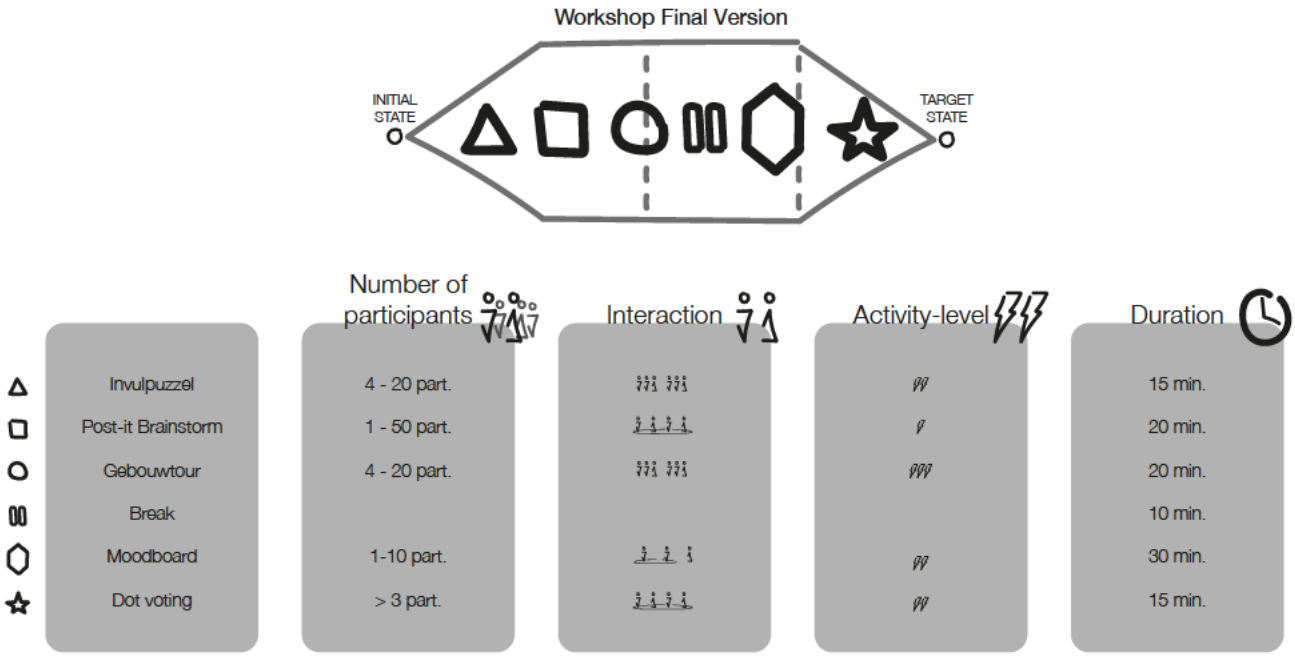


Figure 52 | Workshop Final Version (own image)

So it is defined how to create a workshop, but now is to be established if this workshop is actually engaging end-users of schools. Schönwälder (2020) composed a set of requirements, as mentioned in chapter 2.1.2:

"*According to Schönwälder (2020), citizen engagement has to be **inclusive**, **deliberate** and **influential**. Meaning that the target group should be well represented in its **diversity** and should be provided with enough **time** and **resources** (Shönwälder, 2020). Finally, their impact has to be **concrete**, meaning that the authorities should at least commit to look at the input and let them know any next steps that are going to be taken. However, not only should the engaged provide input, they also play an important role in **evaluating** the final outcome (Schönwälder, 2020). These are properties that the design in part III will be tested on.*"

The workshop allows for all three groups that are considered end-users (students, teachers and support staff) to be represented during the workshop as mentioned in chapter 3.2. This does not automatically ensure **diversity**, but the design of the workshop gives the possibility for all of them to participate in the workshop.

Regarding **time**, the outcome of the questionnaires (Appendix F & H) is positive, the workshop is thought to have the right duration. However, the **resources** of the workshop are maybe an issue. This will be discussed in the next chapter.

To ensure that the impact is **concrete**, the outcome of the workshop is presented by (at least) two delegates of the participants, as mentioned in chapter 3.1. This chapter also discusses that the **evaluation** of the brief is executed by the board/municipality as well as by the participants of the workshop.

So to answer the main research question, the end-users of schools in developing a circular school building will be engaged through the workshop as it is designed through this research.

5.2 | Discussion

This discussion touches upon the limitations of this research and offers a broader view to discuss possible opportunities of the research.

Limitations

During the feedback-loops a lot of feedback is received. Because of the quantity and the contradictions between some of the comments, not all feedback is processed in the different versions. It is aimed to process the feedback that is mentioned multiple times by different people, but it is possible that this is not achieved.
Something that could have influenced the feedback is the fact that these workshops were executed by one facilitator, instead of two as is common at ICSAdviseurs. To add to that that the facilitator did not really have any experience in facilitating workshop.
Thirdly, the test of the second workshop is executed with the help of family and friends as stand-in participants. They are selected because of their similarities to the intended participants (ie. no expertise in real estate or circularity) and are instructed to not go easy on the questionnaire. But for at least one participant this was not possible and therefore their input is dropped. Maybe this also has been the case with other participants, but at least it has not been as obvious.
Another limitation is the fact that the conclusion is (partly) written based on the feedback on the second version of the workshop, assuming that the last version is actually an improvement. However, this is not sure as this workshop version is not tested.
The final limitation is, as the previous point states, the final workshop is not tested. As a big change is made in the background information provided in the introduction of the workshop, it is not possible to give a decisive answer if the participants are provided with enough resources.
A limitation of the research itself is the fact that during Part II of the research, only colleagues from ICSAdviseurs are interviewed. As they all have a similar source of learning about workshops and no real academic background on this aspect, their answers might not reflect a broad spectrum on this subject.

Possibilities

As the background information on real estate and circularity is quite abstract, this workshop might be applicable on different cases as well. It does not necessarily have to be a secondary school building that is to be demolished and rebuilt. The most important thing that is to be taken into consideration when repurposing this workshop is the knowledge level of the intended participants as this workshop really focuses on people with little to no knowledge on circularity and real estate.
In line with previous possibility, Teun van Wijk mentioned during the expert interview that this workshop could also be the starting point of an “informing and exploring” session that is offered to schools, or other businesses, that are not transforming their real estate.
This research describes how to design a real participation process. This theory can be used to design participation processes for other purposes and to prevent fake participation processes in the future.

Recommendations for further research

Application of participatory processes on a large scale are scarce. This research might be able to support systematic research into a method for the designing of participation processes.
Secondly, as one of the main steps in this design process, the application in a test case, could not take place because of a low turnout, it might be interesting to investigate the reason behind this. Are people not interested in the subject or is it due to a lack of time? Maybe the the step of engaging to execute the engagement has to be researched.

And of course, as the final workshop is not yet tested, take the liberty to keep improving the workshop!

5.3 | Reflection

This reflection focuses on two parts: An explanation of the research results & design in the final phase, touching on product, process and planning. And an explanation and evaluation of the approach.

The main product of this research is the design of a circularity workshop. I started this process wanting to create a workshop, as just writing a thesis seemed too boring. However, to academically substantiate the choice for the engagement tool, it was necessary to stay openminded. The desire of creating a workshop might have subconsciously influenced the research, because in the end the tool that was proposed through the research: a workshop!

From the beginning the set-up of the research, visualised in the conceptual model, had been determined. It changed shape through the different versions of the report, but it is almost executed as planned. The two main alterations in the model have been the second test-workshop and the input from the experts.
The test-workshop did not take place at an actual case of ICSAdviseurs as intended. Due to a lack of subscriptions, the minimum of six participants could not be achieved. On short term an alternative had to be set up, as the P4 was approaching. After attempting to find a new case to test the workshop, matters were taken into my own hands and I asked (almost) everyone that met the criteria to join the second test-workshop. Finally, six people were gathered to test the workshop. This was very stressful and it took a lot of extra time, but it showed me that I am flexible and resourceful.
The input from the experts was planned to be through an expert panel. It turned out that this is really hard to set up due to the personal agendas, so it was decided to gather the input through interviews. In the end I think this was not a bad choice, as more than once information from one expert interview was used as input for another. It allowed me time to let the information of an interview sink in and ask about uncertainties in the next interview.

It has not been an easy subject to catch in an academic research as workshops are a very practical application. This is also reflected in the first year of the Graduation Laboratory. Due to poor planning skills and a lack of motivation now and then, I had to retake the P2, twice. This really bothered me and was quite frustrating sometimes. After passing P2 the realisation landed that, even though it often feels like that, I am probably not alone in these struggles. Something that really helped me into realising this, was to enlist the help of a student counselor. Jokingly with my roommates, I always call her my cheerleader.

Together with a steady team of mentors, the third half of the Graduation Laboratory went considerably better. Towards the end I feel like I am more in control of the research and in realising my (academic) needs, where a year ago I was very depending on the input that my mentors would provide. I also feel that I can focus better on the important parts than at the beginning of the Graduation Lab. However, both my control and my focus can still be improved.

The upcoming weeks, I will be focusing on the final presentation. I want it to reflect my research through form. I don't know if I am going to design another workshop, but I am sure that it is not going to be a simple presentation, as just telling a story seems too boring…

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Appendix

Appendix A | *Interview Questions*

Algemeen
Workshop Ontwerp Ω
Workshop Invulling (Circulariteit) ∞
Workshop Uitvoering ~
Workshop Evaluatie Δ

Het doel van mijn afstudeeronderzoek is het opstellen van een workshop om eindgebruikers te betrekken in het maken van keuzes over circulariteit. Deze workshop kan uiteindelijk dan ook volledig of gedeeltelijk door ICSAdviseurs gebruikt worden. Dit doe ik aan de hand van de hoofdvraag: "Hoe creëer je een workshop die bijdraagt aan het betrekken van eindgebruikers om circulair sociaal vastgoed te ontwikkelen?". Op dit moment ben ik bezig met het invullen van een framework, zowel met werkvormen als informatie over circulariteit.

1. Kan je kort vertellen wat jouw rol is binnen ICSAdviseurs?
   - Wat zijn je dagelijkse bezigheden?

2. ∞ Wie worden door ICSAdviseurs gezien als de eindgebruikers van scholen?

3. ∞ Hoe zou je circulariteit omschrijven?
   - Hoe verhoudt dit zich tot het begrip 'circular economy'?

   Circular Economy: Een economisch systeem dat zich richt op de verandering van de manier waarop de samenleving is verweven met de natuur, met als doel om de uitputting van bronnen te voorkomen, energie- en materiaalkringlopen te sluiten en duurzame ontwikkeling aantrekkelijker te maken (op verschillende levels). Om dit te bereiken zullen er cyclische en regeneratieve milieu-innovaties moeten plaatsvinden in de manier waarop de samenleving wetten maakt, produceert en consumeert.

4. Ω Hoe worden op dit moment circulaire toepassingen (zoals het hergebruiken van materialen uit het oude gebouw) gecommuniceerd vanuit ICSAdviseurs naar de eindgebruikers?
   - Welke middelen / methodes worden op dit moment gebruikt?
   - Is het bijv. onderdeel van een bepaalde workshop of afhankelijk per adviseur?

5. Hoe zie je de rol van ICSAdviseurs in het realiseren van circulaire gebouwen?

6. Hoe wordt circulariteit momenteel onder de aandacht gebracht in projecten van ICSAdviseurs?
   - En wanneer circulariteit niet direct een onderwerp is vanuit de opdrachtgever?

7. ∞ Bij welke soort circulariteit-vraagstukken worden de eindgebruikers doorgaans betrokken door ICSAdviseurs? En waarom?
   - Worden ze bijvoorbeeld vooral betrokken bij vragen over specifieke **schalen**?
   - Worden het kostenplaatje of de **impact** met hen besproken?
   - **Welke** eindgebruikers worden **wanneer** en **waarvoor** (op welk detailniveau) betrokken?

8. ∞ Welke circulaire toepassingen worden op dit moment concreet 'aangeboden'/ gefaciliteerd door ICSAdviseurs? En waarom? (m.b.t. de schalen bijvoorbeeld)
   a. Welke kansen liggen er nog voor de toekomst? En welke hindernissen gaan hiermee gepaard?
   b. Hoe worden deze toepassingen bepaald?

9. Ω/∞ Wat zijn de verschillen in de workshop en benodigde informatie als het gaat over circulaire toepassingen in nieuwbouw vs. renovatie?

10. ∞ Welke rol speelt geld / budget / betaalbaarheid van de verschillende toepassingen voor de eindgebruiker?

11. Ω Hoe zorg je dat de eindgebruikers een gegronde keuze kunnen maken?
    - Worden de gevolgen van de keuzes / ambities inzichtelijk gemaakt, zoals: **interne en externe impact** of kosten?
    - Hoe ga je om met verschillende kennisniveaus van eindgebruikers op het gebied van circulariteit?
    - Welke 'basiskennis' over circulariteit is nodig om eindgebruikers goed te kunnen betrekken?

12. ~ Wat zijn verschillen in workshops met kinderen t.o.v. workshops waar alleen volwassenen aan deelnemen?
    - Bijvoorbeeld: type workshop / informatie die wordt opgehaald

13. ~ Zijn er vanuit ICSAdviseurs al workshops (over circulariteit) die uitgevoerd kunnen worden met kinderen?

14. ~ Welke informatie / kaders ten aanzien van een project heeft een adviseur (minimaal) nodig om het gesprek met de eindgebruikers goed te kunnen voeren?

15. ~ In hoeverre ben je als facilitator sturend voor de keuzes binnen (en buiten) een workshop?

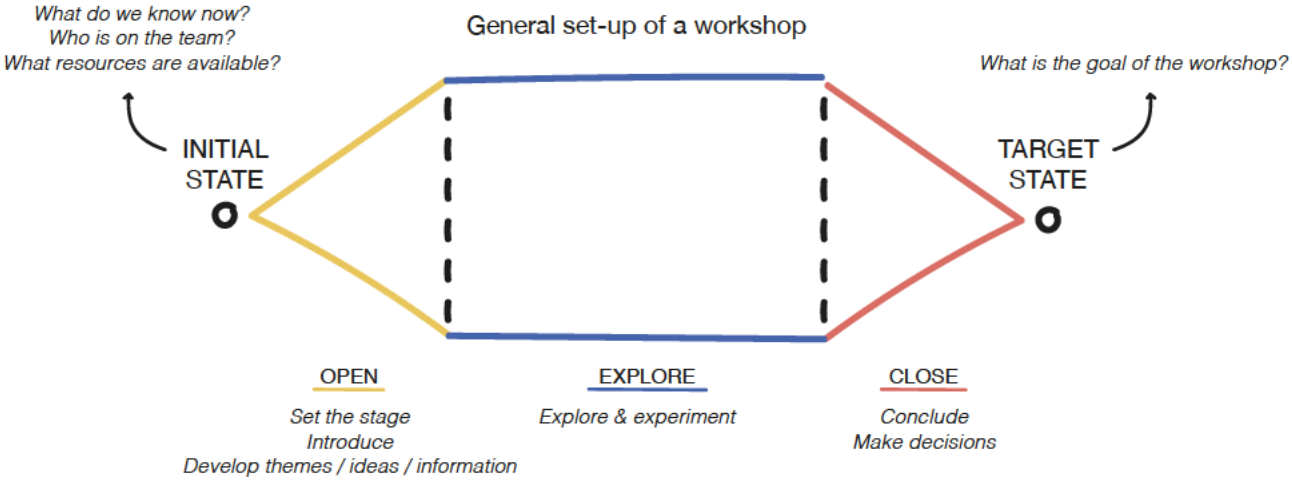
16. ~ Wat zijn strategieën voor een facilitator als deelnemers niet betrokken zijn tijdens de workshop?

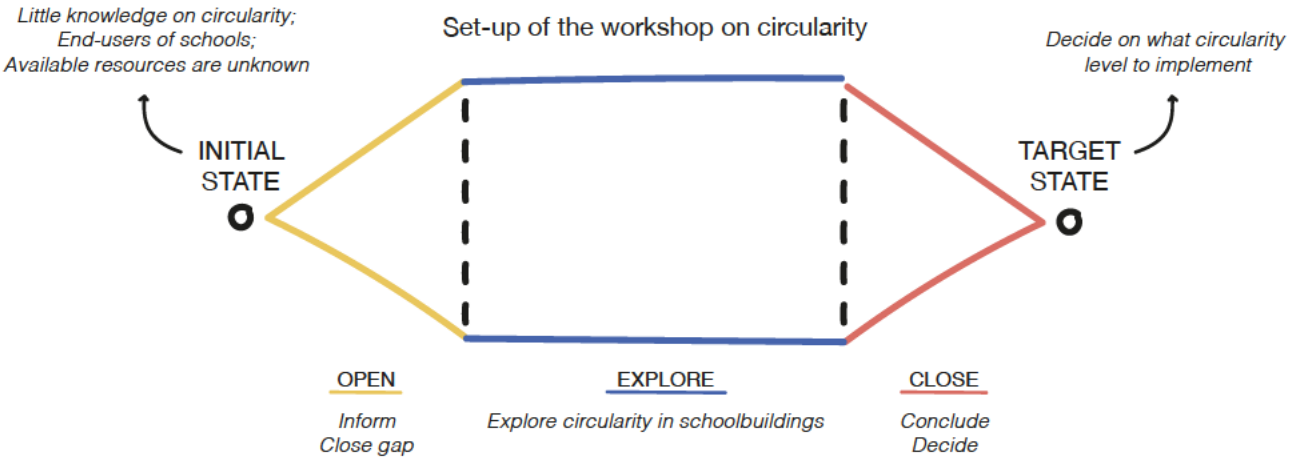
17. ~ Heb je nog tips voor het faciliteren van een workshop?

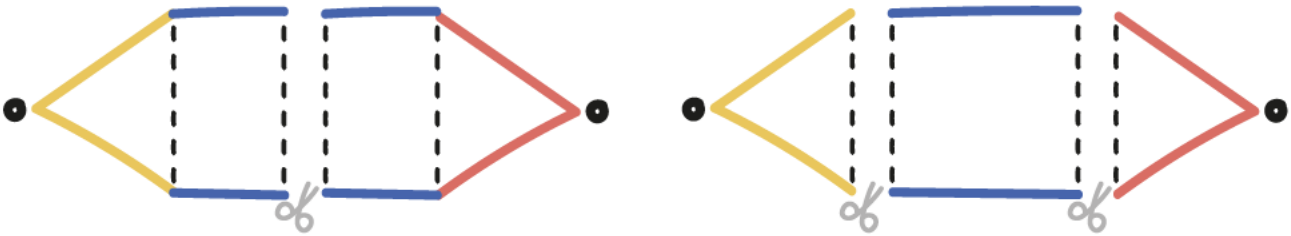
18. Ω […] is het doel van de workshop en […] zijn de doelen per workshop onderdeel. Welke workshop vormen passen daar bij?

19. Ω Dit is de algemene workshop-opzet [uitleg].

20.







Welke opzet / configuratie heeft jouw voorkeur en waarom?

21. Δ Welke manieren gebruiken jullie om workshops te testen / evalueren?

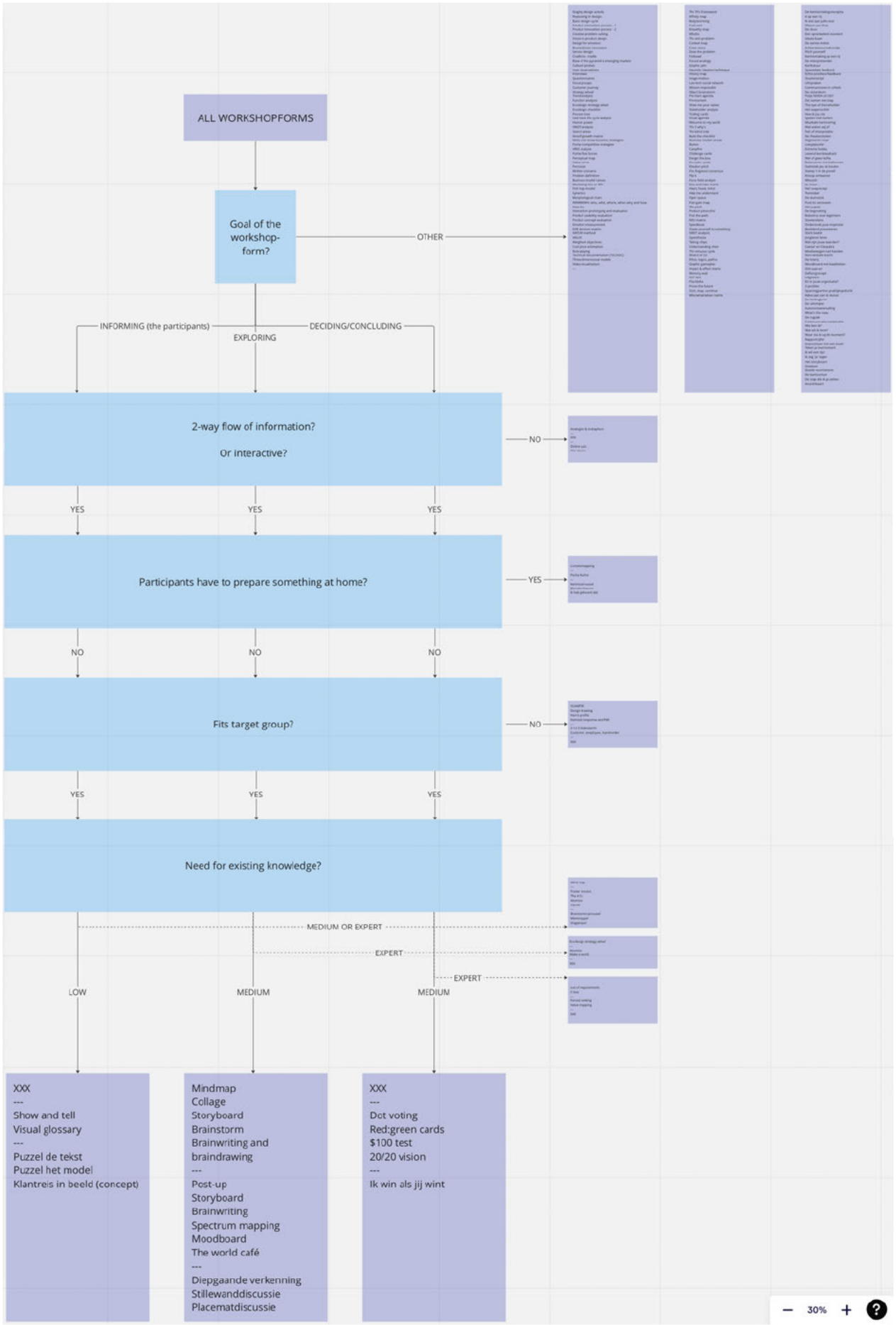
Appendix B | *Interviews Outcomes*

Vraag		Gesteld aan:				
	Concluding	Nora Hartman	Bram van der Klej	Jan Willem van Kasteel	Chantal Pieterse	Teun van Wijk
Datum		06-05-2022	12-05-2022	16-05-2022	19-05-2022	18-05-2022
1. Kan je kort vertellen wat jouw rol is binnen ICSAdviseurs?		3,5 jaar huisvestingsadviseur bij O&R.	Aantal jaar projectmanager.	23 jaar vastgoedontwikkelaar bij ICSAdviseurs. De afgelopen jaar houd ik me vooral bezig met verduurzaming.	2 jaar huisvestingsadviseur bij O&R.	Als pensionado aan het werk voor een aantal oude klanten.
2. Wie worden door ICSAdviseurs gezien als de eindgebruikers van scholen?	Iedereen die het gebouw dagelijks gebruikt, leerlingen, docenten en ondersteunend personeel.	Leerlingen, studenten, docenten, medewerkers (ondersteunend & faciliterend personeel).	Iedereen die het gebouw dagelijks gebruikt: Bestuurders, directeur, teamleiders, docenten, studenten, leerlingen.	Het personeel van de school en de leerlingen of studenten.	Directeur, leerkrachten, bij een basisschool is het betrekken van leerlingen misschien wel lastig, bij een middelbare school is dat wellicht beter toepasbaar.	Leerkrachten, docenten, directieleden en leerlingen, maar ook ondersteunend personeel en het schoolbestuur.
3. Hoe zou je circulariteit omschrijven?	Hoogwaardig hergebruik van materialen.	Het opnieuw hoogwaardig kunnen inzetten van materialen.	Het beperken tot voorkomen van afvalstromen en materialen dus niet meer als afval te beschouwen.	Het hoogwaardig herbruikbaar ontwerpen met een zo laag mogelijke milieuimpact.	XXX	Het opnieuw kunnen gebruiken van alle materialen.
4. Hoe worden op dit moment circulaire toepassingen gecommuniceerd vanuit ICSAdviseurs naar de eindgebruikers?	Er zijn geen engaging workshops over circulariteit. End-users worden oa. Geïnformeerd of betrokken bij duurzaamheid.	Er zijn nu nog geen workshops die volledig over circulariteit gaan, maar er worden vaak collega's ingezet om te vertellen over hun ervaring met circulaire projecten. Verder is er een duurzaamheidsworkshop waar circulariteit een klein onderdeel van is en er een aantal voorbeelden besproken worden.	De oplossingen worden gemaakt door het ontwerpteam, niet door ons. Wij willen de ambitie vertalen naar een aanpak. Daarnaast moeten we informeren. Verder wordt circulariteit onderverdeeld in de volgende thema's: Hergebruikt materiaal, herbruikbaar materiaal en bio-based materiaal.	Momenteel worden de eindgebruikers vooral geïnformeerd.	XXX	XXX
5. Bij welke soort circulariteit-vraagstukken worden de eindgebruikers doorgaans betrokken?	Dit verschilt per adviseur. Wat betreft de schalen: Stuff, Space Plan en Skin, soms Structure en Services. De keuzes liggen uiteindelijk bij het bestuur.	Het is altijd goed om eindgebruikers te betrekken, zo weet je goed wat er speelt op de werkvloer. De eindgebruikers worden betrokken bij het ophalen van en dromen over circulaire ideeën, vervolgens worden de keuzes wel gemaakt door het bestuur, in verband met verantwoording bijvoorbeeld.	Bij de aspecten waar de gebruikers belang bij hebben. Dat zijn voornamelijk de twee binnenste schalen en de gevel, maar ook de constructie en installaties als die te zien zijn. De twee belangrijkste dingen zijn het "waarom" en het verhaal.	Tijdens het maken van het PvE gaat het echt over het opstellen van ambities. Circulariteit is vaak een onderdeel voor het technisch PvE en daar worden door mij eindgebruikers niet echt bij betrokken.	XXX	Locatiekeuze, plattegrond, spullen en systemen. De gevel en constructie lijken mij wel onderwerpen voor experts.
6. Welke circulariteit-toepassingen worder op dit moment 'aangeboden' / gefaciliteerd door ICSAdviseurs? En waarom?	Dit gebeurt nu niet. Toepassingen worden bepaald door de architect.	Er zijn niet letterlijk toepassingen die voorgeschoteld worden, dat wordt uiteindelijk bepaald door de architect.	Dat doet ICSAdviseurs niet echt. De toepassing wordt bepaald door de architect, afhankelijk van de visie.	In de duurzaamheidsworkshop worden niet echt producten aangeboden. Wel probeer ik uit te leggen hoe je restwaarde kan capitaliseren.	XXX	XXX
a. Welke kansen liggen er nog voor de toekomst? En welke hindernissen gaan hiermee gepaard?		Misschien dat gebruikers betrokken moeten worden in wat en hoe ze circulariteit willen terugzien in het gebouw.	Het bespreekbaar maken, het enthousiasmeren en het vertalen van ambities naar oplossingen.	XXX	XXX	XXX
b. Hoe worden deze toepassingen bepaald?						
7. Wat zijn de verschillen in de workshop als het gaat over circulaire toepassingen in nieuwbouw vs. renovatie?	Er zijn geen verschillen in workshops maar wel in informatie. Bij sloop-nieuwbouw is er sprake van een donor gebouw waar vanuit hergebruikt kan worden, daarnaast wordt vaker gekozen voor bio-based of herbruikbaar. Bij renovatie kijken we naar behouden en hergebruik.	Als je uitgaat van nieuwbouw kan je het oude gebouw zien als een soort 'donor-gebouw'. Bij renovatie heb je dat niet echt zo, maar je kan wel kijken wat er binnen het gebouw hergebruikt kan worden en hoe het herbruikbaar gemaakt kan worden voor de toekomst. Dat laatste kan natuurlijk ook bij nieuwbouw.	Er zijn geen verschillen in workshops, maar wel grote verschillen in benodigde informatie. Bij renovatie is er al een basis en wordt er gekeken wat er behouden en hergebruikt kan worden. Bij nieuwbouw begin je vanaf nieuw en dan wordt er eerder gekozen voor bio-based of herbruikbare opties.	Het komt wel met elkaar overeen, maar de insteek verschilt.	XXX	Het lijkt eigenlijk wel op elkaar. Bij beide situaties betrek je de eindgebruikers om de school zo goed mogelijk te laten functioneren.
8. Hoe groot is de rol van geld / budget / betaalbaarheid bij de verschillende toepassingen in relatie tot de eindgebruiker?	De eindgebruiker wordt hier niet bij betrokken, dit ligt bij het bestuur.	Het is belangrijk dat wat met de eindgebruikers besproken wordt ook haalbaar is, maar de keuzes qua budget liggen wel bij het bestuur.	Het is niet de verantwoordelijkheid van de eindgebruiker, maar het is belangrijk om hen erbij te betrekken.	Het financiële proces gebeurt zonder de eindgebruiker. Dat speelt zich af op directieniveau.	Dat wordt op dit moment niet echt inzichtelijk gemaakt voor de gebruikers, tenzij de directeur dat belangrijk vindt bijvoorbeeld.	Het is heel belangrijk. [Raadt boek: kostenefficiënt scholen bouwen aan]. Budget is ook een tool waarmee je kan sturen. In het geval van circulariteit wordt restwaarde gecreëerd, dus het is belangrijk om dit te laten lukken.
9. Hoe zorg je dat de eindgebruikers een gegronde keuze kunnen maken?	Goed informeren en betrekken tijdens het proces. Hierdoor begrijpen ze waar ze over meedenken. Daarnaast is het goed de impact van de opties te laten zien.	De eindgebruikers moeten geïnformeerd worden, dit werkt goed met behulp van voorbeelden. Daarnaast moet benadrukt worden dat de keuze niet vaststaat voor de komende 40 jaar. Het helpt ook om de workshop op te knippen zodat de informatie kan landen en het gevalideerd kan worden.	Het betrekken van eindgebruikers gedurende het volledige proces. Daarbij is het belangrijk dat er aan de voorkant een realistische ambitie gevormd wordt. Verder werkt het goed om met wensen en eisen te werken.	Zorgen dat ze vertrouwen in de deskundigheid, dat de thematiek begrijpelijk is en dat het duidelijk is waar ze over meedenken.	Door de eindgebruikers verschillende opties en de impact van die opties te laten zien.	XXX
10. Wat zijn verschillen in workshops met kinderen t.o.v. workshops waar alleen volwassenen aan deelnemen?	Tijdsduur.	XXX	XXX	XXX	Tijdsduur, door de kortere spanningsboog van kinderen, maar ook de werkvormen die je gebruikt en de manier waarop je dingen uitlegt.	De groep verschilt sowieso heel erg van elkaar. Dus je moet echt zorgen dat er voor elk wat wils is.
11. Zijn er vanuit ICSAdviseurs al workshops (over circulariteit) die uitgevoerd kunnen worden met kinderen?	Nog niet over circulariteit, maar algemene workshops kunnen bijna altijd uitgevoerd worden met kinderen.	De meeste algemene workshops kunnen ook uitgevoerd worden met kinderen.	Circulariteitsworkshops voor kinderen zijn er op dit moment nog niet.	XXX		Ja, maar nog niet over circulariteit.
12. In hoeverre ben je als facilitator sturend voor de keuzes binnen (en buiten) een workshop?	Dit verschilt per adviseur. Sommigen zijn erg sturend, anderen meer afwachtend.	Als facilitator kan je erg sturend zijn. Ook na de workshop, dan brengen wij een advies uit naar de stuurgroep.	Ik weet eigenlijk al wat ik wil en het doel van mijn workshop is om de gebruikers dan daarin mee te nemen.	XXX	Ik ben zelf nog niet zo sturend, dus ik sta er blanco in en haal de informatie echt op vanuit de gebruikers. Ik kan me voorstellen het per persoon verschilt.	Als het goed is ben je als facilitator eigenlijk niet op te merken. Het is echt de bedoeling dat het uit de deelnemers zelf komt. Toekomstgericht denken, samenwerken en creativiteit stimuleren zijn de doelen voor en facilitator.
13. Wat zijn strategieën als deelnemers niet betrokken zijn tijdens de workshop?	Staan, optijd pauzeren en afwisseling van werkvormen.	XXX	XXX	XXX	Het helpt enorm om deelnemers te laten staan tijdens de workshop, maar ook om op tijd een pauze in te lasten. Verder moeten de werkvormen elkaar goed aflossen en kan je enthousiaste mensen inzetten om anderen ook enthousiast te maken. Ook werkt het goed om individuele opdrachten te geven en die dan als groep te bespreken.	Sociale intelligentie is belangrijk, vragen stellen, mensen op hun gemak stellen.
14. Heb je nog tips voor het faciliteren van een workshop?	Zorg voor afwisseling.	XXX	XXX	XXX	De beste tip is het zorgen voor afwisseling. Vaak hebben de deelnemers veel energie aan het begin, dus dan is het slim om dat te gebruiken en te zorgen dat ze niet naar een presentatie hoeven te luisteren.	Kleine groepen of dingen laten opschrijven op papier zorgt ervoor dat de hierarchie van een organisatie verdwijnt. Je moet het vooral leren door het te doen.
15. ... is het doel van de workshop en ... zijn de doelen per workshop onderdeel. Welke workshop vormen passen daar bij?		XXX	XXX	XXX	Om te informeren zou je een brainstorm kunnen doen om te bepalen waar de deelnemers aan denken bij circulariteit en zo te bepalen wat er nog verteld moet worden. Maar hier hoort misschien ook een stuk enthousiasmeren bij. De ambitiecalculator zou je ook kunnen gebruiken om de niveau's te bepalen bij decide bijvoorbeeld.	XXX
16. Welke (workshop)opzet / configuratie heeft jouw voorkeur en waarom?	1 sessie met verschillende workshopvormen. Deciden is misschien wel alleen met de stuurgroep.	Een aantal keer de diamant achter elkaar plakken met verschillende workshopvormen die elkaar opvolgend input leveren. Verder denk ik dat aan het einde van de explore-phase de end-user participation stopt en dan het derde deel met alleen de stuurgroep is. Of dat er na de diamant, met de eindgebruikers, een aparte diamant komt met alleen de stuurgroep bijvoorbeeld.	XXX	XXX	Je kan niet verwachten dat docenten een huiswerkopdracht gaan doen of in hun curriculum ruimte maken om een workshop te doen met hun leerlingen. Verder zijn tijd en budget sturende factoren, dus als je dit aanvullend wil ophalen is het aantrekkelijker om dat in 1 sessie te doen ipv in meerdere sessies, anders wordt het te duur.	Opsplitsen werkt helemaal niet goed. Mensen lezen notulen toch niet. Alles in 1 sessie.
17. Welke manieren gebruiken jullie (bij ICSAdviseurs) om workshops te testen / evalueren?	Dit gebeurt niet vaak.	XXX	We bellen vaak achteraf de opdrachtgever om te vragen wat hij / zij ervan vond en of het leerzaam was.	XXX	Er worden niet vaak workshops getest, maar toen er geswitcht moest worden naar de online variant is dat wel getest.	Dat gebeurt niet vaak.
LATER TOEGEVOEGD:						
Hoe zie jij de rol van ICSAdviseurs in het realiseren van circulaire gebouwen?	Concretiseren, daarnaast informeren en inspireren!.	XXX	De grootste rol voor ICSAdviseurs ligt in het maken van een circulaire businesscase en te zorgen dat dit wordt waargemaakt in de uitvoering.	Informeren en inspireren omdat scholen worden gerealiseerd mbv maatschappelijk geld en de gebruikers zijn de toekomstige generatie.	De rol voor ICSAdviseurs is het concreter maken van de visie. Die blijft nu namelijk vaak hangen op "duurzaam" en "toekomstbestendig".	Note: Veel informatie in het interview, niet allemaal samen te vatten in deze tabel.
Wat is de uitkomst van een circulariteitsworkshop, naar welke informatie ben je op zoek?	Het bepalen van prestaties/speerpunten, niet het bedenken van oplossingen.	XXX	Het doel is om speerpunten te formuleren rondom het 7S model en dan de 3 thema's rondom materialen (bio-based, herbruikbaar, hergebruik). Een uitkomst kan zijn dat de gevel volledig bio-based is en dat de constructie 100% losmaakbaar wordt.	Het bepalen van prestaties, niet het bedenken van oplossingen, dat ligt bij de architect. Verder moet het gaan over bewustwording en enthousiasmeren.	XXX	

Appendix C | *Questionnaire Internal Experience*

Wat is jouw functie binnen ICSAdviseurs?	Circulariteit (in de bouw) betekent voor mij: ...	Ik weet ... over circulariteit. (1-5)	Ik zou meer willen leren over circulariteit.	Ik probeer circulariteit te integreren in de projecten die ik doe. (1-5)	Als ik circulariteit integreer, doe ik dat op de volgende manier:	De reden dat ik circulariteit nooit integreer is:	Ik vind dat circulariteit een grotere rol moet spelen in mijn projecten.	Ik denk dat circulair bouwen de standaard zal zijn in toekomstige projecten (door middel van hergebruik van materialen of door losmaakbaar te bouwen).
Adviseur 2	Voorkomen van afval, toekomstbestendig	2	Ja.	2	visiefase, nog niet concreet in PvE	Ik weet er te weinig	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit
Jurist	Het slim gebruik van grondstoffen (afvalvermindering)	3	Nee.	1	Ik integreer circulariteit nooit.	De keuze is niet aan mij dit toe te passen, maar aan de projectleider	Nee.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.
Senior adviseur Voorzieningenplanning	Hergebruik van materialen en ontwerpen om dit mogelijk te maken	2	Ja.	3	Bij intergrale huisvestingsplannen of haalbaarheidsonderzoeken kaders en of budgetten hiervoor in de plannen proberen te krijgen.	Ik weet er te weinig over., De opdrachtgever vindt het niet belangrijk.	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.
Advisaur	Een belangrijk onderdeel van bouwen voor in de toekomst	4	Ja.	2	Nog niet echt mee gemaakt	De opdrachtgever vindt het niet belangrijk.	Ja.	Nee, het is onhaalbaar om een gebouw voor een groot deel circulair te maken. Het blijft bij kleine onderdelen die circulair kunnen zijn.
Adviseur	voorkomen van afval, sloopmateriaal als bouwmateriaal gebruiken	3	Ja.	2	opdrachtgever aan het denken zetten, inspireren, visie ophalen	De opdrachtgever vindt het niet belangrijk.	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.
adviseurs	zorgvuldig omgaan met materialen en producten in de bouw	3	Ja.	2	onderzoeken of een gebouw (deels) herbruikbaar is	Ik weet er te weinig over.	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.
Senior Adviseur- Projectmanager	duurzaam en bedachtzaam omgaan met de bronnen	3	Ja.	3	Als het budget het toelaat	De opdrachtgever vindt het niet belangrijk.	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.
Huisvestingsadviseur O&R	Slim omgaan met het materiaalgebruik. Hoe minder nieuwe materialen worden gebruikt, hoe beter. En ervoor zorgen dat de nieuwe materialen die noodzakelijk zijn, ook na zijn gebruiksduur opnieuw hoogwaardig kunnen worden ingezet..	3	Ja.	3	opnemen als teksten in een RFPvE, meer omschrijven dat de ambitie er is en welke voorbeelden er zijn. Niet zo zeer versterkt met duidelijke/toetsbare eisen.	Ik weet er te weinig over.	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.
HV adviseur senior	zuinig, verantwoord, toekomstgericht en efficiënt omgaan met hetgeen er al is.	3	Ja.	3	nog niet heel concreet, meer in algemene zin	x	Ja.	Nee, ieder gebouw zal voor het grootste gedeelte circulair zijn, maar nooit volledig.

Appendix D | *Total filter for the Workshop Forms*



Appendix E | *Questionnaire Feedback-loop 1*

Als deelnemer:

- Hoe interactief vond je de workshop?

_____
_____

- Voelde je je betrokken bij alle onderdelen of had je meer input willen geven?

_____
_____

- Waarom? En wat zou dit kunnen verbeteren?

_____
_____

- Heb je veel geleerd over circulariteit?
  - Ja, ik weet nu veel meer dan voor de workshop
  - Nee, ik snap het nog steeds niet want het niveau was te hoog
  - Nee, ik wist alles al

Anders:_____
_____

- Heb je het gevoel dat je weloverwogen keuzes hebt kunnen maken?
  - Ja
  - Nee

- Waarom wel / niet?

_____
_____

- Hoe zou je circulariteit implementeren in andere facetten van je leven?

_____
_____

Als collega:

- Was het kennisniveau van de workshop te hoog / te laag?

_____
_____

- Vond je de workshop te lang / te kort?

_____
_____

- Zou je deze workshop zelf kunnen uitvoeren?

_____
_____

- Tips / Aanvullingen / Opmerkingen

_____
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Appendix F | *Outcome of Questionnaire Feedback-loop 1*

	Overall Conclusion	1	2	3	4	5	6	7	8
Hoe interactief vond je de workshop?	Heel interactief.	Goed.	Heel interactief.	Zeer interactief.	Leuke mix van activiteiten, allemaal erg interactief, leuk!	Heel interactief. Weinig zerden en veel doen.	Heel interactief, prikkelend ondanks dat het vrijdag 15-17h is.	Goed, tijdens ieder onderdeel werd onze input gevraagd.	Heel interactief, leuk!
Voelde je je betrokken bij alle onderdelen of had je meer input willen geven?	Mensen voelden zich over het algemeen betrokken, maar het doel was niet altijd duidelijk en de conclusie was niet altijd duidelijk.	Ja.	Ja.	Zorg voor een tafel waarbij "spullen in het midden" door iedereen te lezen zijn.	Balans was goed en genoeg input.	Bij de eerste opdracht was het zoeken naar het doel en de verwachting.	Er was voldoende mogelijkheid om input te geven.	Qua input was het meer dan genoeg, maar na iedere ronde feedback op wat gedaan is, zou fijn zijn.	Wat meer duiding over het doel zou goed zijn in de introductie.
Waarom? En wat zou dit kunnen verbeteren?	Onderbouwing per onderdeel om het doel te verduidelijken en een feedback-loop / samenvattende terugblik.	Er zou meer plek mogen zijn voor eventuele onderbouving.	nvt	Bij de laatste sessie kon ik niet terugblikken op de resultaten van de eerste sessie.	Gebouwschillen wel toelichten denk ik, niemand kent dat buiten bouwkunde.	Meer stapsgewijs: eerst invulpuzzel (toelichten en laten matchen), dan gebouwtour koppeling toelichten en doel uitleggen	Overal ruimte voor eigen input, zonder dominante gespreksleiders.	Dan is het vertrekpunt voor de volgende ronde duidelijk.	Uitgebreidere toelichting + doel.
Heb je veel geleerd over circulariteit?	Over het algemeen heeft iedereen wat geleerd, maar voorbeelden en soms een beetje meer toelichting missen.	Nee, ik wist niet alles, maar voor mij niet iets nieuws.	Graag meer mooie voorbeelden.	Ja, ik weet nu veel meer dan voor de workshop. Maar ik begrijp nog steeds niet hoe een heel gebouw circulair gebouwd kan worden.	Goede bewustwording en leuk om een ruimte te bekijken vanuit die blik. Op pagina van gebouwtour wel meer uitleg.	Ja, ik weet nu veel meer dan voor de workshop.	Ja, ik weet nu veel meer dan voor de workshop. Niveau eerste ronde was wel te hoog, meer zwembandjes meegeven.	Ja, ik weet nu veel meer dan voor de workshop.	Nee, ik wist alles al (gekeken vanuit mijn kennisniveau). Voorbeelden zouden helpen.
Heb je het gevoel dat je weloverwogen keuzes hebt kunnen maken?	50/50 ja en nee.	Nee.	Ja / nee.	Nee.	Ja / nee.	Ja / nee.	Ja.	Ja.	Ja
Waaron wel / niet?	Impact van de keuzes was niet altijd helder en twijfel of alles aan bod is gekomen.	Voor mij was het doel niet helemaal helder, waardoor ook keuzes of impact ervan niet helemaal heldr was.	Wat zijn de gevolgen van de keuzes?	Ik kan de consequenties van mijn keuzes niet overzien.	Leuke plaatjes, maar hoe moet ik ze beoordelen? Op circulariteit / duurzaamheid / beeldkwaliteit?	Ik twijfel of nu alles aan bod is gekomen wat mogelijk is, ik ben geen expert.	Goede opbouw omdat je eerst wat leert en dan een keuze kan maken.	Ja, iedere ronde kon ik rustig naderken en mijn input leveren.	Wel op ambitieniveau. De vraag is natuurlijk welke keuzes op bestuurlijk niveau worden gemaakt. Dit duidelijk introduceren aan deelnemers.
Hoe zou je circulariteit implementeren in andere facetten van je leven?	Veel implementaties op re-use level.	t-pve aanpakken op werk ;) en niet altijd iets nieuws.	Geen afval kopen, maar duurzame producten.	Gescheiden afval. Grofvuil naar milieupark brengen.	Vooral weinig onnodigs gebruiken.	Spullen kringloop.	Keuze in aankoop van producten, eigen woonomgeving.	Kijken hoe spullen een tweede leven kunnen krijgen.	Ja, k ga al heel vaak naar de kringloop.
Was het kennisniveau van de workshop te hoog / te laag?	Aan het begin was het kennisniveau te hoog.	Mag van mij iets hoger, bijv. voorbeelden laten zien.	Te hoog, de 6S schillen meer levend maken bijv. door foto's eromheen.	De puzzel is te ingewikkeld. Het woord "schillen" misschien vervangen door "elementen van vast naar los".	Prima.	Eerste opdracht simpeler maken.	Begin was te veel om vanuit 0 in te vullen. Wellicht de uitleg al invullen en de icoontjes laten doen.	Als het begint met de vragen over circulariteit wordt de introductie makkelijker en goed op het kennisniveau te komen.	Was denk ik goed. Maar uitleg kan wat uitgebreider.
Vond je de workshop te lang / te kort?	Precies goed.	Goed.	Te kort, een deel mag best jouw expertise inbrengen zijn.	Precies goed.	3 onderdelen was wel veel, maar tijd vloog voorbij in positieve zin.	Precies goed.	Prima.	Goede lengte, zeker door het interactieve karakter.	Precies goed om energie erin te houden. Goed dat je een pauze erin gestopt hebt.
Zou je deze workshop zelf kunnen uitvoeren?	Ja, mits er ambitie is en er meer voorbeelden zijn.	Ja, mits ik het doel goed weet + voorbeelden.	Ja.	Ik vond dat jij het heel goed deed. Ik ben daarvoor te cynisch.	Ja, ik denk het wel. Wel belangrijk om mensen te kunnen inspireren met goede voorbeelden.	Ja.	Ja, maar wellicht beste geschikt als je er zelf in hebt verdiept.	Ja, als de ambitie er is zeker!	Ja.
Tips / Aanvullingen / Opmerkingen		Doel + opdracht goed aangeven aan deelnemers.	Positief is de afwisseling van werkvormen.	Wellicht de referentiebeelden verdelen n de's en dont's.	Soms ingewikkeld om vanuit circulaire bril te blijven kijken en niet allemaal andere dingen erbij te betrekken (vooral bij collage lastig).	Zoveel mogelijk voorbereiden (kaartjes knippen).	Duidelijkere uitleg & doel van iedere fase van de workshop.	Goed de doelen van de workshop op een rijtje te hebben en daar de volgorde van onderdelen op aanpassen.	Ik zou van ieder type een voorbeeld geven. In de vorm van foto bijv. (bio-based, herbruikbaar, hergebruikt).
		Eerst enthousiast maken met voorbeelden, dan nadenken wat dit voor hun school betekent.	Van welke werkvorm krijg je energie, van welke niet?	Kan een gebouw ook een beetje circulair zijn?	Bij de puzzel echt benoemen dat het is als bewustwording en niet wat mee gaat naar het volgende gebouw.	Bij oplossing puzzel: delen op grote scherm.	Brainstorm / woorder wellicht op chinees tafelkleed.	Concretiseer de rondoopvragen voor gebruikers > discussie voorkomen over waar te plaatsen (als het gaat om wat de gebruiker mee wil).	Bij afbeeldingen het materiaal benoemen, zoals 'hennep&hars'. Dit maakt dat je minder oordelend bent over hoe het erut ziet en meer of je achter het idee staat.
		"laaghangend fruit" > ICS in pve's!	De invulpuzzel lijkt me moeilijk voor docenten.		Minder stickers is ook prima, bijv. 3 groene en 1 rode.	Bij neerleggen kaartjes met schillen zie je de kleuren niet meer.	Voorbeelden ergens opnemen om te prikkelen.		Ik zou de eerste oefening op grotere vellen printen. En benoemen waarom je de eerste oefening doet (peilen van het kennisniveau).
		Omwisselen: eerst wat is circulariteit, daarna rondje gebouw.			Nadenken over wat er gebeurt als mensen zeggen "Ik wil helemaal geen circulariteit".	Rondje door gebouw: duidelijk maken wat de bedoeling is > inventarisatie huidige gebouw?	Heel leuke workshop ontwikkeld!		Overweeg om minder stickers ge geven, dan moet je bewuster kiezen.
		Wat is het doel? Alleen awareness / kennis? Om ambitie te formuleren? > dan eerder met gemeente en schoolbestuur.			Puzzel: Eerst uitlegkaartjes plaatsen op het vel, dan pas de icoontjes.				
					Iets om op te schrijven bij de gebouwtour.				
					Invulpuzzel zou ik kennisquiz noemen, dan is het duidelijk wat het doel is van de opdracht.				
					Bij de schillen iets meer toelichting dat de binnenste schil makkelijker te vervangen is dan de constructie. Als je dit schema nog mooi gezien hebt is het wel moeilijk denk ik.				
					Zou ook leuk zijn als alle plaatjes circulair zijn, zodat je iets kan kiezen wat echt kan en geeft voorbeeld van alle mogelijkheden.				

Appendix G | *Questionnaire Feedback-loop 2*

- Hoe interactief vond je de workshop?

_____
_____

- Heb je het gevoel dat je je mening kon uiten tijdens de workshop?

_____
_____

- Voelde je je betrokken bij alle onderdelen of had je meer input willen geven?

_____
_____

- Waarom? En wat zou dit kunnen verbeteren?

_____
_____

- Heb je veel geleerd over circulariteit?
  - Ja, ik weet nu veel meer dan voor de workshop
  - Nee, ik snap het nog steeds niet want het niveau was te hoog
  - Nee, ik wist alles al

Anders:_____
_____

- Heb je het gevoel dat je weloverwogen keuzes hebt kunnen maken?
  - Ja
  - Nee

- Waarom wel / niet?

_____
_____

- Zou je circulariteit nu implementeren in andere facetten van je leven? Zo ja, hoe?

_____
_____

- Was het kennisniveau van de workshop te hoog / te laag?

_____
_____

- Vond je de workshop te lang / te kort?

_____
_____

- Tips / Aanvullingen / Opmerkingen

_____
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Appendix H | *Outcome of Questionnaire Feedback-loop 2*

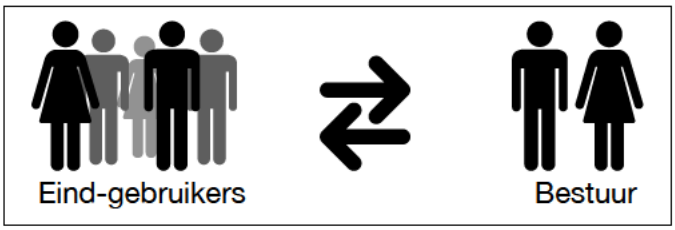
	Overall Conclusion	9	10	11	12	13
Hoe interactief vond je de workshop?	Erg interactief.	Erg interactief, veel ruimte om gedachten te delen.	Heel erg: Niet te lang overal bij stilstaan, continu eigen input en invloed op de uitkomst.	OK. Je stelde voldoende vragen en ging ook goed in op opmerkingen vanuit de groep.	Goede interactiviteit, laagdrempelig door kleine groep.	Goed interactief! (Niet te lang doorgaan over 1 ding)
Heb je het gevoel dat je je mening kon uiten tijdens de workshop?	Jazeker.	Ja.	Zeker, zie hierboven.	Zeker!	Jazeker.	Ja, was een goede open sfeer. Belangrijk om dit als facilitator aan het begin te benadrukken!
Voelde je je betrokken bij alle onderdelen of had je meer input willen geven?	Ja, vooral door de kleine groep.	Ja.	Was top, zeker als het normaal gesproken in kleinere groepjes is.	Jazeker (wel voordeel van wat kleinere groep die ook al gemotiveerd was om mee te doen).	Ik heb voldoende input kunnen geven.	Ja, zeker!
Waarom? En wat zou dit kunnen verbeteren?	Er was voor iedereen ruimte om te spreken. Onder andere bij de oefening in sub-groepen.	Je gaf mensen de beurt en gaf ruimte om te spreken.	-	-	Je had de mogelijkheid om per persoon de opmerkingen te vragen.	Er was voor iedereen ruimte om input te geven. Ik denk dat het goed was om de oefeningen in kleine groepjes te doen, daardoor heeft iedereen wel de ruimte om input te leveren.
Heb je veel geleerd over circulariteit?	Ja.	Ja, ik weet nu veel meer dan voor de workshop.	Zeker meer inzichten en fijn om op een rijtje de verschillen te weten in het begin.	Inhoudelijk wist ik het meeste wel, maar juist in "het doen" en toepassen leer je steeds weer nieuwe dingen bij.	Ja, ik weet nu veel meer dan voor de workshop.	Ja, dingen zijn nu concreter voor me dan voor de workshop.
Heb je het gevoel dat je weloverwogen keuzes hebt kunnen maken?	Ja.	Ja.	Ja.	Ja.	Redelijk.	Ja.
Waarom wel / niet?	Na voldoende uitleg was er veel keuze bij de plaatjes. Voelde misschien wel meer als een exploration.	Er was veel vrijheid, geen fout antwoord, en veel keuze bij de plaatjes.	Voldoende uitleg en voorkennis, dus prima keuzes kunnen maken.	Goede open discussie, zonder vooropgezette antwoorden.	Omdat het gebruik van de TU nu voor mij niet bekend genoeg is.	Ik heb niet het idee gehad dat ik veel keuzes heb moeten maken. Het was meer een exploration voor mij, maar dan is het antwoord denk ik ja.
Zou je circulariteit nu implementeren in andere facetten van je leven? Zo ja, hoe?	Ja/Nee. Sommigen zijn al bezig met circulariteit, anderen zijn zich nu meer bewust en daarvan weten sommigen niet hoe ze het moeten implementeren.	Ik vind het wel interessant om over na te denken en mee bezig te zijn, maar zie op dit moment niet direct ruimte waar ik het kan toepassen.	Niet op de korte termijn.	We doen ons best!	Ja, gebruik van oude materialen.	Ja, het maakt je wel bewuster en zet aan tot denken. Ik denk dat ik meer over hergebruik ipv nieuw zou nadenken.
Was het kennisniveau van de workshop te hoog / te laag?	Goed, mits er meer introductie is aan het begin van de workshop.	Voor mij was het goed, ik kan me voorstellen dat het voor (basisschool) leerlingen ingewikkeld kan zijn.	Meer introductie aan het begin is wenselijk, meer inzicht in verschil tussen duurzaamheid en circulariteit.	Goed te doen.	Voor jouw doelgroep misschien te hoog.	Was goed!
Vond je de workshop te lang / te kort?	Goed / te kort. In een langere workshop kunnen aspecten beter worden uitgewerkt.	Ik vond de duur goed.	Nee.	Geen moment verveeld.	Te kort, ik denk dat je zeker beter kunt uitwerken als je er iets meer tijd voor neemt en iets meer tijd om per onderdeel de doelstelling toe te lichten (vooral het eerste doel).	Ook goed, de pauze is wel nodig.
Tips / Aanvullingen / Opmerkingen		Leuke gesprekken ontstaan.	Meer context voor invulpuzzel. Had duidelijker mogen zijn dat we eerst zelf gaan ontdekken wat circulariteit is.	Enthousiast gebracht! En je gaat ook goed in op opmerkingen en vragen.	Puzzel: Dubbel gebruik / Flexibel gebruik niet duidelijk.	Misschien goed om aan het begin te vermelden waarom participatie van de mensen nuttig of relevant is.
		Het is voor leerlingen misschien een lastig onderwerp, minder kennis hierover.	1 slide die concreet maakt wat het verschil is tussen duurzaamheid en circulariteit. Moeilijk voor beginners om het verschil te begrijpen.	Gebouwtour leuk om "de praktijk" te onderzoeken, maar hangt er in het programma toch een beetje bij.	Puzzel: "Gebruik van hernieuwbare materialen..."	Gebouwtour is super leuk en relevant! Tip om misschien meer concrete vragen op template te zetten, nu wisten we niet altijd precies waar we naar zochten.
		Post-it brainstorm goed opgesplitst in onderdelen, dit laat je op een andere manier nadenken.		Definities: Weigeren misschien veranderen in vermijden of voorkomen.	Post-it Brainstorm: Was niet duidelijk dat de termen per stuk behandeld werden.	Je weet super veel en kan op alles antwoord geven, goed! Wel uitkijken dat je niet te lang blijft hangen en mensen hun aandacht verliest (met name bij mensen met minder achtergrond kennis misschien?)
		Weten alle scholieren wat circulariteit is?		De introductie stem je ongetwijfeld af op je doelgroep/ publiek. Voor een basisschool zou ik iets meer vertellen over 'waarom' het belangrijk is (voor jou) en 'wat' je wil bereiken.	Post-it Brainstorm: Was niet duidelijk wat de bedoeling was.	Het is mij nu niet helemaal duidelijk of de 4 vormen nou onderdeel zijn van circulariteit of gewoon duurzaam? Of is dit geen verschil?
		Plaatje bij de puzzel uitleggen vóór het starten van de puzzel.		Goede time-management. Het proces wordt 'strak' geleid, maar blijft toch speels.	Post-it Brainstorm: Goed om de opmerkingen plenair te bespreken.	Aan het begin van de sessie misschien een icebreaker doen om in de mood voor de workshop te komen.
		De voorbeeldplaatjes zijn wel fijn. Voorbeeld D is een beetje lastig te begrijpen, lastig te zien dat het een plattegrond is.			De uitleg over afschrijving was moeilijk; Hoge initiële investering met hoge restwaarde (materialen bank) zou voldoende moeten zijn.	
					Gebouwtour: 15 minuten lijkt me te kort.	
					Gebouwtour: Moeilijk om notities te maken bij gebouwtour op het papier.	
					Beter uitleggen dat de opmerkingen van gebouwtour bij moodboards te gebruiken zijn.	
					Tijdens bespreken moodboards op een flip-over de conclusies schrijven.	

Informatie voor Expert Interviews

Doel van het onderzoek

Het doel van mijn onderzoek is het creëren van een workshop over circulariteit die eind-gebruikers van middelbare scholen ‘engaged’ tijdens van het opstellen van het PvE voor hun nieuwe schoolgebouw.

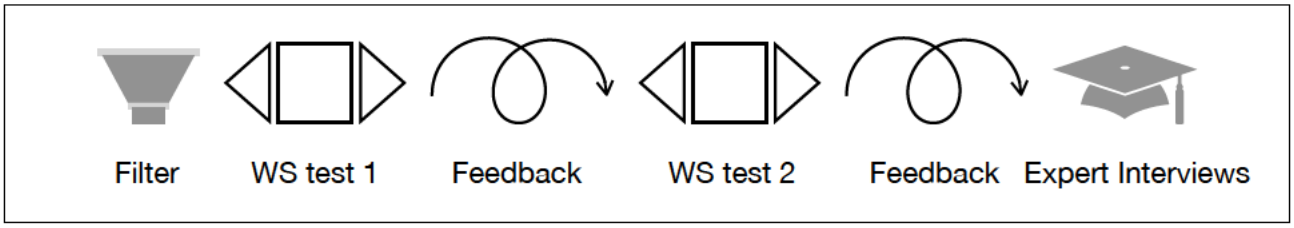
‘Engagement’ is een level van participatie waar sprake is van een ‘two-way flow of information’. Dit in tegenstelling tot ‘informing’ en ‘empowerment’ waarbij er enkel een zender en een ontvanger van informatie is.



Onder de eind-gebruikers van scholen vallen docenten, studenten of leerlingen en al het ondersteunend personeel van de school. Deze doelgroep is gedefinieerd als leken op het gebied van gebouwen en circulariteit. De workshop zal dus laagdrempelig moeten zijn.

Tijdlijn van het onderzoek

Op basis van specifieke eigenschappen is een filter gemaakt waarmee de werkvormen uit 3 verschillende bronnen zijn gefilterd, zodat een selectie aan werkvormen is ontstaan. Deze combinatie van werkvormen is vervolgens ingevuld om een workshop (WS) te creëren. De workshop is eerst getest met behulp van collega’s bij ICSAdviseurs. Zij hebben na de workshop feedback kunnen geven op de opzet en inhoud van de workshop. Dit is input geweest om de workshop te kunnen aanpassen. Vervolgens is deze aangepaste workshop getest met deelnemers die qua kennisniveau overeen kwamen met de doelgroep en hebben ook zij feedback kunnen geven op de workshop.



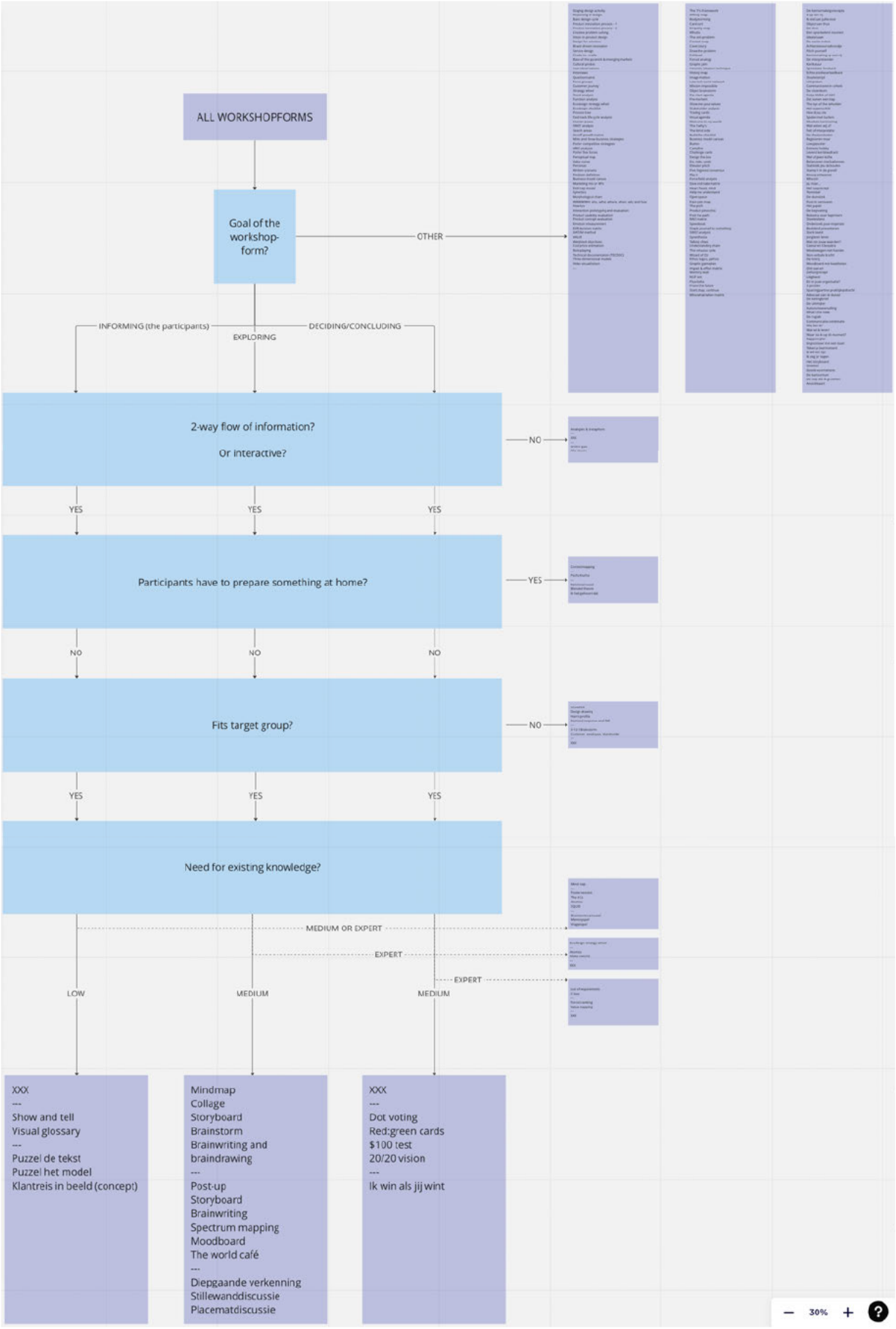
Doel van de expert-interviews

Het doel van de expert-interviews is om, met behulp van de experts, de workshop-opzet nog 1 keer te verbeteren en/of aanbevelingen te kunnen doen voor de toekomst. Daarnaast zal er een korte terugblik zijn om te bepalen of de aanpassingen tussen de eerste en de tweede versie van de workshop logisch en nuttig waren. Dit gebeurt aan de hand van de volgende vragen:

1. Zijn de juiste aspecten veranderd naar aanleiding van de feedback na de eerste test?
2. Hoe zouden jullie de feedback na de tweede test verwerken?
3. Is er een goede balans tussen ‘engagen’ en informeren? Zo nee, hoe zou je dat aanpassen?
   - Hoe zorg je dat alle info over circulariteit aan bod komt én de workshop ‘engaging’ blijft?
4. Denken jullie dat de workshop (en de filter) multi-inzetbaar is / zijn?

Opzet van de filter

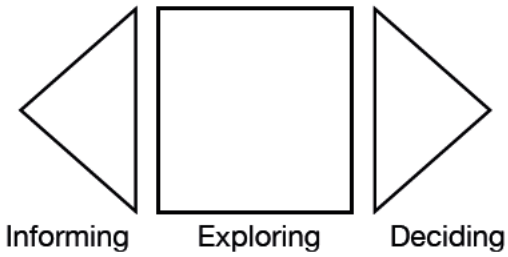
Om te bepalen welke werkvormen het beste aansluiten bij het doel en de doelgroep van de workshop is de volgende filter opgesteld. De uitkomst van de filter is vervolgens gebruikt om de set-up van de workshop te bepalen.



Opzet van de workshop

Algemeen

De algemene opzet van de workshop is als volgt:



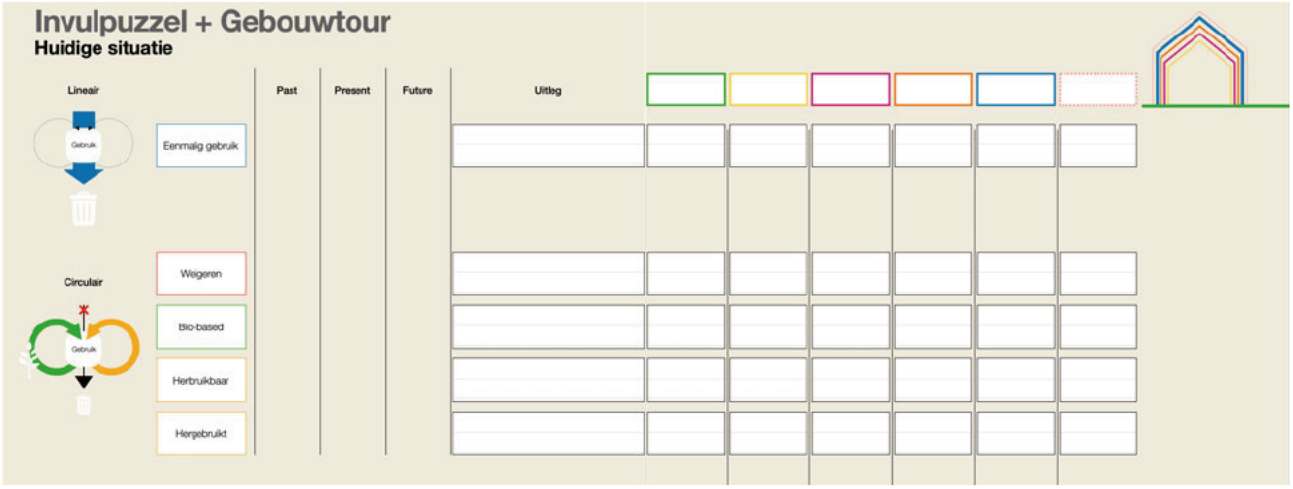
Deze opzet wordt zowel in de eerste als in de tweede versie van de workshop aangehouden.

Versie 1

Hieronder een overzicht van de verschillende werkvormen. In het overzicht wordt onder andere duidelijk in welke volgorde de werkvormen gebruikt worden. Op de volgende pagina's worden de werkvormen verder toegelicht door middel van afbeeldingen uit de workshop.

	Doel	Groepsgrootte	Activity-level	Tijd (min)
Invulpuzzel + Gebouwtour	Informing		ϟϟ / ϟϟϟ	30
Post-it Bainstorm	Informing	* * *	ϟ	20
Pauze	-	-	-	10
Post-it Brainstorm	Informing / Exploring	* * *	ϟ	10
Moodboards	Exploring / Deciding		ϟϟϟ	30
Prioriteren	Deciding		ϟϟ	10

Invulpuzzel + Gebouwtour
Doel: Op een interactieve manier kennis verkrijgen over circulariteit.
Dit gebeurt aan de hand van eigen ontdekkingen, learning by doing. Eerst zullen de groepjes door het invullen van de template met de invulwoorden kennis verkrijgen over de belangrijkste begrippen van circulariteit. Vervolgens zullen de groepjes met deze template het gebouw met een andere blik bekijken. De opdracht is dat de eind-gebruikers de materialen van het voor hun welbekende gebouw indelen in de verschillende categorieën (zie omcirkelde vakjes hieronder). Zo wordt de opgedane kennis toegepast in de praktijk en de huidige situatie in beeld gebracht.



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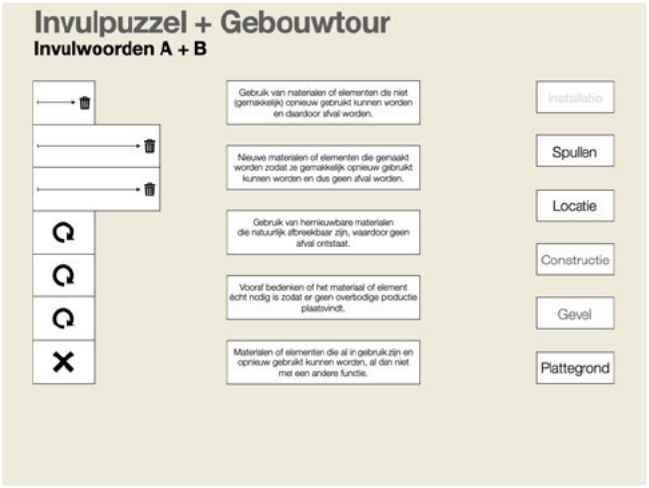
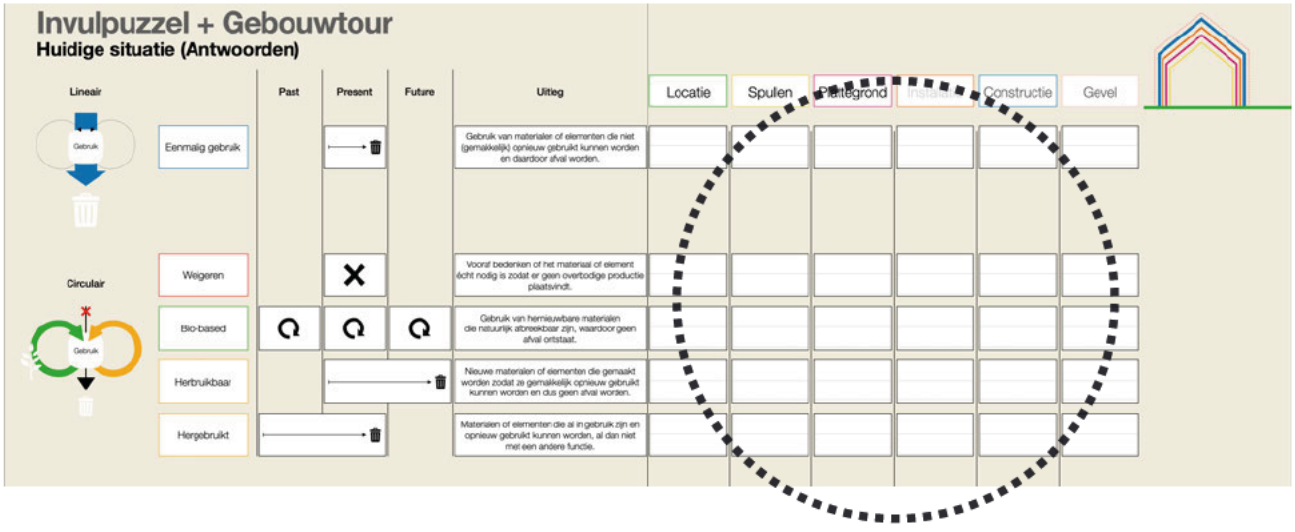
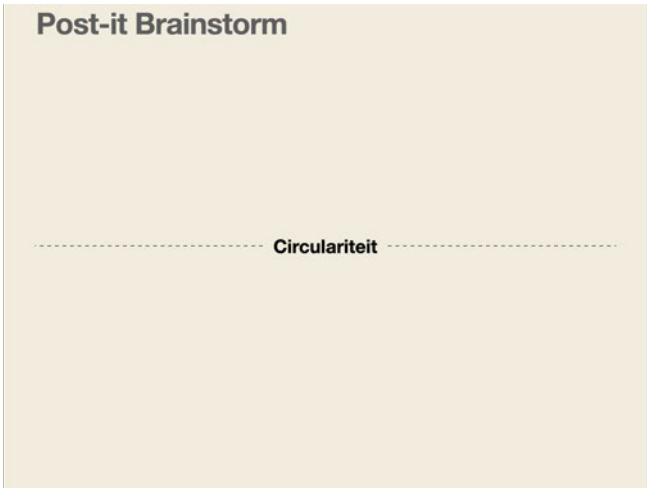
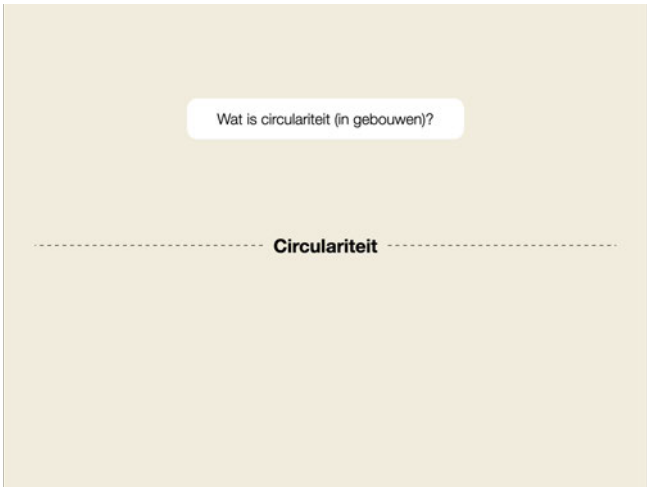


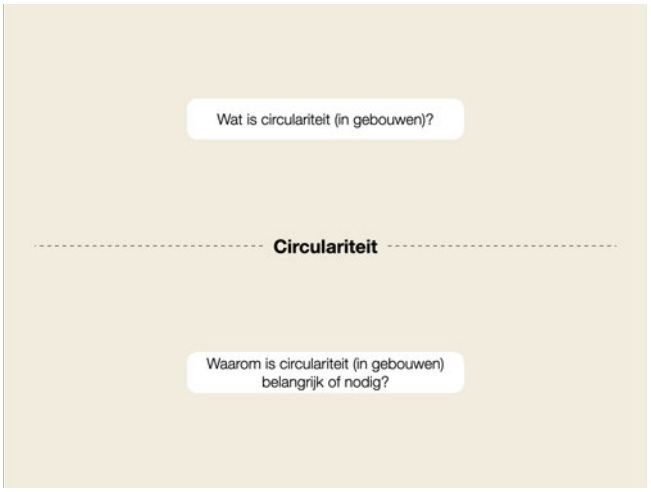
Antwoorden



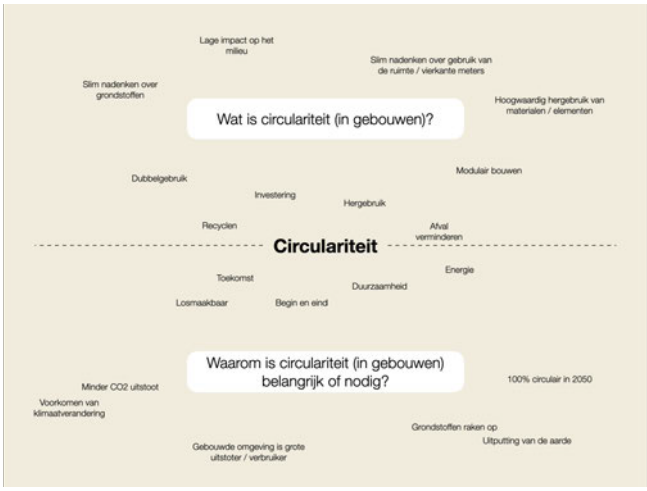
Post-it Brainstorm
Doel: Het delen van individuele kennis over circulariteit.
Tijdens de post-it brainstorm krijgt iedereen (kort) de tijd om steekwoorden op een post-it te schrijven. Dit zijn woorden die zij associeren met de woorden of vragen die ze te zien krijgen in de powerpoint (zie hieronder). Deze woorden worden naar gelang diepgaander en specifieker. Het is een individuele opdracht en na de derde slide kunnen alle post-its op een groot bord geplakt worden. Vervolgens kunnen de deelnemers elkaars post-its tijdens de pauze doorlezen als input voor de laatste vraag die na de pauze gesteld wordt: *Waarom een circulair schoolgebouw?* Ook het antwoord op deze vraag wordt weer opgeschreven. Deze antwoorden worden vervolgens plenair besproken.





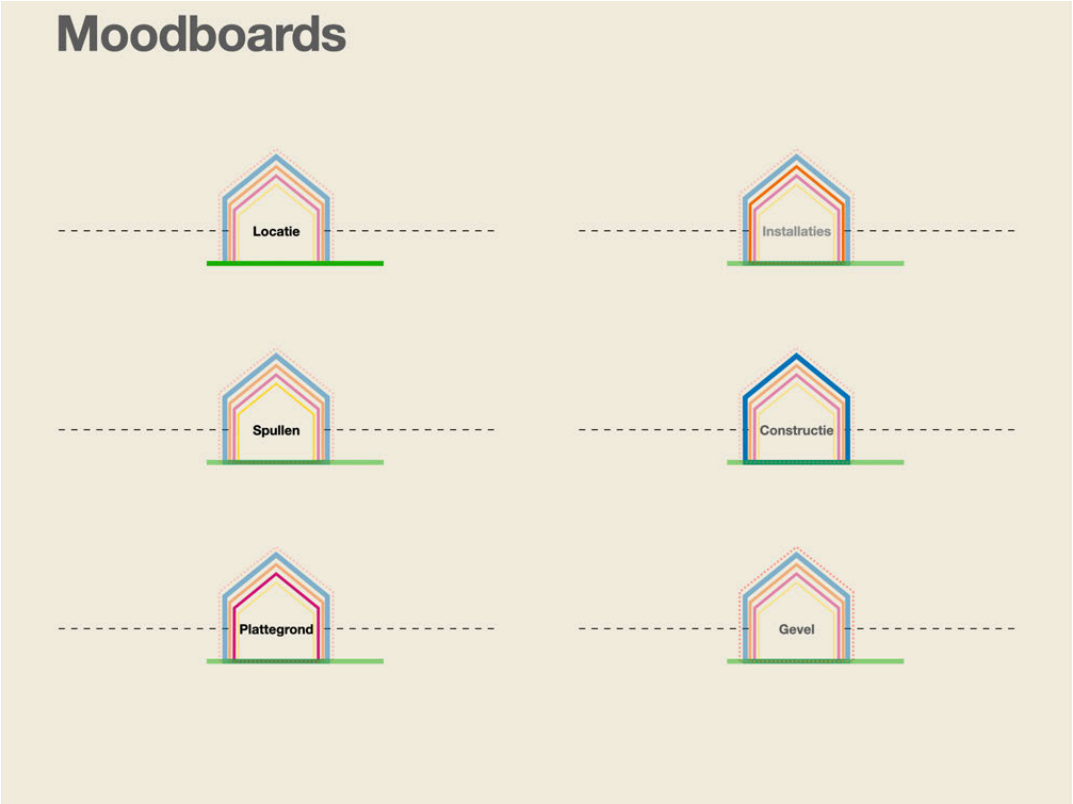


Mogelijke antwoorden die de deelnemers kunnen geven. Mocht er weinig input vanuit de groep komen, kan deze dia eventueel doorgenomen worden om toch een aantal belangrijke punten te noemen ter voorbereiding van de laatste vraag.



De laatste vraag:

Moodboards
Doel: Mogelijkheden met betrekking tot circulariteit ontdekken en de visie van het toekomstige gebouw visualiseren.
De moodboards worden gemaakt aan de hand van de gebouwschalen die ook zijn gebruikt bij de eerste oefening (zie hieronder). Zo ontstaan er dus zes verschillende moodboards. Uit een diverse verzameling van afbeeldingen kunnen de deelnemers kiezen om zo hun visie visueel te maken. De afbeeldingen kunnen geïnterpreteerd worden door de deelnemers zoals zij dat graag willen, er is dus geen goed of fout. De selectie van afbeeldingen is niet uitsluitend circulair. Dit maakt dat ze echt bewust kunnen kiezen voor en circulair gebouw, maar ook eventueel lineaire toepassingen kunnen kiezen (en toelichten).

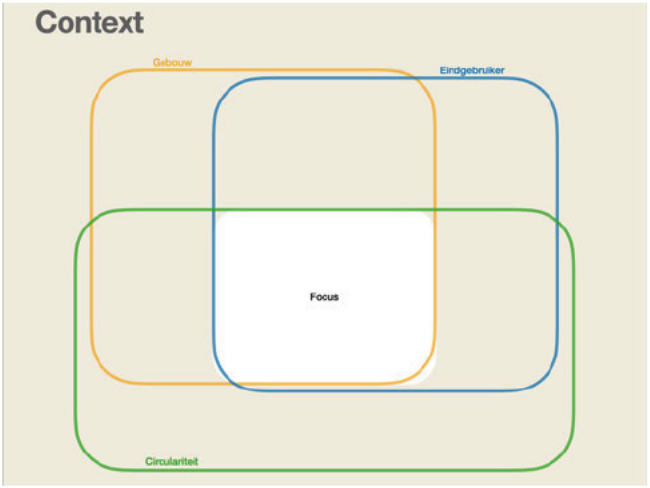


Prioriteren
Doel: Het bepalen van prioriteit van de verschillende ideeën.
Om te bepalen welke ideeën beter of belangrijker zijn, krijgen alle deelnemers een aantal stickers die ze op de moodboards kunnen plakken bij plaatjes en/of toelichtingen die hen aanspreken. Op die manier kan er uiteindelijk geïnventariseerd worden wat de deelnemers belangrijk vinden om terug te zien in hun toekomstige gebouw.

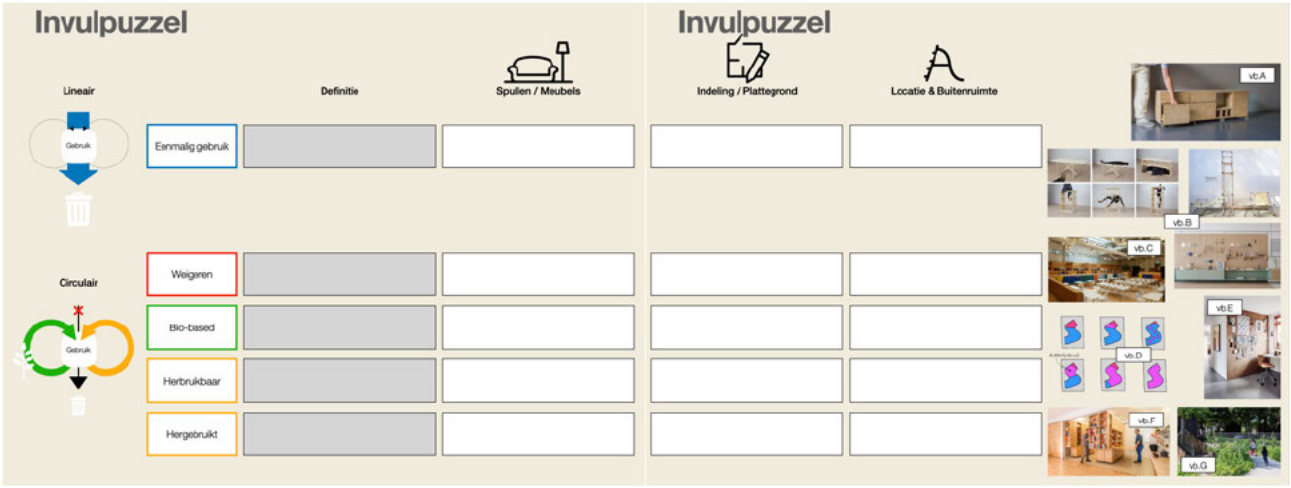
Versie 2

Naar aanleiding van de feedback is deze tweede versie van de circulariteitsworkshop gemaakt. Sommige onderdelen komen (gedeeltelijk) overeen met de eerste versie. Aanpassingen ten opzichte van de eerste versie zijn in blauw getypt, zodat deze makkelijker te herkennen zijn. De meest opvallende aanpassingen zijn de uitvoering van de invulpuzzel en de splitsing van de invulpuzzel en de gebouwtour, zie hieronder. Daarnaast is de inleiding van deze versie ook iets uitgebreider.

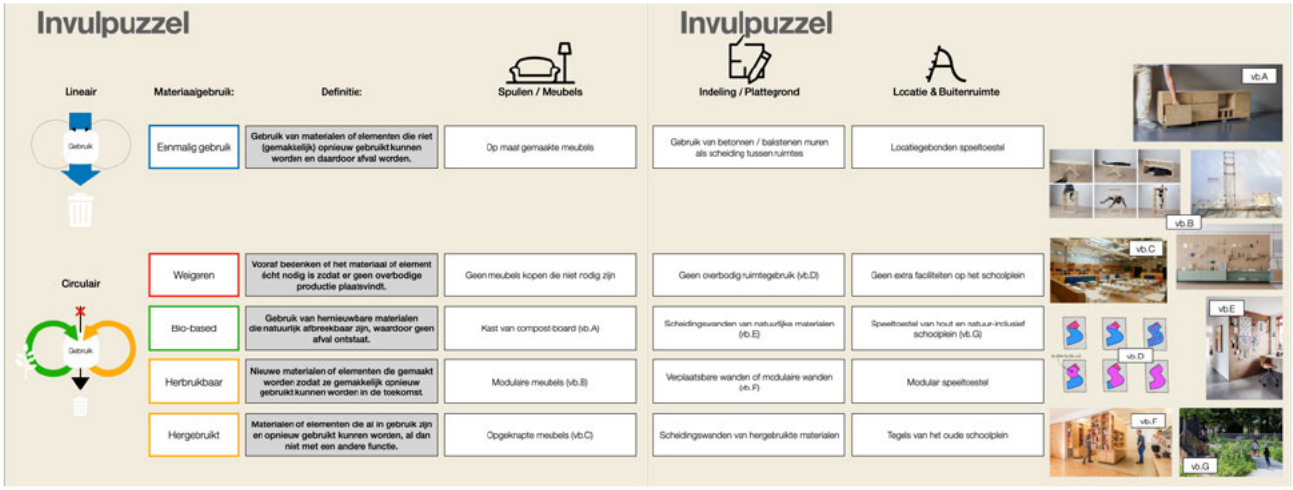
	Doel	Groepsgrootte	Activity-level	Tijd (min)
Invulpuzzel	Informing			15
Post-it Bainstorm	Informing			20
Pauze	-	-	-	10
Gebouwtour	Exploring			20
Moodboards	Exploring / Deciding			30
Prioriteren	Deciding			15



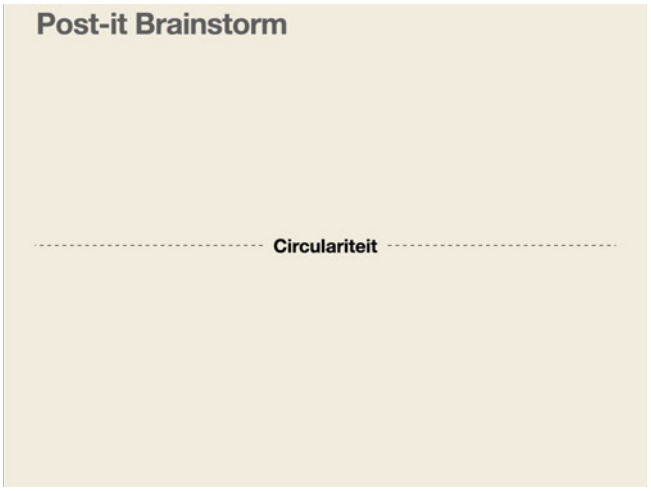
Invulpuzzel
Doel: Op een interactieve manier kennis verkrijgen over circulariteit.
Dit gebeurt aan de hand van eigen ontdekkingen, learning by doing. De groepjes zullen door het invullen van de template met de invulwoorden kennis verkrijgen over de belangrijkste begrippen van circulariteit. Er wordt gefocust op de onderdelen waar de deelnemers de meeste affiniteit mee hebben en er worden een aantal circulaire voorbeelden gegeven. De ingevulde puzzel kan als spiekbrief gebruikt worden tijdens de rest van de workshop.

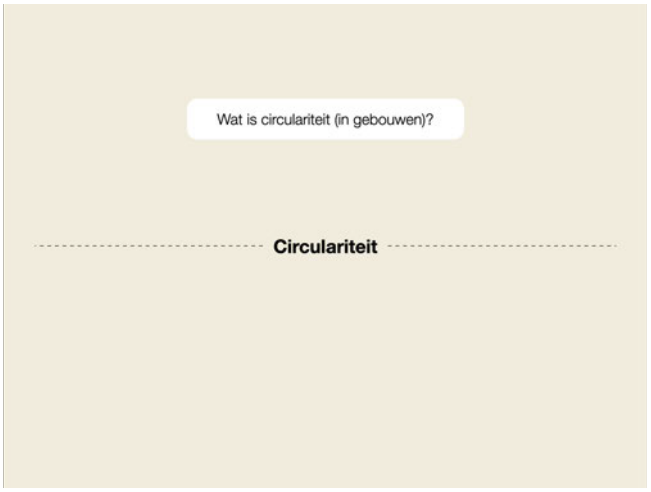


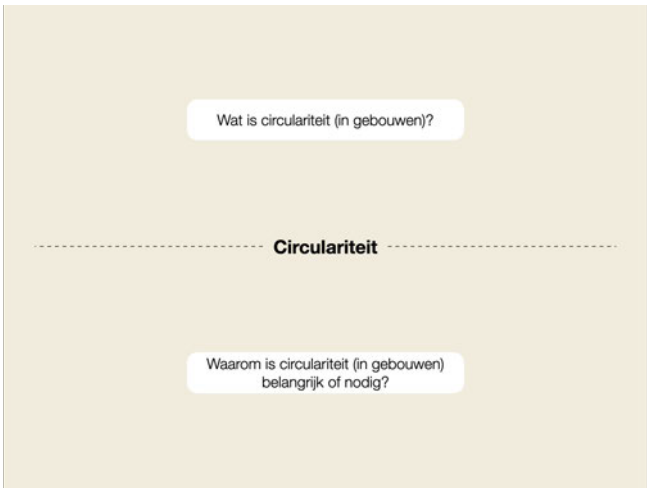
Antwoorden



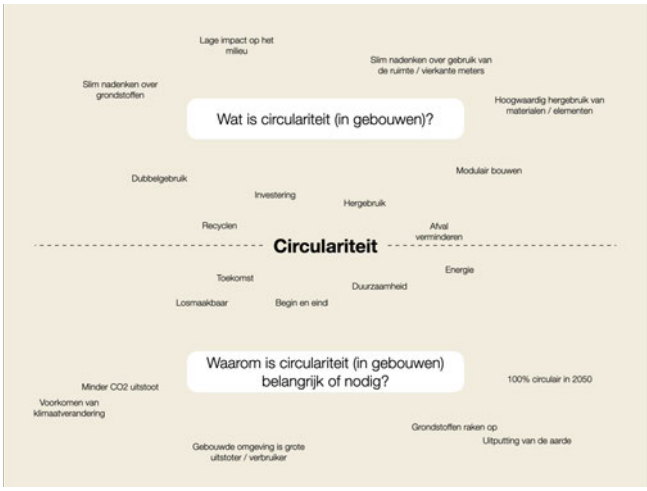
Post-it Brainstorm
Doel: Het delen van individuele kennis over circulariteit.
Tijdens de post-it brainstorm krijgt iedereen (kort) de tijd om steekwoorden op een post-it te schrijven. Dit zijn woorden die zij associeren met de woorden of vragen die ze te zien krijgen in de powerpoint (zie hieronder). Deze woorden worden naar gelang diepgaander en specifieker. Aan de hand van de woorden op de post-its kan uitwisseling van kennis plaatsvinden en er kunnen verbanden gelegd worden door de post-its direct op te plakken.







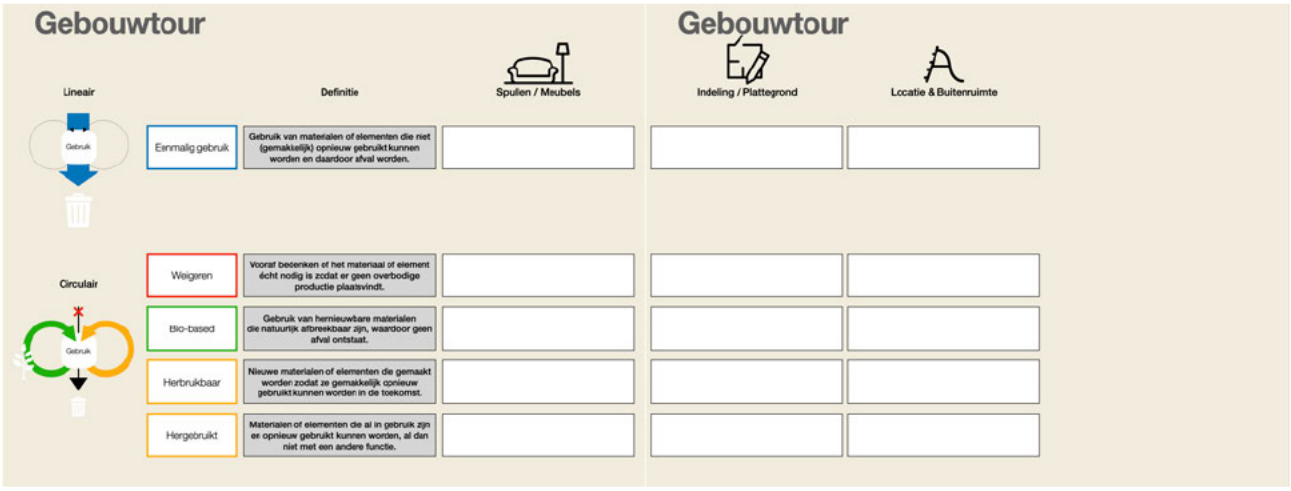
Mogelijke antwoorden die de deelnemers kunnen geven. Mocht er weinig input vanuit de groep komen, kan deze dia eventueel doorgenomen worden om toch een aantal belangrijke punten te noemen ter voorbereiding van de laatste vraag.



Tot slot de laatste vraag, *waarom een circulair schoolgebouw?* Bij deze vraag zullen de deelnemers, aan de hand van de antwoorden die ze eerst op een post-it schrijven, met elkaar bedenken wat redenen kunnen zijn om voor een circulair schoolgebouw te kiezen. Deze vraag rondt het ‘informing’ gedeelte van de workshop af en opent het ‘exploring’ gedeelte.

Gebouwtour
Doel: Opgedane kennis toepassen in de praktijk.
Aan de hand van (een deel van) de template die aan het begin is ingevuld gaan de deelnemers hun gebouw met een nieuwe 'point of view' bekijken. Het is de bedoeling ze de materialen en elementen in het gebouw bij een categorie onderbrengen. Dit is (waarschijnlijk) niet mogelijk voor alle categorieën, het is dan ook geen vereiste om met een gevulde template terug te komen.

[De template kan op 2 manieren ingevuld worden. Enerzijds, zoals hierboven benoemd, kan de huidige situatie beschreven worden. Anderzijds kan er al met een meer kritische blik gekeken worden. Is er nu een grote ruimte die alleen gebruikt wordt om te lunchen? Misschien zou die ruimte wel gecombineerd kunnen worden met werkplekken door op een aantal handige punten stopcontacten toe te voegen. Dit is afhankelijk van het niveau van de (sub-)groep en de facilitator.]



Moodboards
Doel: Mogelijkheden met betrekking tot circulariteit ontdekken en de visie van het toekomstige gebouw visualiseren.
De moodboards worden gemaakt aan de hand van de onderdelen die ook zijn gebruikt bij de eerste oefening (zie hieronder). Zo ontstaan er dus drie verschillende moodboards. Uit een diverse verzameling van afbeeldingen kunnen de deelnemers kiezen om zo hun visie visueel te maken. De afbeeldingen kunnen geïnterpreteerd worden door de deelnemers zoals zij dat graag willen, er is dus geen goed of fout. De selectie van afbeeldingen is niet uitsluitend circulair. Dit maakt dat ze echt bewust kunnen kiezen voor en circulair gebouw, maar ook eventueel lineaire toepassingen kunnen kiezen (en toelichten). Ook de antwoorden die uit de gebouwtour naar voren komen zijn goede en relevante input voor dit onderdeel.

Prioriteren
Doel: Het bepalen van prioriteit van de verschillende ideeën.
Om te bepalen welke ideeën beter of belangrijker zijn, krijgen alle deelnemers 3 groene en 1 rode sticker die ze op de moodboards kunnen plakken bij plaatjes en/of toelichtingen die hen aanspreken. Op die manier kan er uiteindelijk geïnventariseerd worden wat de deelnemers belangrijk vinden om terug te zien in hun toekomstige gebouw.

Overzicht van de feedback

De deelnemers kregen post-its waar ze tijdens de workshop alvast opvallende punten op konden noteren. Vervolgens kregen alle deelnemers na de testworkshop een formulier met vragen waarmee ze anoniem feedback konden geven op de opzet en inhoud van de workshop. De post-its en het formulier leverden ze aan het einde van de sessie in. Deze uitkomsten zijn opgenomen in onderstaande tabel.

Feedback op versie 1

	1	2	3	4	5	6	7	8
Hoe interactief vond je de workshop?	Goed.	Heel interactief.	Zeer interactief.	Leuke mix van activite ten, allemaal erg interactief, leuk!	Heel interactief. Weinig zenden en veel doen.	Heel interactief, prikkelend ondanks dat het vrijdag 15-17h is.	Goed, tijdens ieder onderdeel werd onze input gevraagd.	Heel interactief, leuk!
Voelde je je betrokken bij alle onderdelen of had je meer input willen geven?	Ja.	Ja.	Zorg voor een tafel waarbij "spullen in het midden" door iedereen te lezen zijn.	Balans was goed en genoeg input.	Bij de eerste opdracht was het zoeken naar het doel en de verwachting.	Er was voldoende mogelijkheid om input te geven.	Qua input was het meer dan genoeg, maar na iedere ronde feedback op wat gedaan is, zou fijn zijn.	Wat meer duiding over het doel zou goed z jn in de introductie.
Waarom? En wat zou dit kunnen verbeteren?	Er zou meer plek mogen zijn voor eventuele onderbouwing.	nvt	Bij de laatste sessie kon ik niet terugblikken op de resultaten van de eerste sessie.	Gebouwschillen wel toelichten denk ik, niemand kent dat buiten bouwkunde.	Meer stapegewijs: eerst invulpuzzel (toelichten en laten matchen), dan gebouwtour koppeling toelichten en doel uitleggen.	Overal ruimte voor eigen input, zonder dominante gesprekslelders.	Dan is het vertrekpunt voor de volgende ronde duidelijk.	Uitgebreidere toelichting + doel.
Heb je veel geleerd over circulariteit?	Nee, ik wist niet alles, maar voor mij niet iets nieuws.	Graag meer mooie voorbeelden.	Ja, ik weet nu veel meer dan voor de workshop. Maar ik begrijp nog steeds niet hoe een heel gebouw circulair gebouwd kan worden.	Goede bewustwording en leuk om een ruimte te bekijken vanuit die blik. Op pagina van gebouwtour wel meer uitleg.	Ja, ik weet nu veel meer dan voor de workshop.	Ja, ik weet nu veel meer dan voor de workshop. Niveau eerste ronde was wel te hoog, meer zwembandjes meegeven.	Ja, ik weet nu veel meer dan voor de workshop.	Nee, ik wist alles al (gekeken vanuit mijn kennisniveau). Voorbeelden zouden helpen.
Heb je het gevoel dat je weloverwogen keuzes hebt kunnen maken?	Nee.	Ja / nee.	Nee.	Ja / nee.	Ja / nee.	Ja.	Ja.	Ja
Waarom wel / niet?	Voor mij was het doel niet helemaal helder, waardoor ook keuzes of impact ervan niet helemaal helder was.	Wat zijn de gevolgen van de keuzes?	Ik kan de consequenties van mijn keuzes niet overzien.	Leuke plaatjes, maar hoe moet ik ze beoordelen? Op circularite t / duurzaamheid / beeldkwaliteit?	Ik twijfel of nu alles aan bod is gekomen wat mogelijk is, k ben geen expert.	Goede opbouw omdat je eerst wat leert en dan een keuze kan maken.	Ja, iedere ronde kon k rustig nadenken en mijn input leveren.	Wel op ambitieniveau. De vraag is natuurlijk welke keuzes op bestuurlijk niveau worden gemaakt. Dit duide ijk introduceren aan deelnemers.
Hoe zou je circulariteit implementeren in andere facetten van je leven?	t-pve aanpakken op werk ;) en niet altijd iets nieuws.	Geen afval kopen, maar duurzame producten.	Gescheiden afval. Grofvuil naar milieupark brengen.	Vooral weinig onnodigs gebruiken.	Spullen kringloop.	Keuze in aankoop van producten, eigen woonomgeving.	Kijken hoe spu len een tweede leven kunnen krijgen.	Ja, ik ga al heel vaak naar de kringloop.
Was het kennisniveau van de workshop te hoog / te laag?	Mag van mij iets hoger, bijv. voorbeelden laten zien.	Te hoog, de 6S schillen meer levend maken bijv. door foto's eromheen.	De puzzel is te ingewikkeld. Het woord "schillen" misschien vervangen door "elementen van vast naar los".	Prima.	Eerste opdracht simpeler maken.	Begin was te veel om vanuit 0 in te vullen. Wellicht de uitleg al invullen en de iooontjes laten doen.	Als het begint met de vragen over circular teit wordt de introductie makkelijker en goed op het kennisniveau te komen.	Was denk ik goed. Maar uitleg kan wat uitgebreider.
Vond je de workshop te lang / te kort?	Goed.	Te kort, een deel mag best jouw expertise inbrengen zijn.	Precies goed.	3 onderdelen was wel veel, maar tijd vloog voorbij in positieve zin.	Precies goed.	Prima.	Goede lengte, zeker door het interactieve karakter.	Precies goed om energie erin te houden. Goed dat je een pauze erin gestopt hebt.
Zou je deze workshop zelf kunnen uitvoeren?	Ja, mits ik het doel goed weet + voorbeelden.	Ja.	Ik vond dat jij het heel goed deed. Ik ben daarvoor te cynisch.	Ja, ik denk het wel. Wel belangrijk om mensen te kunnen inspireren met goede voorbeelden.	Ja.	Ja, maar wellicht beste geschikt als je er jezelf in hebt verdiept.	Ja, als de ambitie er is zeker!	Ja.
Tips / Aanvullingen / Opmerkingen	Doel + opdracht goed aangeven aan deelnemers.	Positief is de afwisseling van werkvormen.	Wellicht de referentiebeelden verdelen n do's en dont's.	Soms ingewikkeld om vanuit circulaire bril te blijven kijken en niet allemaal andere dingen erbij te betrekken (vooral bij collage lastig).	Zoveel mogelijk voorbereiden (kaartjes knippen).	Duidelijkere uitleg & doel van iedere fase van de workshop.	Goed de doelen van de workshop op een rijtje te hebben en daar de volgorde van onderdelen op aanpassen.	Ik zou van ieder type een voorbeeld geven. In de vorm van foto bijv. (bio-based, herbruikbaar, hergebruikt).
	Eerst enthousiast maken met voorbeelden, dan nadenken wat dit voor hun school betekent.	Van welke werkvorm krijg je energie, van welke niet?	Kan een gebouw ook een beetje circulair zijn?	Bij de puzzel echt benoemen dat het is als bewustwording en niet wat mee gaat naar het volgende gebouw.	Bij oplossing puzzel: delen op grote scherm.	Brainstorm / woorden wellicht op chinees tafelkleed.	Concretiseer de rondlooopvragen voor gebruikers > discussie voorkomen over waar te plaatsen (als het gaat om wat de gebru ker mee wi).	Bij afbeeldingen het materiaal benoemen, zoals 'hennep&hars'. Dit maakt dat je minder oordelend bent over hoe het eruit ziet en meer of je achter het idee staat.
	"laaghangend fruit" > ICS in pve's!	De invulpuzzel lijkt me moeil jk voor docenten.		Minder stickers is ook prima, bijv. 3 groene en 1 rode.	Bij neerleggen kaartjes met schillen zie je de kleuren niet meer.	Voorbeelden ergens opnemen om te prikkelen.		Ik zou de eerste oefening op grotere vellen printen. En benoemen waarom je de eerste oefening doet (pellen van het kennisniveau).
	Omwisselen: eerst wat is circulariteit, daarna rondje gebouw.			Nadenken over wat er gebeurt als mensen zeggen "Ik wil helemaal geen circulariteit".	Rondje door gebouw: duidelijk maken wat de bedoeling is > inventarisatie huidige gebouw?	Heel leuke workshop ontwikkeld!		Overweeg om minder stickers ge geven, dan moet je bewuster kiezen.
	Wat is het doel? Alleen awareness / kennis? Om ambitie te formuleren? > dan eerder met gemeente en schoolbestuur.			Puzzel: Eerst u tiegkaartjes plaatsen op het vel, dan pas de iooontjes.				
				Iets om op te schrijven bij de gebouwtour.				
				Invulpuzzel zou ik kennisquiz noemen, dan is het duidelijk wat het doel is van de opdracht.				
				Bij de schillen iets meer toelichting dat de binnenste schil makkelijker te vervangen is dan de constructie. Als je dit schema nog nooit gezien hebt is het wel moe lijk denk ik.				
				Zou ook leuk z jn als alle plaatjes circulair zijn, zodat je iets kan kiezen wat echt kan en geeft voorbeeld van alle mogelijkheden.				

Eigen feedback:
- Doel van de workshop verduidelijken;
- Tafels anders zetten voor overzicht / betere interactie;
- Zorgen dat er tussendoor opgeruimd kan worden;
- Kennisniveau was te hoog + Niet concreet genoeg;
- Groter papier voor de moodboards;
- Grotere ruimte nodig / regelen voor workshop;
+ Pauze was goed;
+ Afwisseling van werkvormen was goed.

Feedback op versie 2

	9	10	11	12	13
Hoe interactief vond je de workshop?	Erg interactief, veel ruimte om gedachten te delen.	Heel erg: Niet te lang overal bij stilstaan, continu eigen input en invloed op de uitkomst.	OK. Je stelde voldoende vragen en ging ook goed in op opmerkingen vanuit de groep.	Goede interactiviteit, laagdrempelig door kleine groep.	Goed interactief! (Niet te lang doorgaan over 1 ding)
Heb je het gevoel dat je je mening kon uiten tijdens de workshop?	Ja.	Zeker, zie hierboven.	Zeker!	Jazeker.	Ja, was een goede open sfeer. Belangrijk om dit als facilitator aan het begin te benadrukken!
Voelde je je betrokken bij alle onderdelen of had je meer input willen geven?	Ja.	Was top, zeker als het normaal gesproken in kleinere groepjes is.	Jazeker (wel voordeel van wat kleinere groep die ook al gemotiveerd was om mee te doen).	Ik heb voldoende input kunnen geven.	Ja, zeker!
Waarom? En wat zou dit kunnen verbeteren?	Je gaf mensen de beurt en gaf ruimte om te spreken.	-	-	Je had de mogelijkheid om per persoon de opmerkingen te vragen.	Er was voor iedereen ruimte om input te geven. Ik denk dat het goed was om de oefeningen in kleine groepjes te doen, daardoor heeft iedereen wel de ruimte om input te leveren.
Heb je veel geleerd over circulariteit?	Ja, ik weet nu veel meer dan voor de workshop.	Zeker meer inzichten en fijn om op een rijtje de verschillen te weten in het begin.	Inhoudelijk wist ik het meeste wel, maar juist in "het doen" en toepassen leer je steeds weer nieuwe dingen bij.	Ja, ik weet nu veel meer dan voor de workshop.	Ja, dingen zijn nu concreter voor me dan voor de workshop.
Heb je het gevoel dat je weloverwogen keuzes hebt kunnen maken?	Ja.	Ja.	Ja.	Redelijk.	Ja.
Waarom wel / niet?	Er was veel vrijheid, geen fout antwoord, en veel keuze bij de plaatjes.	Voldoende uitleg en voorkennis, dus prima keuzes kunnen maken.	Goede open discussie, zonder vooropgezette antwoorden.	Omdat het gebruik van de TU nu voor mij niet bekend genoeg is.	Ik heb niet het idee gehad dat ik veel keuzes heb moeten maken. Het was meer een exploration voor mij, maar dan is het antwoord denk ik ja.
Zou je circulariteit nu implementeren in andere facetten van je leven? Zo ja, hoe?	Ik vind het wel interessant om over na te denken en mee bezig te zijn, maar zie op dit moment niet direct ruimte waar ik het kan toepassen.	Niet op de korte termijn.	We doen ons best!	Ja, gebruik van oude materialen.	Ja, het maakt je wel bewuster en zet aan tot denken. Ik denk dat ik meer over hergebruik ipv nieuw zou nadenken.
Was het kennisniveau van de workshop te hoog / te laag?	Voor mij was het goed, ik kan me voorstellen dat het voor (basisschool) leerlingen ingewikkeld kan zijn.	Meer introductie aan het begin is wenselijk, meer inzicht in verschil tussen duurzaamheid en circulariteit.	Goed te doen.	Voor jouw doelgroep misschien te hoog.	Was goed!
Vond je de workshop te lang / te kort?	Ik vond de duur goed.	Nee.	Geen moment verveeld.	Te kort, ik denk dat je zeker beter kunt uitwerken als je er iets meer tijd voor neemt en iets meer tijd om per onderdeel de doelstelling toe te lichten (vooral het eerste doel).	Ook goed, de pauze is wel nodig.
Tips / Aanvullingen / Opmerkingen	Leuke gesprekken ontstaan.	Meer context voor invulpuzzel. Had duidelijker mogen zijn dat we eerst zelf gaan ontdekken wat circulariteit is.	Enthousiast gebracht! En je gaat ook goed in op opmerkingen en vragen.	Puzzel: Dubbel gebruik / Flexibel gebruik niet duidelijk.	Misschien goed om aan het begin te vermelden waarom participatie van de mensen nuttig of relevant is.
	Het is voor leerlingen misschien een lastig onderwerp, minder kennis hierover.	1 slide die concreet maakt wat het verschil is tussen duurzaamheid en circulariteit. Moeilijk voor beginners om het verschil te begrijpen.	Gebouwtour leuk om "de praktijk" te onderzoeken, maar hangt er in het programma toch een beetje bij.	Puzzel: "Gebruik van hernieuwbare materialen…"	Gebouwtour is super leuk en relevant! Tip om misschien meer concrete vragen op template te zetten, nu wisten we niet altijd precies waar we naar zochten.
	Post-it brainstorm goed opgesplitst in onderdelen, dit laat je op een andere manier nadenken.		Definities: Weigeren misschien veranderen in vermijden of voorkomen.	Post-it Brainstorm: Was niet duidelijk dat de termen per stuk behandeld werden.	Je weet super veel en kan op alles antwoord geven, goed! Wel uitkijken dat je niet te lang blijft hangen en mensen hun aandacht verliest (met name bij mensen met minder achtergrond kennis misschien?)
	Weten alle scholieren wat circulariteit is?		De introductie stem je ongetwijfeld af op je doelgroep/ publiek. Voor een basisschool zou ik iets meer vertellen over 'waarom' het belangrijk is (voor jou) en 'wat' je wil bereiken.	Post-it Brainstorm: Was niet duidelijk wat de bedoeling was.	Het is mij nu niet helemaal duidelijk of de 4 vormen nou onderdeel zijn van circulariteit of gewoon duurzaam? Of is dit geen verschil?
	Plaatje bij de puzzel uitleggen vóór het starten van de puzzel.		Goede time-management. Het proces wordt 'strak' geleid, maar blijft toch speels.	Post-it Brainstorm: Goed om de opmerkingen plenair te bespreken.	Aan het begin van de sessie misschien een icebreaker doen om in de mood voor de workshop te komen.
	De voorbeeldplaatjes zijn wel fijn. Voorbeeld D is een beetje lastig te begrijpen, lastig te zien dat het een plattegrond is.			De uitleg over afschrijving was moeilijk; Hoge initiële investering met hoge restwaarde (materialen bank) zou voldoende moeten zijn.	
				Gebouwtour: 15 minuten lijkt me te kort.	
				Gebouwtour: Moeilijk om notities te maken bij gebouwtour op het papier.	
				Beter uitleggen dat de opmerkingen van gebouwtour bij moodboards te gebruiken zijn.	
				Tijdens bespreken moodboards op een flip-over de conclusies schrijven.	

Eigen feedback:
- Manier vinden om antwoorden bij post-it brainstorm te categoriseren;
- Input voor moodboards beter benoemen;
- Afbeeldingen bij de moodboards laten plastificeren, zodat ze opnieuw gebruikt kunnen worden;
- Manier om te prioriteren verbeteren;
+ Werkvormen volgden elkaar goed op;
+ Tijd om lay-out van de ruimte aan te passen.

Feedback Pieter[2]:
- Intro: alle info op 1 slide, misschien zijn meerdere slides beter / overzichtelijker;
- Context: cirkels zijn misschien duidelijker dan vierkanten;
- Context: duurzaamheid vs. circulariteit expliciet maken;
- Planning: Uitleggen waarom we wat doen, dus de driedeling van de workshop expliciet maken voor de deelnemers;
  - *Wat is circulariteit?*
  - *Hoe zien we circulariteit in het gebouw?*
  - *Hoe willen we circulariteit in ons toekomstige gebouw?*
- Invulpuzzel: Namen van de onderdelen veranderen: Inboedel // Wanden // Buitenruimte;
- Invulpuzzel: Weigeren veranderen in voorkomen;
- Extra dia maken voor 10R theorie en initiële investering in het geval dat het uitgelegd moet worden;
- Hoofdthema's opzetten of checklist maken om te checken of alles over circulariteit besproken is;
- Input bij post-it brainstorm evalueren (goed of fout);
- 'Herbruikbaar' en 'hergebruikt' zijn verwarrend, misschien veranderen in 'Herbruikbaar' en 'Flexibel'.

[2] Vriend van bouwkunde die aanwezig was bij de workshop om aantekeningen te maken.

Appendix J | *Outcome of Expert Interviews*

	Expert Interview 1			Expert Interview 2			Expert Interview 3
Deelnemers	Teun van Wijk (T); Jan Willem van Kasteel (JW); Koert Klevant Groen (K)			Jana de Heer			Shuly Themans
Expertise	Experts op gebied van participatie en/of duurzaamheid.			Adviseur duurzaamheid en ruimte & Duurzaamheidscoördinator bij Kuiper Compagnons.			Strategic Real Estate Consultant bij JLL.
Feedback nav Workshop Version 1	Intro over urgentie en relatie tot duurzaamheid mist. Geef goed aan waarom de deelnemers deze workshop doen. (JW)		**Wat vind je van de vertaling van het 10R en 6S model?**	Hoe je het 10R model uitlegt klopt het wel. Misschien weigeren veranderen in weigeren/ verminderen. Goed dat bio-based is toegevoegd. Deze heeft te meeste impact.		**Wat vind je van de verschillen tussen V1 en V2?**	Goede veranderingen. Goed dat post-it brainstorm en gebouwtour zijn omgewisseld.
	Goed dat de deelnemers snel aan de slag kunnen, geef wel aan wat de lijn is tussen de opdrachten. (K)			Misschien de relevantie van de abstracte lagen van het 6S model benoemen.		**Op welke schalen focussen jullie bij JLL?**	Vooral visie, minder praktische toepassingen.
	Geef goed aan waar de keuzes over gaan die gemaakt moeten worden tijdens het prioriteren. (K)						
	Zorg dat de waarom-vraag bij de post-it brainstorm een gevoel van saamhorigheid tackelt. (T)						
Feedback nav Workshop Version 2	Leuk dat er groene en rode stickers worden gebruikt bij het prioriteren. (T)		**Feedback nav Workshop Version 2**	Als het doel is informeren, enthousiasmeren en een beeld krijgen van de praktische mogelijkheden binnen de school waar zij controle over hebben, dan is het hartstikke nuttig zo. Ik vind het een mooie workshop waar veel verschillende theorieën in zitten maar toch inzichtelijk zijn gemaakt.		**Feedback nav Workshop Version 2**	Goed dat je door het prioriteren ook probeert te quantificeren.
	Ligt toe waarom er alleen gefocust wordt op deze 3 lagen. (JW)			Als toevoeging op de post-it oefening: "Wat hebben we invloed op binnen ons gebouw wat betreft circulariteit?" "Welke keuze heeft de meeste impact / effect?"			Let wel op dat de ideeën / stickers elkaar kunnen beïnvloeden. Misschien goed om individuele input te genereren.
	Maak de verantwoordelijkheid per schaal inzichtelijk. (T) Ja, dit geeft ook aan dat de gebruikers zich niet druk hoeven te maken over bijv. de constructie. (K)			De gebouwtour is goed om uit te voeren omdat het goed is om in de praktijk te kunnen kijken en even actiever bezig te zijn.			Intro en outro toevoegen. Fijn als mensen zich kunnen voorstellen en informatie krijgen van de facilitator. Jezelf voorstellen zorgt er wel voor dat je je welkom voelt en dat je voelt dat er naar je wordt geluisterd. Aan het eind vragen: Is er nog iets dat ik moet weten voor we deze workshop beëindigen?
	Het is leuk dat de besluiten van de eind-gebruikers wellicht het bestuur kunnen inspireren om ook voor circulariteit te kiezen op de vlakken waar zij invloed op hebben. (JW, T, K)			Bedenk goed wat het doel is van het moodboards. Misschien goed om korte uiteg toe te voegen aan de plaatjes, zo zijn ze extra informerend en enthousiasmerend.			Bedenk wat je wil weten nav de moodboards. Wil je weten hoeveel impact / invloed van circulariteit is tov andere topics of wil je weten welke topics belangrijk gevonden worden? Of allebei, dan zou ik het onderzoek splitsen.
	Wat als de workshop 2.5 of 3 uur duurt? (K)			Goed om de lineaire opties ook te laten zien bij de plaatjes voor de moodboards.			Bij de plaatjes voor de moodboards zou ik geen tekst toevoegen, want dat kan overwhelming zijn. Zolang ze erbij benoemen wat hen aanspreekt in het plaatje, ontvang je de goeie input.
	Qua opbouw zou ik de gebouwtour en de pauze omwisselen, dat heb je een buffer in het geval van uitloop. Zoiets als een tour duurt altijd larger dan gepland. (K)			Groene en rode stickers zorgen voor een gesprek bij het prioriteren. Daarnaast is het een goeie stap om te achterhalen wat mensen echt vinden, of ze een ander beeld hebben van iets en goed om concreter te worden om mee verder te gaan.		**Hoe denk je dat de engagement verbeterd kan worden?**	Ruimte creëren in de workshop om eventueel langer door te gaan over een onderwerp dat heel erg in de smaak valt, door bijvoorbeeld een reserve-opdracht.
	Let op met het gebruik van voorbeelden. Deze kunnen erg sturend zijn voor deelnemers en je krijgt dan vaak dezelfde dingen terug. (K) Ja je moet er of geen gebruiken, of heel veel! (T)		**Hoe zou jij omgaan met input tijdens de post-it brainstorm die niet volledig relevant is aan het thema circulariteit, zonder enthousiasme te verliezen?**	Doorvragen via misschien een andere vraag			Verder denk ik dat engagement ook vanzelf wel op gang komt omdat het echt over een belangrijke plek gaat voor de deelnemers.
	Een workshop duur van 2 uur is goed. (T)			Kijken of ze nog andere input hebben			
	Het personifiëren van de informatie richting het bestuur vind ik erg sterk. (JW) > Ja, hierdoor kan het gesprek gestart worden en kunnen bepaalde punten verdedigd worden. Dit is echt die 2-way flow of information.			Mensen op elkaar laten reageren		**Extra opmerkingen**	Huiswerkopdrachten werken best goed bij ons.
	Bij het ophangen van de post-its moet je goed opletten dat dingen die hetzelfde lijken, niet perse hetzelfde zijn. Vraag goed door. (K)		**Wat vind je van het informatie-niveau?**	Misschien kan je nog iets toevoegen over de verschillende bouw-lagen en hun levensduur en voorbeelden geven van invulling en footprint.			Probeer de persoon die het hoogste in een organisatie is, als laatste aan bod te laten komen
Welke workshop vormen missen jullie nu nog waarvan je denkt dat ie wel echt toegevoegde waarde kan leveren?	De No Wonder Workshop vorm, daarbij maken de deelnemers op post-its 2 stapels: 1 met dingen die ze al weten en 1 met dingen die ze zich afvragen. Deze post-its proberen ze vervolgens te matchen, dit zorgt voor een andere dynamiek dan bijv. bij de post-it brainstorm.			In de introductie meer context benoemen, wat is een schoolgebouw, wat is de invloed per laag?			Wij proberen vaak het aantal deelnemers tussen de 8 en 12 personen te houden, maar dat is wel online. De groepen met betrekking tot design zijn wel vaak groter.
Wat vinden jullie van de balans tussen circulariteit en engagement?	Wat betreft circulariteit mis ik bio-diversiteit. Ik kan me voorstellen dat dit heel erg aanspreekt bij de deelnemers. (T)						Wij laten soms ook deelnemers selecteren door afdelingshoofden, daardoor zijn ze er vaak bij omdat het moet en omdat ze zich ook wel een beetje speciaal voelen. Daarbij zorgen we wel dat het een gevarieerde groep is (gender, leeftijd, etc.).
	De 7-pillars of circularity kan je misschien gebruiken. (JW) Of probeer toe te lichten waarom je alleen focust op de materials-pillar. (K) Kijk goed welke pillars relevant zijn voor end-users van een school. Misschien kunnen bij een grotere groep ook andere pillars aan bod komen. (K)						> Ja, wat kan meespelen bij de lage opkomst is dat ik zelf niet verbonden was met het project, waardoor je minder persoonlijk contact hebt. S: Ja en daarnaast moeten zij natuurlijk betalen om een workshop te doen normaal gesproken.
	Focus op de relatie met leren. (T)						Bij ons zijn de sessies ook 2 uur vaak.
	Misschien actualiteit betrekken. (JW)						Het is heel interactief en informatief aan het begin en daarna echt aan de slag te gaan, ik denk dat jouw opzet heel goed in elkaar zit. Overall klinkt het als een hele goeie workshop :)
	Hoe zorg je dat pubers betrokken zijn? (T)						
	Probeer te zorgen dat je een plek creëert voor bijvangst. (K)						
Waar ligt het initiatief om de workshop in te zetten?	Het zou de missie van ICS moeten zijn en dan zouden ze kunnen aangeven dat de opdrachtgever deze workshop cadeau krijgt bijvoorbeeld. (K) Misschien dat het ook een wereiste moet zijn vanuit ICS om kennis te hebben over deze aspecten. (JW)						
	Bestuurder of opdrachtgever heeft soms ook motivatie om voor circulariteit te kiezen, en uiteindelijk moeten zij betalen. (JW)						
	Misschien is dit ook wel een goede opzet om als workshop aan te bieden buiten bouwprojecten, maar bijvoorbeeld op een lerarendag, want het is een leuke, inspirerende workshop. (T)						

Circulariteit-workshop

1

Planning

Inleiding	5 min.
Invulpuzzel + Gebouwtour	30 min.
Post-it Brainstorm	20 min.
Pauze	10 min.
Post-it Brainstorm	10 min.
Moodboards	30 min.
Prioriteren	15 min.

2

Inleiding

Doel van de workshop:
Op een interactieve manier bewust worden van circulariteit in gebouwen
&
de prioriteit bepalen van circulariteit in het nieuwe schoolgebouw

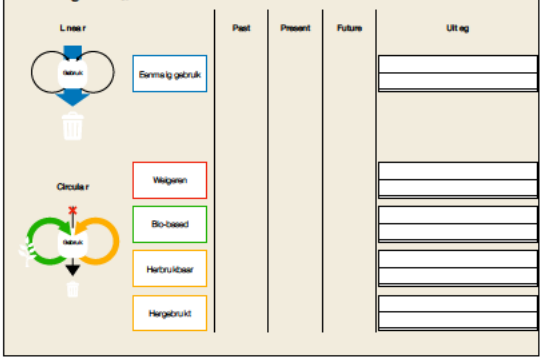
Rollen

Tips!

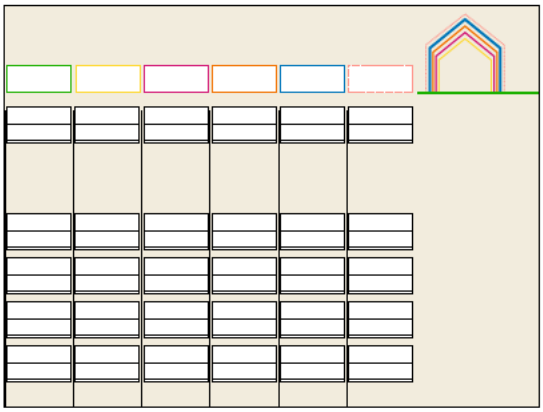
Enquête :)

3

Invulpuzzel + Gebouwtour
Huidige situatie



4

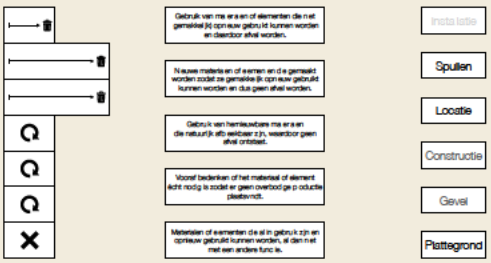


5

Invulpuzzel + Gebouwtour
Invulwoorden A

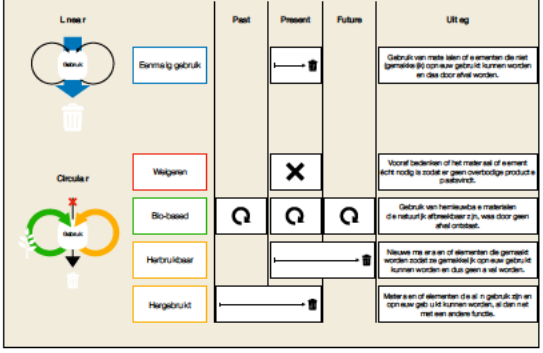
6

Invulpuzzel + Gebouwtour
Invulwoorden A + B



7

Invulpuzzel + Gebouwtour
Huidige situatie (Antwoorden)



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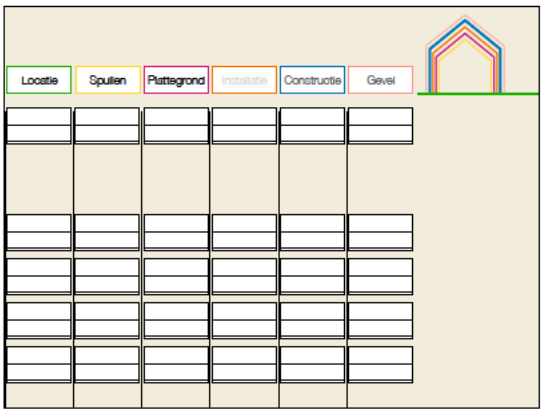


9

Post-it Brainstorm

Circulariteit

10

Wat is circulariteit (in gebouwen)?

Circulariteit

11

Wat is circulariteit (in gebouwen)?

Circulariteit

Waarom is circulariteit (in gebouwen) belangr jk of nodig?

12

Post-it Brainstorm

Mogelijke antwoorden

Circulariteit

13

Lage impact op het mi eu
Sim nadenken over geb u k van de ru mte / vierkante meters
Sim nadenken over g ondsto fen
Hoogwaardig hergeb u k van materialen / elementen
Wat is circulariteit (in gebouwen)?
Dubbelgebruik
Modu air bouwen
Investe ing
Hergeb u k
Recyclen
Afval vermi ideren
Circulariteit
Energie
Toekomst
Duurzaamheid
Loomaakbaar
Begin en eind

14

Lage impact op het mi eu
Sim nadenken over geb u k van de ru mte / vierkante meters
Sim nadenken over g ondsto fen
Hoogwaardig hergeb u k van materialen / elementen
Wat is circulariteit (in gebouwen)?
Dubbelgebruik
Modu air bouwen
Investe ing
Hergeb u k
Recyclen
Afval vermi ideren
Circulariteit
Energie
Toekomst
Duurzaamheid
Loomaakbaar
Begin en eind
Waarom is circulariteit (in gebouwen) belangr jk of nodig?
Minder CO2 ui stoot
100% circuair in 2050
Voorkomen van kl maatverandering
Gronds of en raken op
Gebouwde omgev ng is gro e ui stoter / verbruiker
Uitputt ng van de as de

15

Pauze

16

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Waarom een circulair schoolgebouw?

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

17

Post-it Brainstorm

Mogelijke antwoorden

Wat is circulariteit (in gebouwen)?

Op elden van de generatie van de toekomst

Toekomst-bestend g

Rest-waarde

Goede voo beed gaven

Waarom een circulair schoolgebouw?

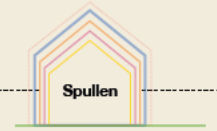
Waarom is circulariteit (in gebouwen) belangrijk of nodig?

18

Moodboards

19

20



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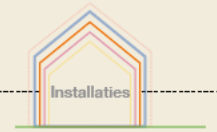

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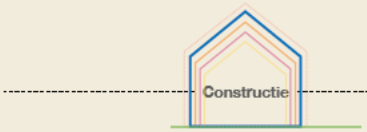

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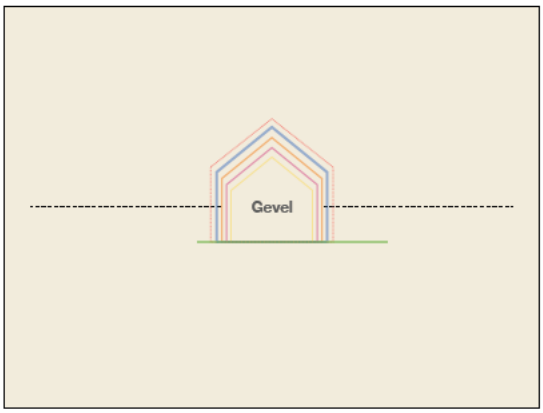

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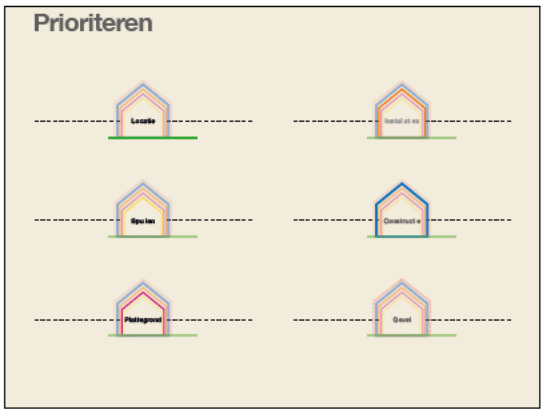

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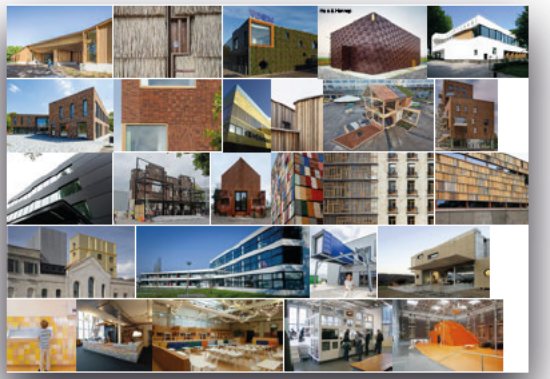


Circulariteit-workshop

1

Inleiding

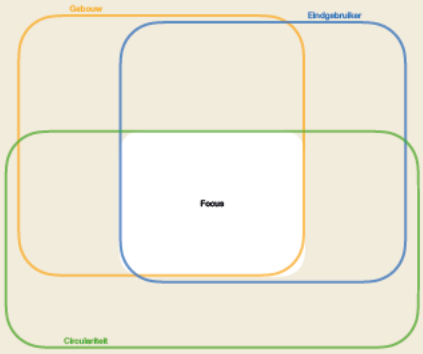
Doel van de workshop:
Op een interactieve manier bewust worden van circulariteit in gebouwen
&
de prioriteit bepalen van circulariteit in het nieuwe schoolgebouw

Case

Tips & Enquête

2

Context



3

Planning

Inleiding	5 min.
Invulpuzzel	15 min.
Post-it Brainstorm	15 min.
Pauze	10 min.
Gebouwtour	20 min.
Moodboards	30 min.
Prioriteren	15 min.
Afsluiting	5 min.

4

Invulpuzzel

Definitie

Spullen / Meubels

Eenmalig gebruik

Weigeren

Bio-based

Herbruikbaar

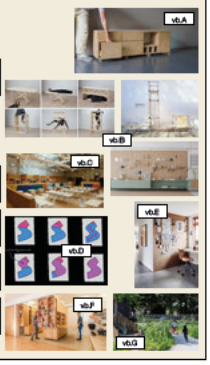
Hergebruikt

5

Invulpuzzel

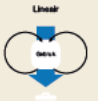
Inde ing / P ettegrond

Locat e & Buitenruimte



6

Invulpuzzel



Materiaalgebru ic

Definitie:

Spullen / Meubels

Eenmalig gebruik

Gebru k van materialen of e ementen d e niet gemakke lijk opn euw gebru kt kunnen worden en daardoor afval worden.

Op maat gemaakt e meubes

Weigeren

Voorst bedenken of het mater ieel of element écht nodig is zodat er geen overbodige productie p as vindt.

Geen meubes kopen die niet nodig zijn

Bio-based

Gebruik van hernieuwbare mater ialen die natuurlijk afbreekbaar zijn, waardoor geen afval ontstaat.

Kast van compost-board (vb.A)

Herbruikbaar

N euwe materialen of e ementen d e gemaakt worden zodat ze gemakkelijk opnieuw gebruikt kunnen wo den in de toekomst.

Modulaire meubels (vb.B)

Hergebruikt

Materialen of e ementen die al n gebruik zijn en opnieuw gebruikt kunnen worden, al dan niet met een andere funct e.

Opgeknap e meubes (vb.C)

7

Invulpuzzel

Inde ing / P ettegrond

Locat e & Buitenruimte

Gebruik van betonnen / baks enen mu en as scheiding tussen ruimtes

Locat egebonden speeltoes el

Geen ove bodig ruimtegebruik (vb.D)

Geen ex ra acti i eiten op het schoolplein

Scheidingswanden van natuurl ijke mater alen (vb.E)

Speeltoes el van hout en na ure-inclus ief schoolplein (vb.G)

Verplaatsbare wanden of modulaire wanden (vb.F)

Modulair speeltoestel

Scheidingswanden van hergebruikt e materialen

Tegels van het oude schoolplein

8

Post-it Brainstorm

Circulariteit

9

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

10

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

11

Post-it Brainstorm

Mogelijke antwoorden

Circulariteit

12

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

13

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

14

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

Waarom een circulair schoolgebouw?

15

Post-it Brainstorm

Mogelijke antwoorden

Wat is circulariteit (in gebouwen)?

Circulariteit

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

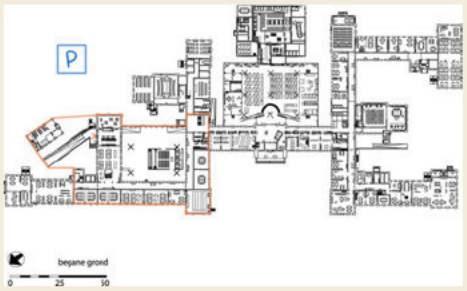
Waarom een circulair schoolgebouw?

16

Pauze

17

Gebouwtour



18

Gebouwtour

	Definitie	Spullen / Meubels
Lineair		
Eenmalig gebruik	Gebruik van materialen of elementen die niet gemaakt zijn opnieuw gebruikt kunnen worden en daardoor afval worden.	
Circulair		
Weigeren	Vooraf bedenken of het materiaal of element écht nodig is zodat er geen overbodige productie plaatsvindt.	
Bio-based	Gebruik van hernieuwbare materialen die natuurlijk afbreekbaar zijn, waardoor geen afval ontstaat.	
Herbruikbaar	Nieuwe materialen of elementen die gemaakt worden zodat ze gemakkelijk opnieuw gebruikt kunnen worden in de toekomst.	
Hergebruikt	Materialen of elementen die al in gebruik zijn en opnieuw gebruikt kunnen worden, al dan niet met een andere functie.	

19

Gebouwtour

Indeling / Plattegrond	Locatie & Buitenruimte

20

Moodboards

Spullen / Meubels

Indeling / Plattegrond

Locatie & Buitenruimte

21

Moodboards

Spullen / Meubels

22

Moodboards

Indeling / Plattegrond

23

Moodboards

Locatie & Buitenruimte

24

Prioriteren

Inrichting / Meubels

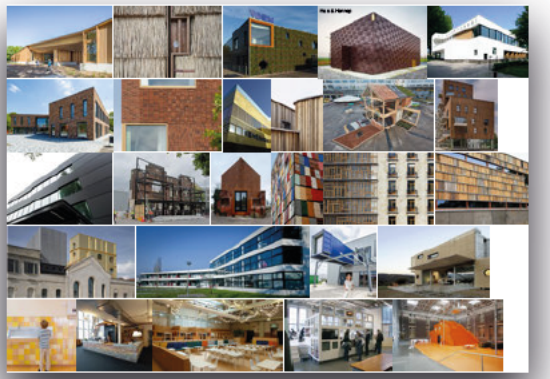
Inrichting / Parkeergarage

Locatie & Buitenruimte

25

Dankjulliewel!

26



Circulariteit-workshop

1

Inleiding

Doel van de workshop:
Op een interactieve manier bewust worden van circulariteit in gebouwen
&
de prioriteit bepalen van circulariteit in het nieuwe schoolgebouw

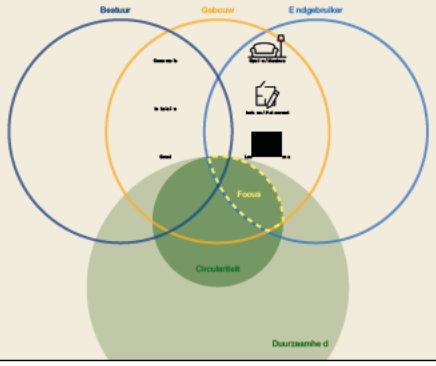
Case

2

Lineair vs. circulair

3

Context



4

Context

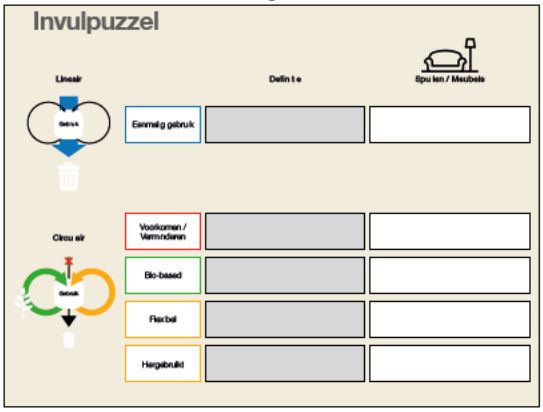
5

Planning

Inleiding	5 min.
Invulpuzzel	15 min.
Post-it Brainstorm	15 min.
Gebouwtour	20 min.
Pauze	10 min.
Moodboards	30 min.
Prioriteren	15 min.
Afsluiting	5 min.

6

Invulpuzzel



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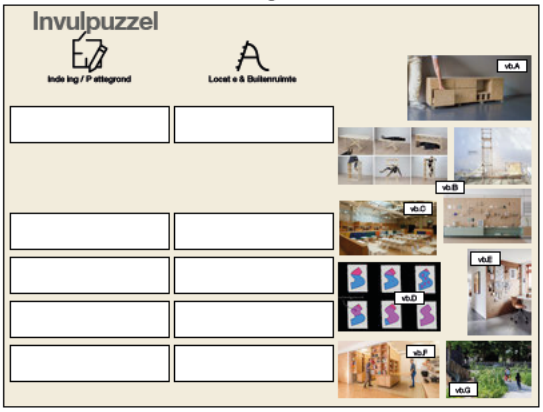
Invulpuzzel



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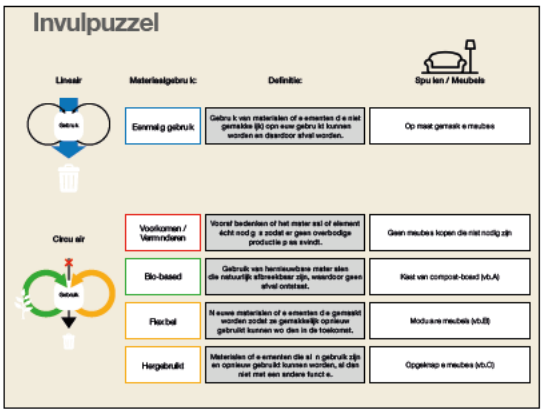
Invulpuzzel



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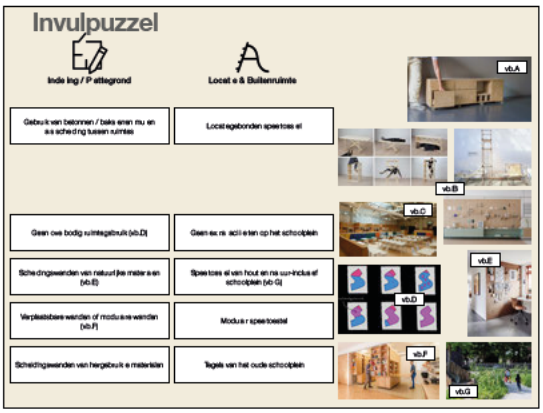
Invulpuzzel



10

Post-it Brainstorm

Circulariteit

11

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

12

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Circulariteit

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

13

Post-it Brainstorm
Mogelijke antwoorden

Circulariteit

Investering
Hergebruik
Recyclen
Afval voorkomen
Energie
Toekomst
Duurzaamheid
Loensklasser
Begin en eind

14

Post-it Brainstorm

Circulariteit

Lage impact op het milieu
Slim nadenken over gebruik van de ruimte / vierkante meters
Slim nadenken over grondstoffen
Hoogwaardig hergebruik van materialen / elementen
Wat is circulariteit (in gebouwen)?
Dubbelgebruik
Investering
Modulair bouwen
Hergebruik
Recyclen
Afval voorkomen
Energie
Toekomst
Duurzaamheid
Loensklasser
Begin en eind

15

Post-it Brainstorm

Circulariteit

Lage impact op het milieu
Slim nadenken over gebruik van de ruimte / vierkante meters
Slim nadenken over grondstoffen
Hoogwaardig hergebruik van materialen / elementen
Wat is circulariteit (in gebouwen)?
Dubbelgebruik
Investering
Modulair bouwen
Hergebruik
Recyclen
Afval voorkomen
Energie
Toekomst
Duurzaamheid
Loensklasser
Begin en eind
Waarom is circulariteit (in gebouwen) belangrijk of nodig?
100% circulair in 2050
Minder CO2 uitstoot
Voorkomen van klimaatverandering
Gronden of energie opslaan op
Gebouwde omgeving is grote uitstoter / vervuiler
Uitputting van de aarde

16

Post-it Brainstorm

Wat is circulariteit (in gebouwen)?

Waarom een circulair schoolgebouw?

Waarom is circulariteit (in gebouwen) belangrijk of nodig?

17

Post-it Brainstorm
Mogelijke antwoorden

Wat is circulariteit (in gebouwen)?

Opleiden van de generatie van de toekomst

Toekomst-bestendig

Waarom een circulair schoolgebouw?

Goede voorbeeld geven

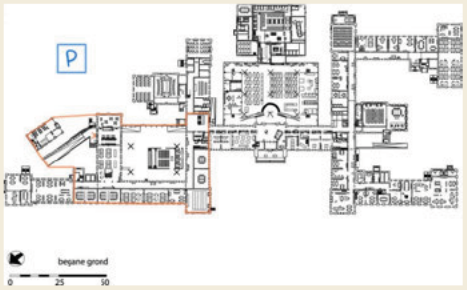
Waarom is circulariteit (in gebouwen) belangrijk of nodig?

18

Pauze

19

Gebouwtour



20

Gebouwtour

		Definitie	Spullen / Meubels
Lineair	Eenmalig gebruik	Gebruik van materialen of elementen die niet gemakkelijk (kunnen) opnieuw gebruikt kunnen worden en daardoor afval worden.	
Circulair	Weigeren	Vooraf bedenken of het materiaal of element écht nodig is zodat er geen overbodige productie plaatsvindt.	
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21

Gebouwtour

Indeling / Plattegrond	Locatie & Buitenruimte

22

Moodboards

Spullen / Meubels

Indeling / Plattegrond

Locatie & Buitenruimte

23

Moodboards

Spullen / Meubels

24

Moodboards

25

Moodboards

26

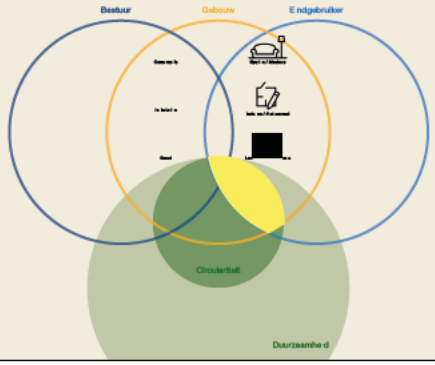
Prioriteren

27

Dankjulliewel!

28

Bijvangst

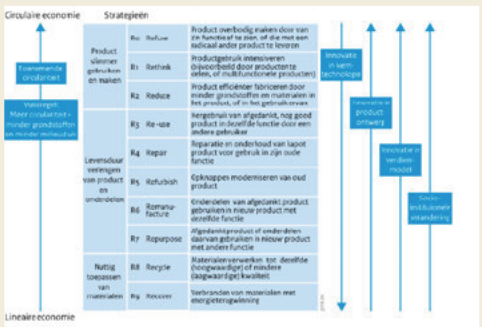


29

Bijvangst

30

10R-model



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Appendix N | *External Feedback*

- *Intro: alle info op 1 slide, misschien zijn meerdere slides beter / overzichtelijker;*
- *Context: cirkels zijn misschien duidelijker dan vierkanten;*
- *Context: duurzaamheid vs. circulariteit expliciet maken;*
- *Planning: Uitleggen waarom we wat doen, dus de driedeling van de workshop expliciet maken voor de deelnemers;*
  - *Wat is circulariteit?*
  - *Hoe zien we circulariteit in het gebouw?*
  - *Hoe willen we circulariteit in ons toekomstige gebouw?*
- *Invulpuzzel: Namen van de onderdelen veranderen: Inboedel // Wanden // Buitenruimte;*
- *Invulpuzzel: Weigeren veranderen in voorkomen;*
- *Extra dia maken voor 10R theorie en initiële investering in het geval dat het uitgelegd moet worden;*
- *Hoofdthema's opzetten of checklist maken om te checken of alles over circulariteit besproken is;*
- *Input bij post-it brainstorm evalueren (goed of fout);*
- *'Herbruikbaar' en 'hergebruikt' zijn verwarrend, misschien veranderen in 'Herbruikbaar' en 'Flexibel'.*