End-user Participation as a Tool to Create Circular School Buildings

A research to *engage* end-users in creating circular schools through a *workshop*

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Preface

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Abstract

Keywords | End-user Participation, Workshop, Circularity, Social real estate

Abstract | Texttexttext

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1 | Introduction

This chapter will introduce the problem and define a problem statement based on background information on the subjects of participation, circularity and social real estate. After the problem statement, the definitions of the most commonly used concepts are stated as a way of preventing mis-communication or misinterpretation throughout this research. Finally, the relevance of this study is stated regarding the following three fields: Scientific, societal and personal.

Background Information
Participation
The beneficial aspects of a participation process make it a popular concept to be implemented in the development of policies, ideas or products. To get a grip on the term *end-user participation*, this research will start with a focus on *citizen participation*, as literature provides a lot of different descriptions on this concept. Afterwards, these descriptions can help to define *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 focusses 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*.

As mentioned before, end-user participation 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. 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, communitywide 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).

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 closes the knowledge gap between participants and experts. 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.

This latest aspect is the reason to implement a participation process 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 established in the Paris Agreement, the global temperature should not rise more than 1,5 to 2 °C 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 1.
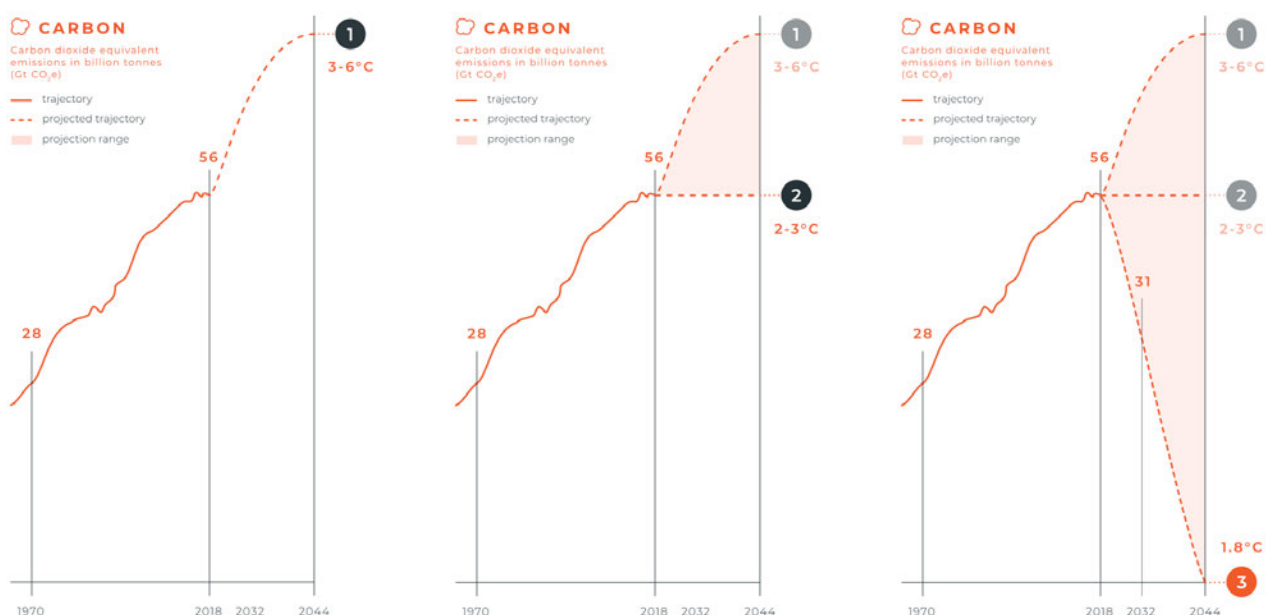

Figure 1 | Scenarios showing the effect of greenhouse gases on the rising temperature (Circle Economy, 2021a)

Figure 1 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 °C 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).

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".

This research will explore ways to implement end-user participation to increase circularity within the construction sector of the Netherlands, since 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 2. This is also the sector in which the percentage of embodied carbon can be influenced. Changing the current way of building to a more circular approach could help 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.
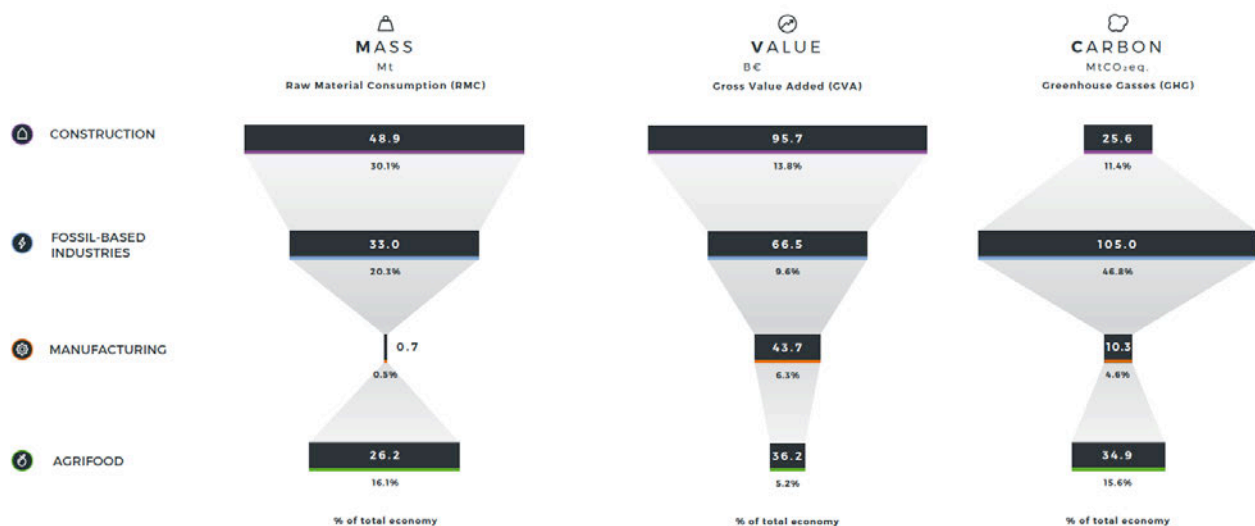
Figure 2 | Material consumption, added value and carbon emissions of different sectors in the Netherlands (Circle Economy, 2020)

School buildings
To narrow down the research, the focus will not be on the total construction sector. Within the built environment, the focus will be on the development of school buildings. This has a couple of reasons. Firstly, a school environment influences its education (Pemsel et al., 2009) and can maybe become a part of education as well. It could be of incredible value to create a circular environment to teach children from a young age about circularity (Interview)(Könings et al., 2017) (Pemsel et al., 2009). Secondly, given that schools are social real estate, and thus (mostly) developed by public money, it would be in line with the national ambitions to develop them as circular as possible (Interview)(De Jong & Arkesteijn, 2013).

Pitfalls of participation

Even though participation processes ensure a lot of advantages, there are also some pitfalls to overcome. This paragraph will discuss some of these pitfalls mentioned in literature and 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, the professionals have 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.

These pitfalls and their solutions should be kept in mind when implementing a participation process.

Problem statement

A form of end-user participation is needed to increase circularity in the built environment, more specifically in school buildings. According to Schönwälder (2020) "dedicated mechanisms, tools and approaches" are needed to implement participation. However, 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 developing a tool to implement end-user participation to create circular school buildings.

Definitions

CIRCULARITY

"The capacity to fulfill the loops "closed-reversible chains" for building materials through dynamics in the building configuration and operation."
- (Hamida et al., 2022)

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 and teachers.
This definition is based on literature research (and interviews) in chapter 7.9.
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 the introduction.

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 and interviews in sub-chapter 6.1.

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)

Relevance
Scientific
The scientific relevance of this research is that it will explore possibilities to create and test a tool based on academic literature research.

Societal
From a societal point of view this research is aimed at counteracting climate change through circularity measures with the input of end-users. Even though participatory trajectories gained a lot of popularity over the years, end-user participation through **workshops** is not yet used on a big scale to do so. The tool will focus on the end-user as a starting point and use their input on implementing circularity measures to improve the environment. So in the end a tool will be created that allows end-users to help in creating circular social real estate.

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.

Kaya (2004): "insufficiencies of the construction industry in the way that the client's needs are met" (Latortue et al., 2015) - Latortue et al. (2015)

As mentioned in chapter 1 in 'personal relevance', I am personally interested in end-user participation and circularity. So in choosing the research subjects end-user engagement and circularity I would like to learn more about these subjects.

I would like to learn more about end-user participation and about how to be the link between end-user and architect for example. This is also the reason that I will do an internship at ICS. They work in the field of social real-estate and I think that that is very inspiring. Furthermore, circularity interests me and I would like to dig into the field of circularity, learn about how to make that insightful and accessible for everyone and I would like to become more aware of the more charming ways to implement circularity in the built environment.

A personal study goal is to stay on track with my planning and to be able to work without having to feel the pressure, as I normally achieve most when the pressure is (too) high.

2 | Research Questions

This chapter will define the research question and the sub-questions to solve the problem that is stated in the previous chapter. Through the conceptual model the connection between the questions and the set up of the research will become clear.

Main Research Question
Based on the literature review and as a result from the research gap, the following research question will be answered:

How to engage end-users in creating circular school buildings?

The next chapter will dive into the research method to answer the research question and the sub-questions.

Sub-Questions
The research question will be investigated through answering several sub-questions. How these sub-questions are related can be seen in the research model (Figure 3). The first three questions focus on participation and engagement. The outcomes of the questions in part I together will give input to part II.

Q1. *What is engagement?*

Q2. *What are ways to engage end-users?*

Q3. *When to engage end-users?*

Part II consists of two components, the *Workshop Layout* and the *Workshop Content*, that are investigated simultaneously. The next four questions are related to the *Workshop Layout*. They will give insight in the typical set-up of a workshop and existing workshop forms. After that, the outcomes will be evaluated. The first through assessing the positives and the pitfalls, the other by filtering on specific properties that a workshop form should possess.

Q4. *What is the typical set-up of a workshop?*

Q5. *What are positives and pitfalls of a typical workshop set-up?*

Q6. *What are available workshop forms that fit the goals of the workshop?*

Q7. *What workshop forms are suitable for a circularity workshop with the end-users of schools?*

The next three questions are aimed at developing the *Workshop Content*. Through these questions the three aspects, end-users, social real estate and circularity, will be connected. Input for this aspect is collected through a *Questionnaire*. The answer on sub-question 9 will be used as input to define the typical set-up of a workshop (dotted arrow).

Q8. *Who are the end-users of school buildings?*

Q9. *What kind of building aspects are relevant to the end-users of school buildings?*

Q10. *What circularity measures can be implemented in school buildings?*

The two components of part II will be the input for part III, the *Workshop Design* (R1). This part focusses on designing the workshop and therefor is more of an executing part of the research. The *Workshop Design* will be a result of all input from foregoing questions.

R1. *Workshop Design*

Part IV is about testing, evaluating and improving the workshop. This will take place in three steps: a simulation with advisors from ICSAdviseurs, an application in a real case from ICSAdviseurs and the use of an expert panel. Between the three steps will be a period to process the collected feedback and to change the workshop if necessary.

Q11. *Does the workshop engage end-users to create circular school buildings?*

Finally, this will result in useful *Recommendations* to potentially improve the workshop in the future (R2).

R2. Final workshop design and recommendations on how to engage end-users in creating circular school buildings.

This will all result in answering the research question.

Research Model

The way that all questions are related is depicted in Figure 3, the research model. It shows the division in research questions related to the four parts as mentioned earlier.
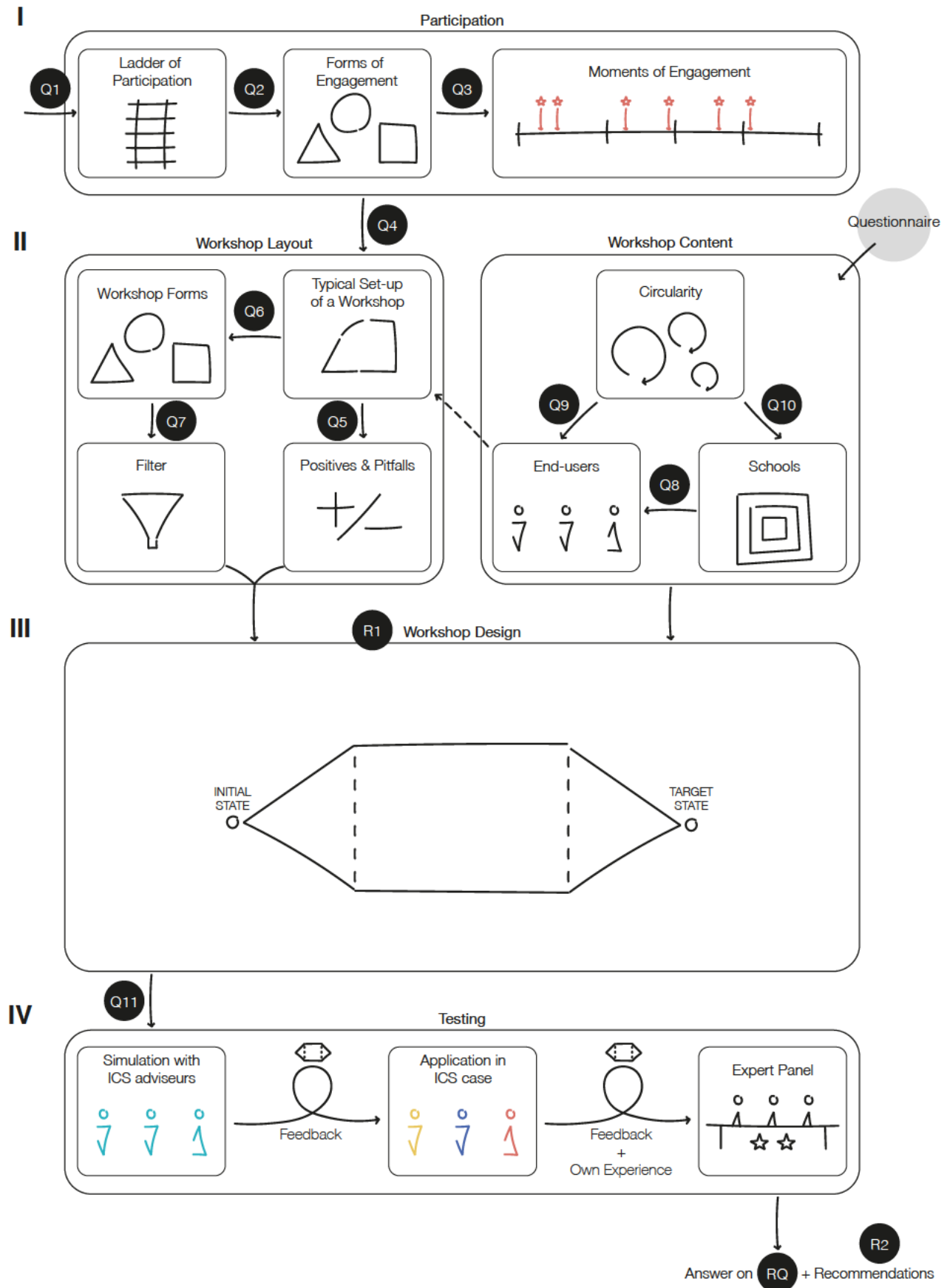

Figure 3 | Research model (Own image)

3 | Research Method

This chapter will start with a broad set-up of the research. Thereafter, it will be illustrated why the sub-questions are of interest and the specific method to answer the sub-questions.

Set-up of the research
To answer the questions of the previous chapter, the research method will be defined based on Blaikie (2000). In his theory, research strategies are divided into inductive, deductive, retroductive or abductive. The aim of the inductive strategy is "To establish universal generalizations to be used as pattern explanations" (Blaikie, 2000, p. 101). Part I and II of the research are aimed at gathering primary or secondary **qualitative** data. It is followed by Part III in which a theory, in this case: the workshop, is created based on the collected data. This matches the **inductive** research strategy. As mentioned earlier, the implementation of end-user engagement to develop circular school buildings is not widely supported, so literature on this specific subject will be lacking. This leads to this being an **exploratory** study, as through the use of literature on other forms of participation, a theory will be constructed for this specific subject.
Part IV of the research is about testing and evaluating the created theory. According to Blaikie (2000, p. 101), the aim of the deductive theory is "To test theories to eliminate false ones and to corroborate the survivor". So Part IV will be researched through the **deductive** strategy. Starting with the workshop as a theory, followed by the hypothesis that the workshop engages end-users, the data will show if the workshop indeed does so. This data will be gathered through a combination of **quantitative** and **qualitative** research in the form of questionnaires and an expert panel.

So, the bigger part of the research is a qualitative exploratory study, from the data collection in Part I to the creation of a theory in Part III. This will be followed by a partly quantitative, partly qualitative evaluation in part IV.

Methods per Sub-Question
This paragraph 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 4. This will be followed by a brief explanation per method.

I | Participation

	Question	Purpose	Method
Q1	What is engagement?	To define the level of participation that is to be achieved through this research.	Literature review.
Q2	*What are ways to engage end-users?*	To inventorize the possible practices to engage end-users.	Literature review.
Q3	*When to engage end-users?*	To determine the moment to engage end-users regarding the project.	Literature review.

II | Workshop Layout

	Question	Purpose	Method
Q4	What is the typical set-up of a workshop?	To define a framework that can be filled during Part III of the research.	Literature review; Qualitative interviews.
Q5	*What are positives and pitfalls of a typical workshop set-up?*	To make sure that the positive aspects are being used and to prevent the pitfalls from happening.	Literature review; Qualitative interviews.

	Question	Purpose	Method
Q6	*What are available workshop forms that fit the goals of the workshop?*	To inventorize available workshop forms that are possible to be used in the workshop.	Literature review;
Q7	*What workshop forms are suitable for a circularity workshop with the end-users of schools?*	To make sure that the workshop forms fit the audience and the goals.	Literature review; Qualitative interviews.

II | Workshop Content

	Question	Purpose	Method
Q8	*Who are the end-users of schools?*	To define the participants for the workshop that is to be carried out with them.	Literature review; Qualitative interviews.
Q9	*What kind of circularity aspects are relevant to the end-users of schools?*	To define the relevant building aspects, so that this can be the focus of the workshop.	Literature review; Qualitative interviews.
Q10	*What circularity measures can be implemented in schools?*	To define the circularity measures that can be implemented in schools to inform the end-users on the possibilities.	Literature review; Qualitative interviews.

IV | Testing

	Question	Purpose	Method
Q11	Does the workshop engage end-users to create circular school buildings?	To check if the workshop does what it is intended to do.	Through a three-step evaluation process and moments to process feedback.

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. Furthermore, he states that a way to structure a literature review is by defining research questions that will help in answering the main question of the research.

Qualitative 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, the researcher means to interview employees of ICSAdviseurs, the company that also contributes to this research. As the company already has a lot of knowledge and skill in designing and carrying out workshops, this method will be used in relation to questions towards the workshop.

Data Collection
During the research, data will be collected by conducting the qualitative interviews and through the feedback of the ICS advisors and the end-users, next to an extensive ongoing literature review.

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 the following four pillars:
1. Findability;

2. Accessibility;
3. Interoperability;
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 will be collected by conducting the qualitative interviews and through the feedback of the ICS advisors and the end-users. To make sure that the privacy of the advisors and the end-users will not be violated, there will be implemented some guidelines. An explanation of the research and an overview of the questions will be given, followed by a form of consent that has to be signed before the data collection. The consent form will mention the fact that their names will not be used in the research. In case of conducting a survey, the participants will be anonymous so that honest answers and opinions can be shared.
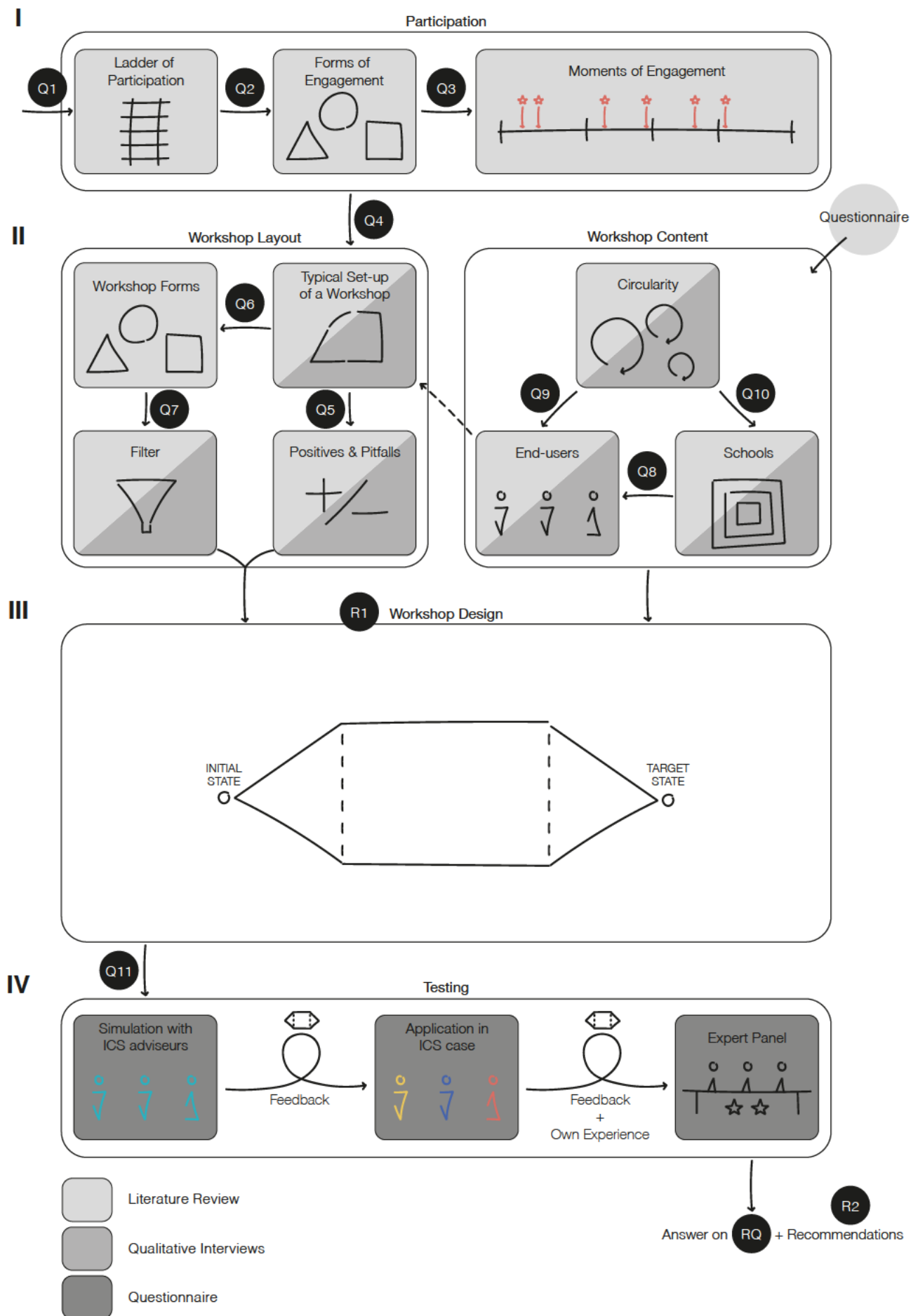
Figure 4 | Research model with research methods (Own image)

4 | Research Output

Goals and objectives
The problem, as stated in chapter 1 is that at this moment, end-users are **not** engaged in the process of developing circular social real estate, while this could create the needed support base to achieve the goals of the Paris Agreement. This means that the main goal is to create a way or tool to engage end-users in the process of developing a circular school building.

To reach this goal, several objectives are set out to be achieved. Most of these objectives are implicit in Figure 3. In part I, there will be decided on a workshop layout and research has to be done to create the workshop content. These aspects will come together in the design of a workshop (part II). To check if the workshop works and does what it is aimed to do, namely engaging end-users, the third part will be about testing the workshop.

Deliverables
The following table gives insight in the objectives and deliverables per checkpoint of this graduation trajectory. It also mentions the method that will be used to achieve the deliverable.

	Objective	Deliverable	Method
P1	Define problem statement; Set up research through questions & conceptual model.	Research set-up.	Literature review.
P2	Research on participation, workshop layouts and workshop content.	Knowledge base on participation; Decision on best workshop layout that fits the goal of the workshop; Data that will define workshop content.	Literature review; Qualitative Interviews.
P3	Design a workshop.	A workshop design.	Internship.
P4	Check if the workshop works.	Feedback from participants; Final version of the workshop.	Qualitative Interviews.
P5	Present an academic based workshop that can be used in the field.	Outcome of the expert panel; Recommendation to improve the workshop.	Qualitative Interviews.

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.

Schedule

The following figure (Figure 5) shows the schedule of the research from start of the research to the P5.
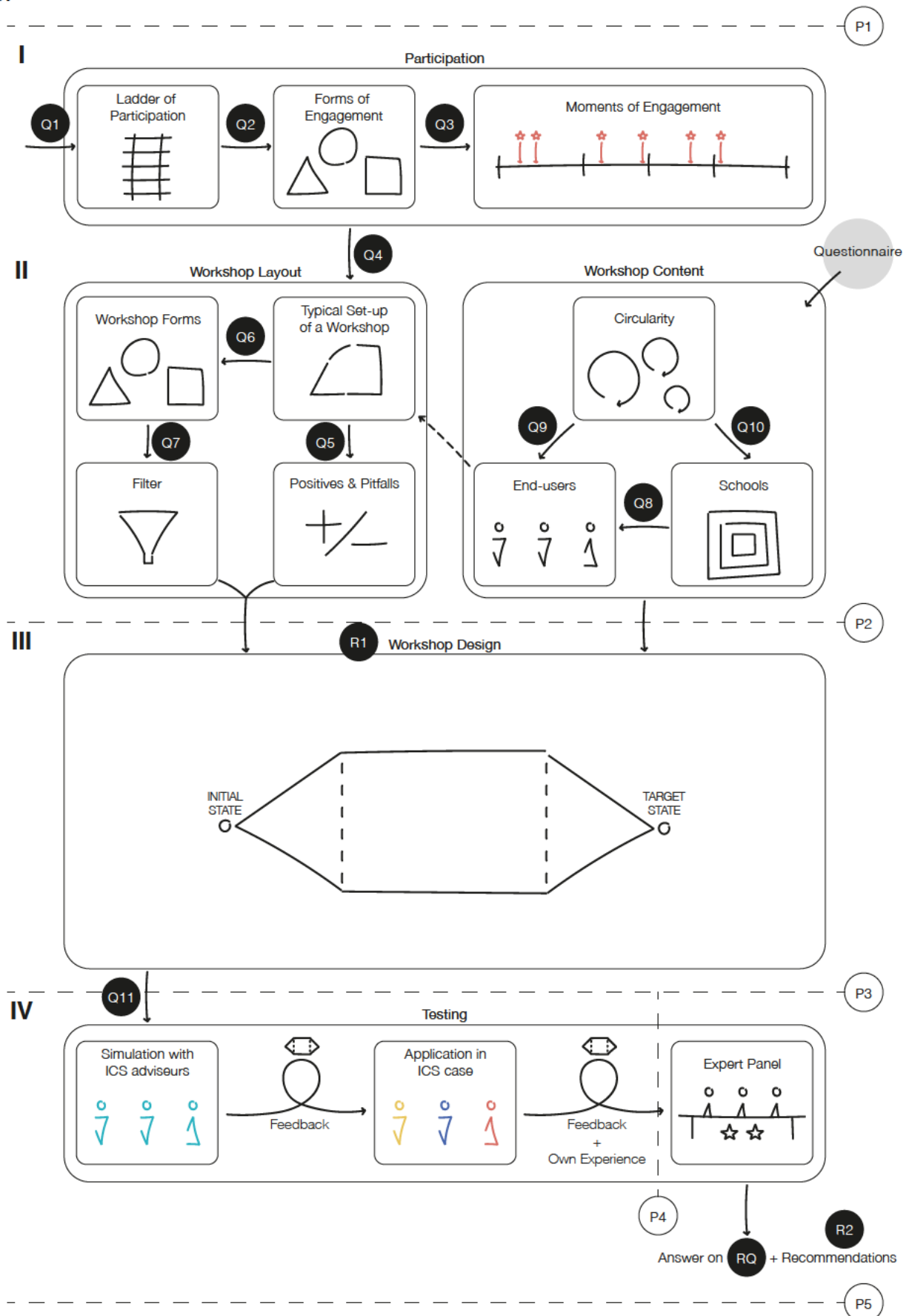
Figure 5 | Research model with planning (Own image)

5 | Research Plan

The research consists of four parts. As mentioned before, part I and II require the most literature research. This will be an ongoing process through systematic literature review. These conclusions will be the base for part II, the workshop.

As can be seen in Figure 6, the workshop will most like consist of 3 parts, following the example of Gray et al. (2010), in which the goal of the first part is to diverge. This means that the focus will be on informing and closing the knowledge gap between the end-users and the professionals. The second part will be about exploring the possibilities of circularity in school buildings. The goal of the third part of the workshop is to converge. This is the part in which the conclusions will be made.

Figure 6 | The Shape of Game Design (Gray et al., 2010)

Part III of the research is to test the workshop through a simulation at first and after processing the feedback, an application in a real ICS case. The people involved in this case will also be asked for feedback and this, together with my own experience, will be used for an expert panel.

6 | Literature Research

As becomes clear in the research model, the research consists of several parts. The first three parts (part I, IIa and IIb) are mainly explored through literature research. Chapter 6 will cover this research part by part through sub-chapters.

Part I | Participation

The first part of this literature research is about participation. On the basis of three questions, the outlines of the participation process with end-users will be defined. The first sub-chapter will define 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 second sub-chapter is about ways to reach aforementioned participation-level. Finally, the third sub-chapter will explore the timeline of participation processes and define the best moment to let end-users participate during the process. This will result in the decision on the participation method and the tool that is to be designed later-on in this research.

6.1 | Q1 - *What level of participation should be achieved?*

According to the definition of end-user participation as mentioned in the introduction, it can be executed on different levels of power. This sub-chapter will determine what level of end-user participation is desired during the participation process to create circular school buildings. It will do 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 7).
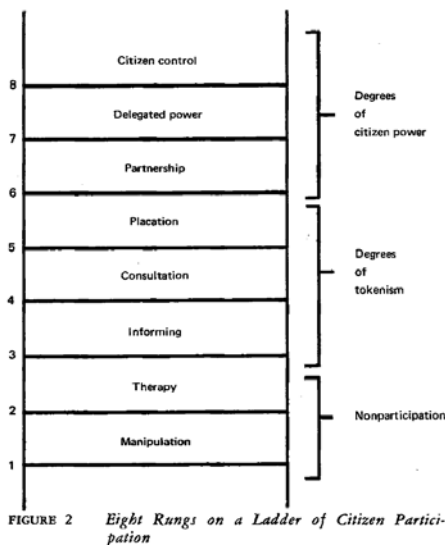
Figure 7 | Ladder of Citizen Participation, according to Arnstein (1969)

Since this theory is the base of participation-theories, it will be explained shortly on the basis of Figure 7. 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, involvement and engagement

The following definition of end-user participation has been established in the introduction: *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*. The term '*participation*' is often used interchangeably with the concepts '*involvement*' and '*engagement*'. However, they are not the same and can be distinguished from each other. This paragraph will determine definitions for the latter two concepts and those will be used throughout this research, based on the theory of Kaikittipoom (2019).

Involvement and engagement can both be seen as a level of participation. When participants are involved there is a 1-way flow of information, from authorities to participants. So the definition that will be used for involvement is: *Involvement is a level of participation on which there is a 1-way flow of information, from authorities to participants*.

When engaging participants, they will be informed and they have the chance to influence the authorities. In this case there is a 2-way flow of information between authorities and participants. This results in the following definition for engagement: *Engagement is a level of participation on which there is a 2-way flow of information between authorities and participants*.

Participation Matrix

Besides Arnstein's ladder of participation, there are many other theories on levels of participation. Therefore, a matrix (Figure 8) is created to give insight into how the different theories are related to Arnstein's theory.

The starting point of this matrix was the ladder of citizen participation by Arnstein. Thereafter, the other theories were 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 8, a division is made that will be used during this research in the most-right column ('*Level of Participation*'). This division will be briefly explained in the following paragraph.

'*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 has been mentioned above. 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*', as defined above. 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.

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.

Figure 8 | Participation matrix based on literature (own image)

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

Conclusion

In the introduction it became clear that a form of participation is necessary to be able to create circular school buildings. On the basis of Figure 8 the first sub-question *What level of participation should be achieved?* will be answered.

The first level, '*Non-participation*', should not be implemented, since it is a form of fake- or pretend-participation. It will not provide the advantages of participation as mentioned in the introduction. Neither is the '*Involvement*'-level recommended to be implemented as there is just a 1-way flow of information from authorities to participants. 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. The highest-possible level would be '*Empowerment*', however this also brings some pitfalls that are rather to be avoided. So the level that should be achieved to be able to create circular school buildings is '*Engagement*'.

Nog verwerken:
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).

6.2 | Q2 - *What are ways to engage end-users?*

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 will first distinguish these two concepts and then create an overview of approaches and methods. In combination with the timing of the engagement, as will be 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.
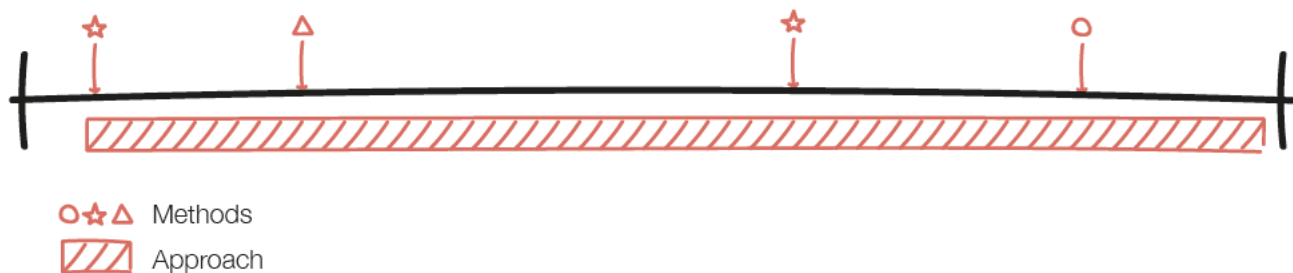
Figure XX | Methods and Approach in relation to the Project Timeline (own image)

Approaches
In literature, several approaches towards design research are mentioned. Sanders (2006) created an overview of these approaches as can be seen in Figure 9. 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.
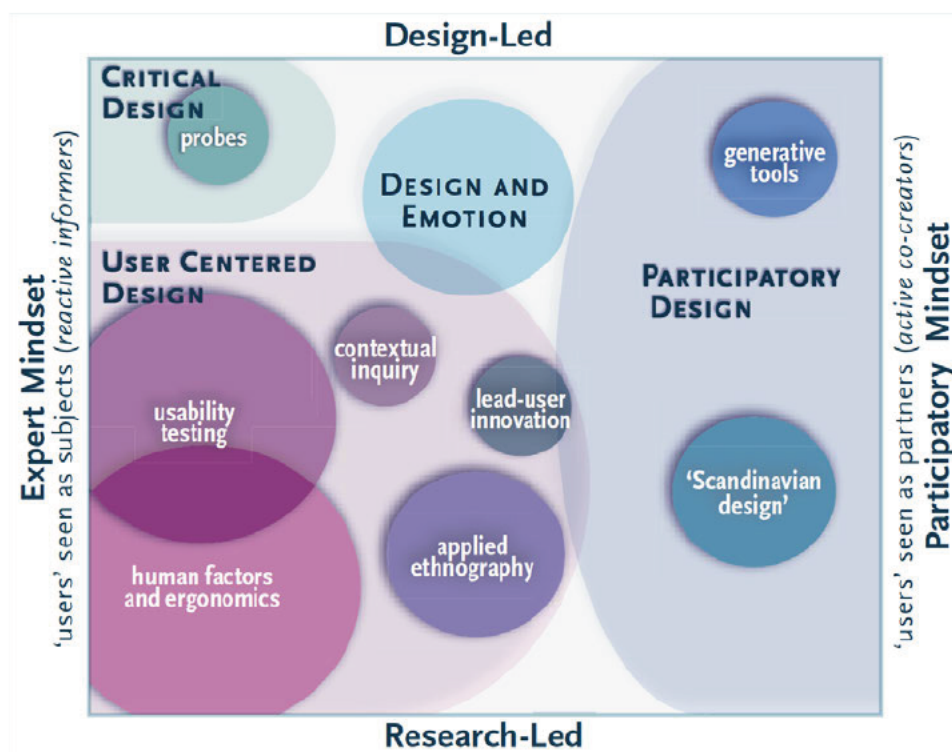
Figure 9 | A Cognitive collage of the design research space as it is in 2006 (Sanders, 2006)

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 focusses 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). 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 10. 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.
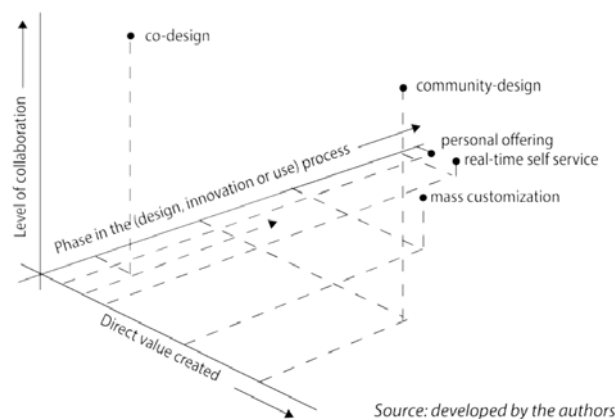
Figure 10 | Five types of co-creation (De Koning et al., 2016)

Furthermore, Figure 11 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.
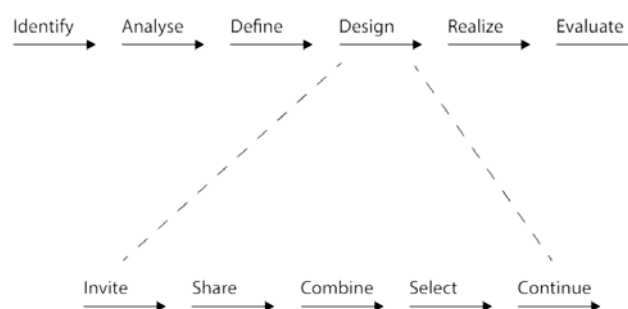
Figure 11 | Steps in a co-creation process (De Koning et al., 2016)

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 (6.1). 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 …

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 have been analyzed.

Figure 12 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 8 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 12. 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 12 | 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. In combination with the outcome of the next sub-chapter, this inventory will help to decide on the method to use during the engagement process.

Conclusion

This sub-chapter started with the overview of different attitudes toward design research and ended with the overview of several methods to engage end-users and thus answers the second sub-question *What are ways to engage end-users?* It is clear that, regarding the approach, co-creation is compliant with the engagement-level of participation because of the two-way flow of

information. That is the reason that co-creation will be the approach for this development process. Furthermore, different methods can be used to engage end-users, such as informal or formal meetings, questionnaires or surveys and workshops. To choose the right method, the moment of engagement in the process is also important and this will be focused on in the next sub-chapter.

6.3 | Q3 - *When to engage end-users?*

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 will be researched based on different sources. To do so, the sub-chapter will start with a short explanation of a typical real estate life cycle. This will 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 13. 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.
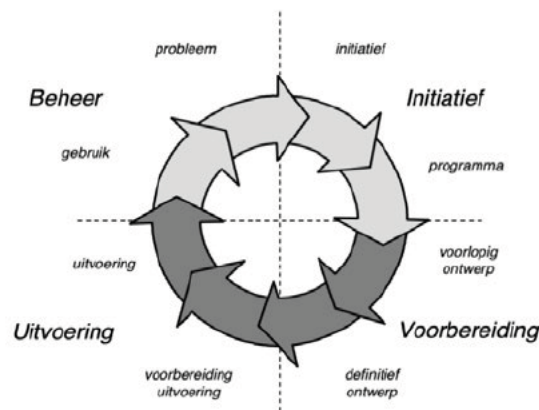
Figure 13 | Real Estate Life Cycle (Den Heijer & Van der Voordt, 2015)

To be able to use this cycle during this research, that is only about one project life cycle, it will be cut at the top en unrolled. This way a timeline is created as shown in the following figure (Figure 14).
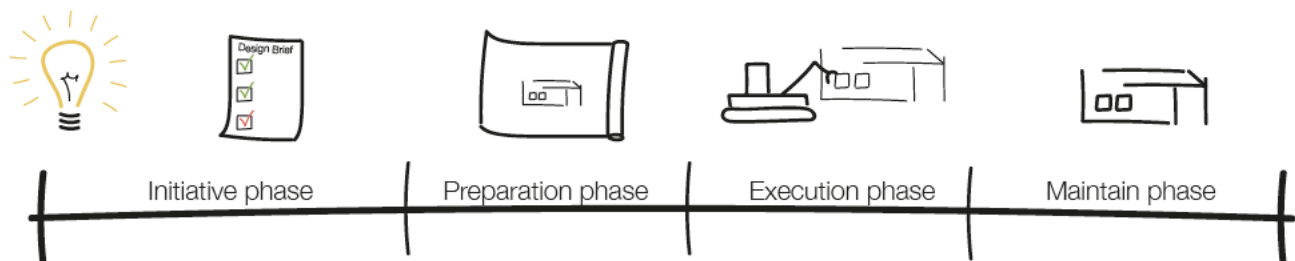
Figure 14 | Real Estate Timeline (Own image, based on Den Heijer & Van der Voordt, 2015)

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 11) to this timeline, the following timeline can be made (Figure 15). 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*.
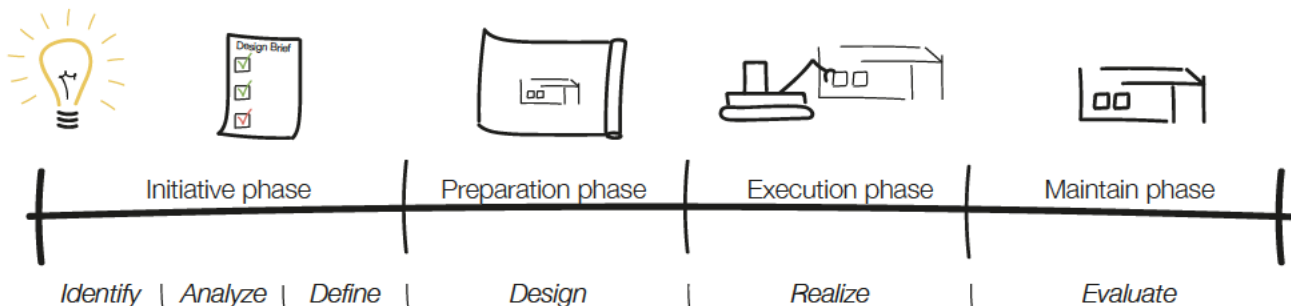
Figure 15 | *The steps of Co-creation related to the Real Estate Timeline (Own image, based on Den Heijer & Van der Voordt, 2015 and De Koning et al., 2016)*

The following timeline (Figure 16) can be created with the starting point being Figure 15. 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 16 | *Co-creation Timeline (Own image, based on Kaikittipoom, 2019 and Nevmerzhitskaya, 2020)*

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, but 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 17.
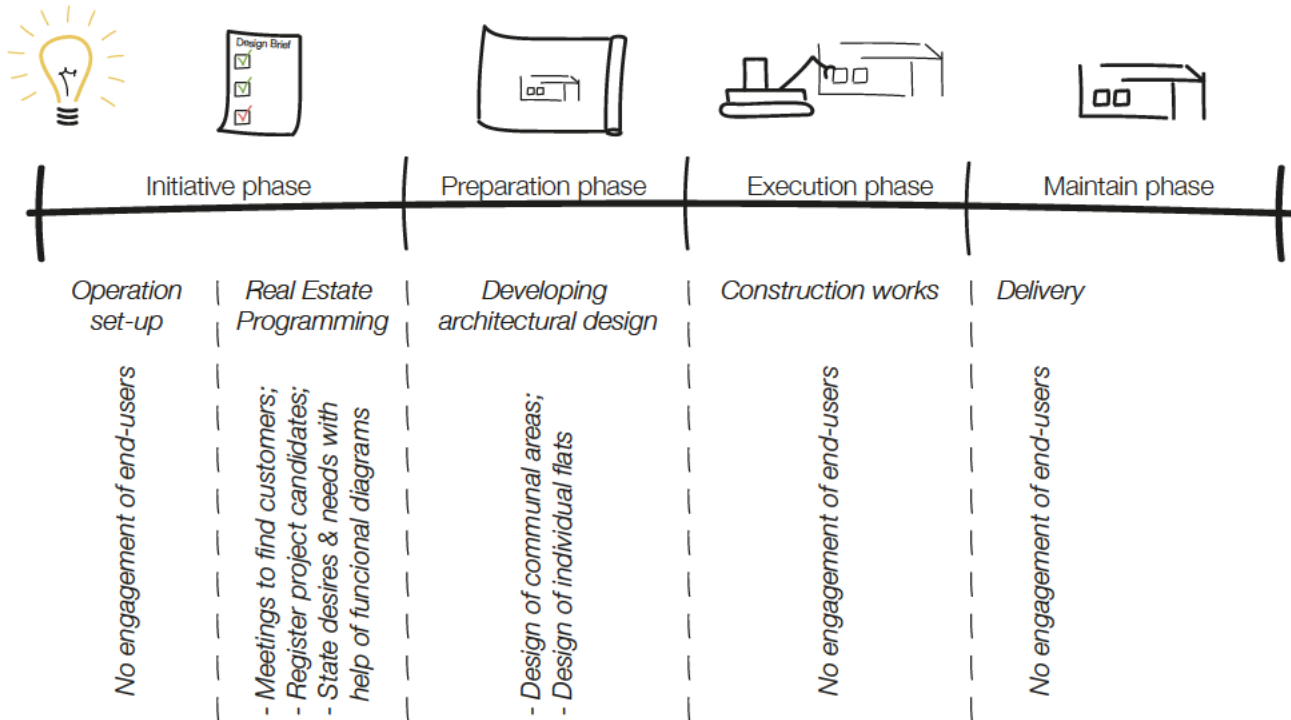
Figure 17 | Timeline of end-user engagement in case-study by Latortue et al. (Own image, based on Latortue et al., 2015)

Nevmerzhitskaya et al. (2020) mention the following about the moment of participation: 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). 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 16.

The best moment for forms of co-design is at the beginning of the process, as this will have the most impact (Kaikittipoom, 2019). She also mentions that the most crucial step for co-creation is the set-up of the brief (Kaikittipoom, 2019).

MacLeamy Curve

In 2004, MacLeamy constructed the curve that is depicted in Figure 18. 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.
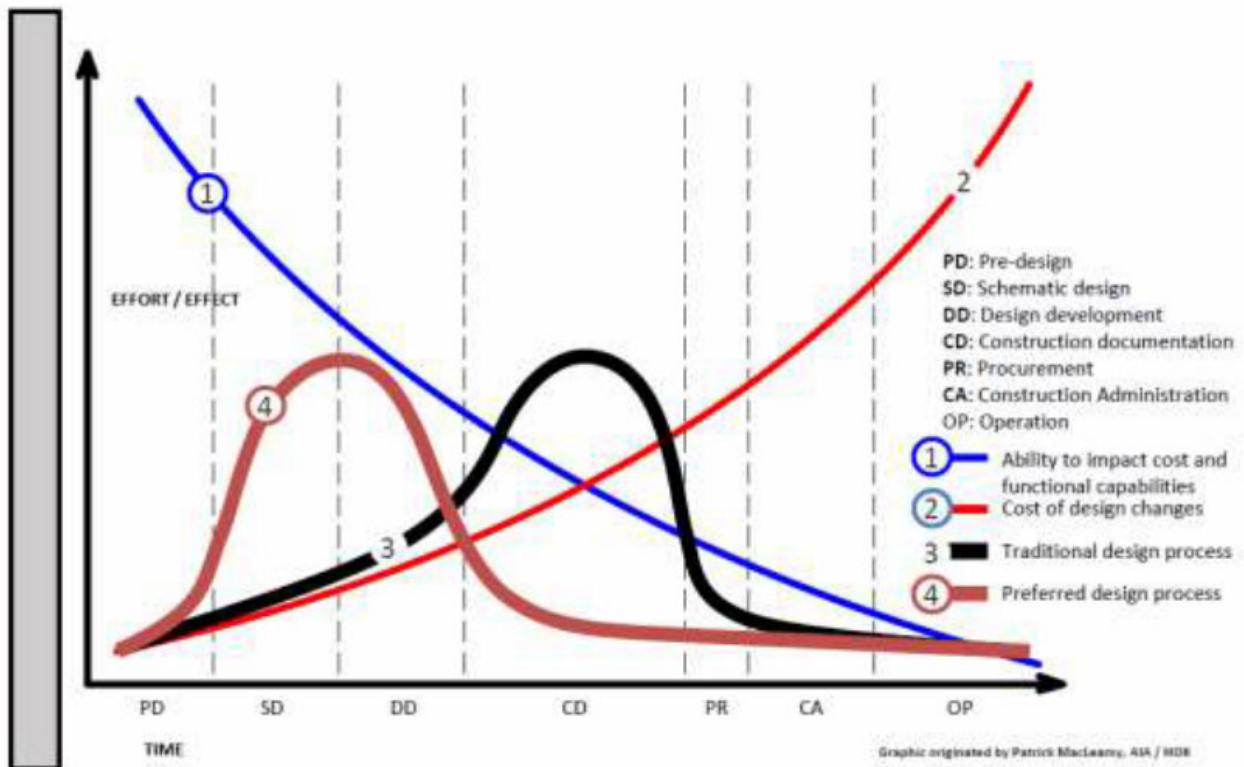
Figure 18 | MacLeamy Curve (MacLeamy, 2004)

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. This results in choices by the end-users at that moment having the biggest impact on the design of the project.

Conclusion

The third sub-question *When to engage end-users?* has been investigated in this sub-chapter. As mentioned in the previous sub-chapter, co-creation is a project approach and this means that it is implemented over the total span of a project. It has been determined that it is best to start engaging end-users as early as possible. This means that end-users will be engaged throughout the whole process. However, 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.

Part I | Conclusion

To conclude part I, the outlines of the participation process with end-users will be stated. Firstly, the best participation-level to implement is engagement. Resulting in a way of participation in which a two-way flow of information is achieved. This results in the project-approach as defined in sub-chapter 6.2: Co-creation, as it matches the engagement-level of participation. Lastly, co-creation takes place during the entire timeline of a project. However, there is a moment in the process at which the impact of the choices by the end-users is biggest: During the definition of the brief.

That is why during this research a tool will be created to engage end-users in defining the brief. Based on the research in sub-chapters 6.2 and 6.3, it can be concluded that the method that fits this goal best is the use of a workshop. The following part will dive more into the layout of this workshop.

Part IIa | Workshop Layout

As previously defined, a workshop will be used as a tool to engage end-users in creating a circular school building. The second part of this literature research is about the layout of this workshop. it will start with defining a typical workshop set-up, followed by the positives and pitfalls of this set-up. Later, an inventory of possible workshop forms and a way to filter them will be created. All this is part a of the input for the workshop design in part III of the research.

As the concepts *workshop*, *workshop set-up*, *workshop forms* and *workshop design* will be used throughout this part of the research, the following figure tries to clarify the distinction between these concepts Figure 19.
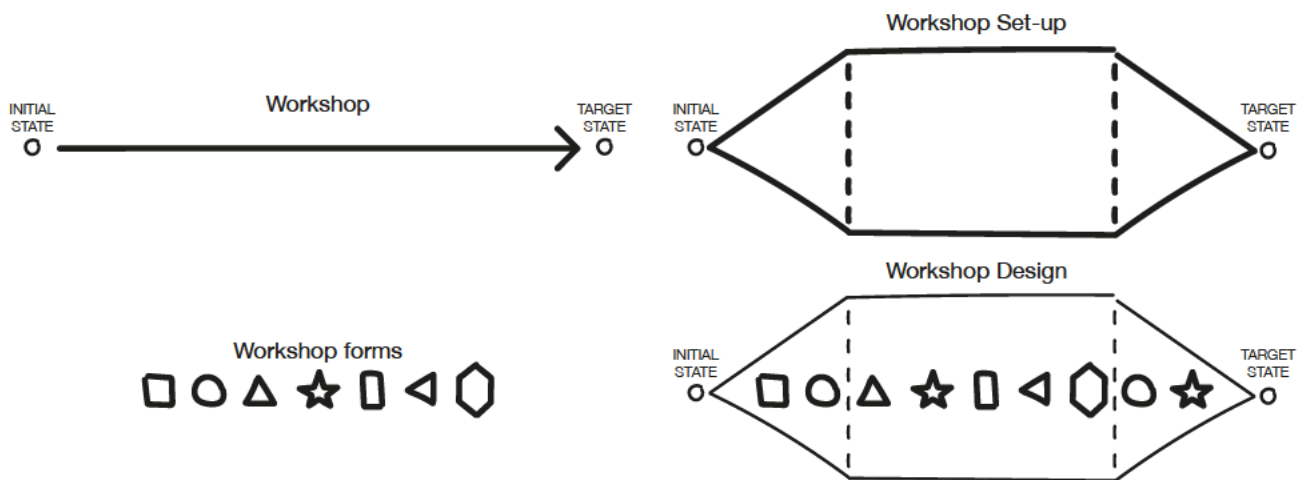
Figure 19 | *Visual explanation of common terminology revolving around workshops (own image, based on Gray et al., 2010)*

6.4 | Q4 - *What is the typical set-up of a workshop?*

As mentioned earlier, 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 will explain the typical set-up of a workshop based on literature and interviews.

What is a Workshop?
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 could be 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 20 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 are the initial and target 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 20). 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 20). 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 20.
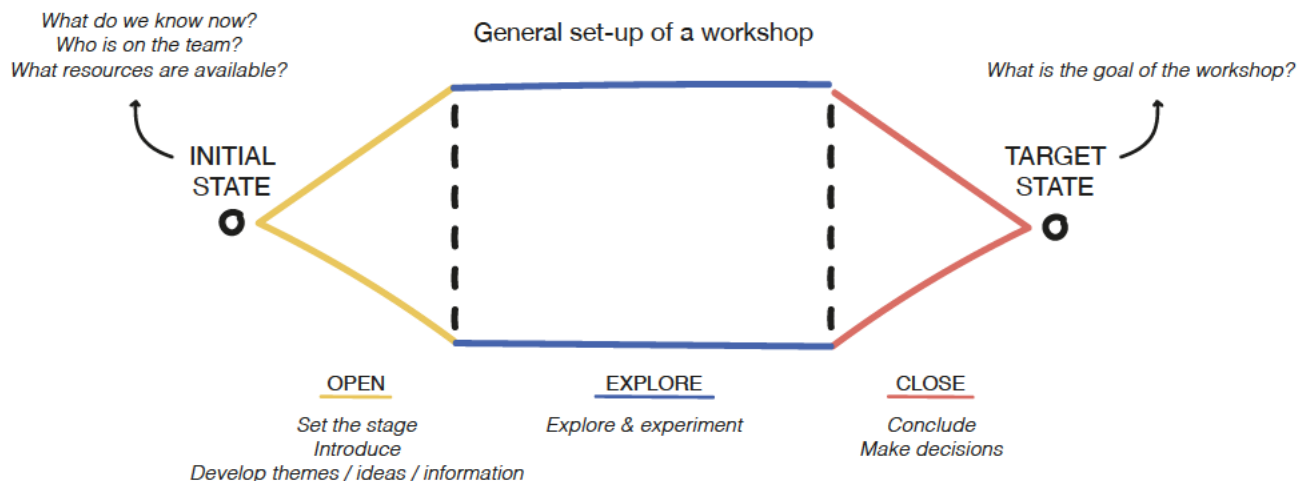
Figure 20 | General set-up of a workshop (own image altered from Gray et al., 2010)

Circularity workshop set-up

Moving towards R1, 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 21. Concerning the initial state, it is known 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 deciding on the circularity level to implement 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 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 circularity measures to implement in the school building. This results in respectively the following sub-goals: Informing, exploring and concluding or deciding.
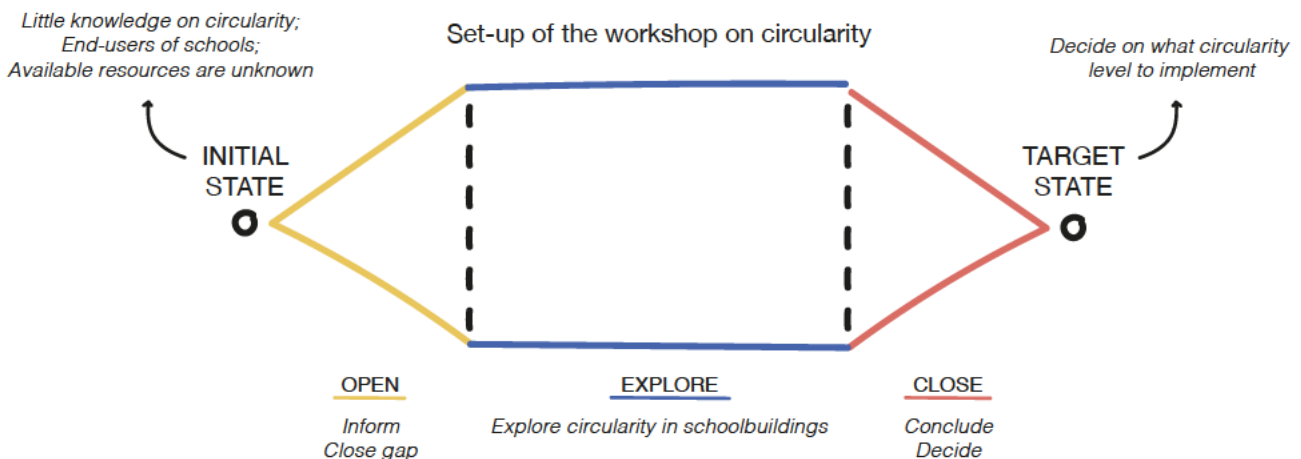
Figure 21 | Set-up of the participatory process on circularity (own image altered from Gray et al., 2010)

Conclusion

To conclude this sub-chapter the following sub-question will be answered: *What is the typical set-up of a workshop?* 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.

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).

6.5 | Q5 - *What are positives and pitfalls of a typical workshop set-up?*

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 6.4 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. 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 22.
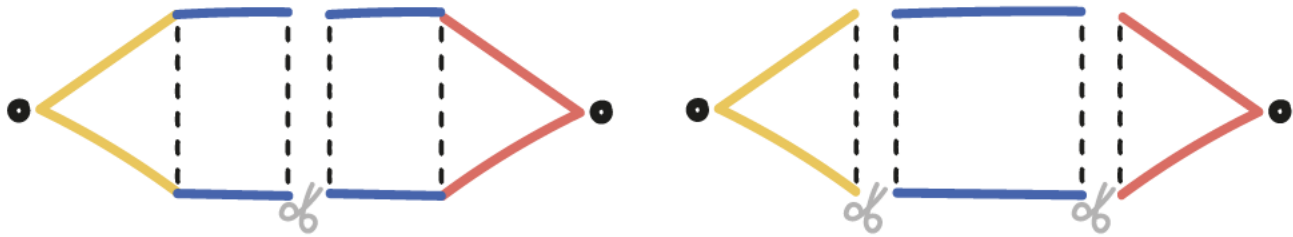
Figure 22 | Alternatives of the typical workshop set-up (own image)

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.

Conclusion

This sub-chapter focused on the question *What are 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. However, there are also some pitfalls determined. These pitfalls formed the starting point of two alternative workshop set-ups. The typical set-up and its two alternatives will be used during interviews with experts to allow them to give feedback on the differences and to help determine the best set-up to engage end-user to create circular school buildings.

6.6 | Q6 - *What are available workshop forms that fit the goals of the workshop?*

According to Gray et al. (2010), designing a workshop should start with identifying the goal of the workshop and as mentioned in sub-chapter 6.4, there are a lot of different workshop forms. This sub-chapter is a gathering of the workshop forms that fit the goals of the workshop based on the category they belong to in the source. In an extensive overview, the available workshop categories from different sources are sorted per goal. This results in an inventory that can later-on be filtered to provide input for the workshop design.

Set-up of the inventory
In sub-chapter 6.4, the goals of the circularity workshop set-up are mentioned, being *Informing*, *Exploring* and *Concluding or Deciding*. These three goals are the starting point of the overview that can be found in Appendix A. Based on three sources, the overview is filled with different workshop forms:
- *Delft Design Guide* (Boeijen et al., 2014)
- *Gamestorming* (Gray et al., 2010)
- *Werkvormenboek* (Van den Ouden, 2016)

The workshop forms of all three sources are divided into different categories by their authors. The appropriate categories are matched with the three goals of the circularity workshop set-up. All workshop forms that are part of matched category are put in the overview. Often the sources contain more than one category that matches a certain goal. Furthermore, per category and workshop form a short explanation is given. Finally, there is a column for extra information. This can contain workshop forms that are more general and that could help during a session. A schematic overview of this set-up is shown in Figure 23.
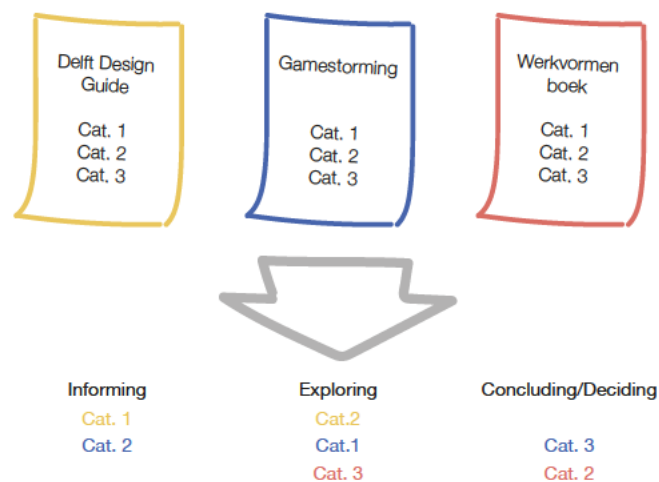
Figure 23 | Set-up of the inventory (own image)

Conclusion
In Appendix A, an overview with available workshop forms fitting the goals of the workshop is given. This extensive overview is the input for the next step, in which the workshop forms will be filtered, so that eventually the workshop set-up can be filled in with the best fitting workshop forms to create the workshop design.

6.7 | Q7 - *What workshop forms are suitable for a circularity workshop with the end-users of schools?*

The outcome of previous sub-chapter is an inventory of a little bit over 230 workshop forms. To decide what workshop forms are best suitable for a circularity workshop with the end-users of schools, the inventory will have to be filtered. This sub-chapter will define the aspects that are going to be assessed per workshop form. Afterwards the assessment takes place and the most fitting workshop forms will be explained. This will be the input for part III, the workshop design.

Filters
The books that are consulted regarding the workshop forms already provide some general properties with their workshop forms to help the reader to choose a fitting workshop form. In the book *Gamification* (Gray et al., 2010) properties of workshop forms are **goal** of the workshop form, **number of 'players'** and **duration** of 'play'. In the Werkvormenboek (Van den Ouden, 2016) the following aspects are mentioned: **Goal** of the workshop form, **number of people**, **duration** and **necessities**. The aspects of the two sources match for the biggest part. In the previous sub-chapter the filter regarding the workshop-goal has already been applied. The other aspects will be used to select a suitable workshop form as well except for the aspect *necessities*.

Another aspect is the **target group** of the workshop. As part of the initial state, Gray et al. (2010) mention that the people that are 'on the team' is one of the starting points in the design of a workshop.

An additional aspect that can be filtered on is the **participation-level** of the workshop form. It is already made clear that the workshop should be engaging the participants. Therefore the workshop forms that are used to create the workshop have to be on the engagement-level as well. This means that the workshop form has to provide a two-way flow of information to be fitting for the circularity workshop.

Assessment
These aspects are classified on level of importance and result in the following steps to filter the workshop forms (Figure 24). The first filter, goal of the workshop form, has been applied in previous sub-chapter and resulted in the inventory of 234 workshop forms as can be seen in Appendix A.
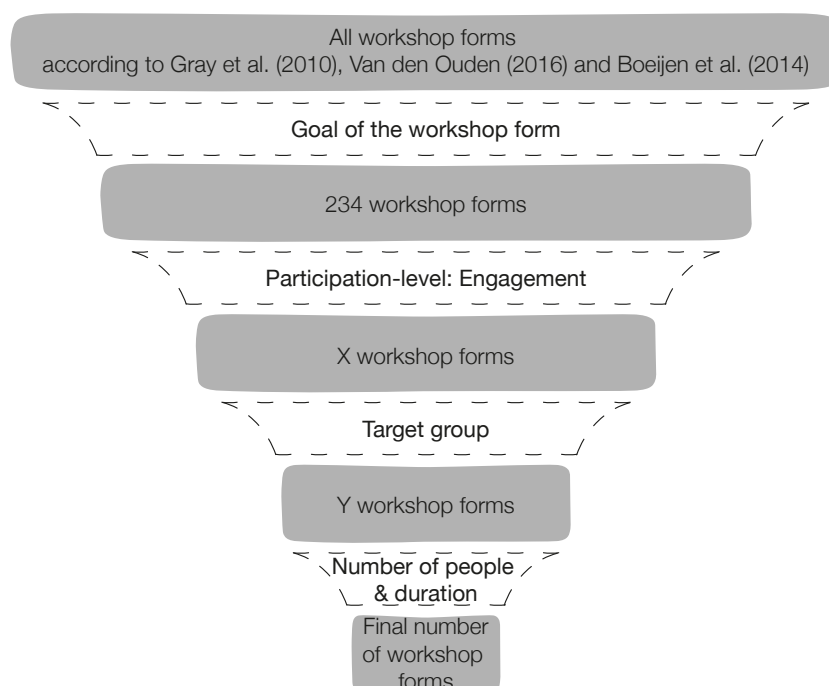
Figure 24 | Workshop form filter (own image)

Part IIa | Conclusion

In this part of the research the typical workshop set-up has been defined and its positives and pitfalls have been appointed. Through interviews that will be discussed in another chapter of this research the final workshop set-up will be chosen. This workshop set-up will then be used to design the workshop in part III of the research. Other aspects that will be used during this design are the workshop forms. The best suitable workshop forms are going to be determined through the filter that is created in the last sub-chapter of this part[1].

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[1] This still has to be executed, this will be described in sub-chapter 6.7.

Part IIb | Workshop Content

The third part of this literature research is about defining the workshop content. On the basis of three questions the input for the workshop design will be defined regarding workshop content. The end-users of schools and the parts of the building that are relevant to them will be defined and a way to measure the circularity level of a building is explained. These aspects will all be used in the workshop design.

6.8 | Q8 - *Who are the end-users of schools?*

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.

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 25). 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 25 | 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 Şenyiğit 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 (Şenyiğit & 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.

Conclusion
The end-users according to this literature research are the people that are influenced most by the design of the school building: students and teachers. This makes that they are also one of the most important stakeholders. However, not all sources agreed completely on this selection. During the interviews that are discussed in another chapter of this research, the definition of end-users from the interviewees point of view will be determined. The selection of the interviews and of this sub-chapter together will determine the 'target group' or 'team-members' for the workshop.

6.9 | Q9 - *What kind of aspects of a building are relevant to the end-users of schools?*

With the end-users of schools being mainly teachers and students, they are in all probability not professionals on the subject of developing buildings. However they have useful expertise on their surroundings. This sub-chapter will define what aspects of a building are relevant for them so that the workshop can focus on those aspects. It will do so by explaining the 6S-model by Brand as a starting point. Thereafter the end-users, as defined in previous sub-chapter, will be connected to the different scales of the 6S-model.

The 6S-model
An important concept in 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 take itself apart (Brand, 1994), this however will not be taken into consideration during this research. An overview of the different layers is shown in Figure 26.
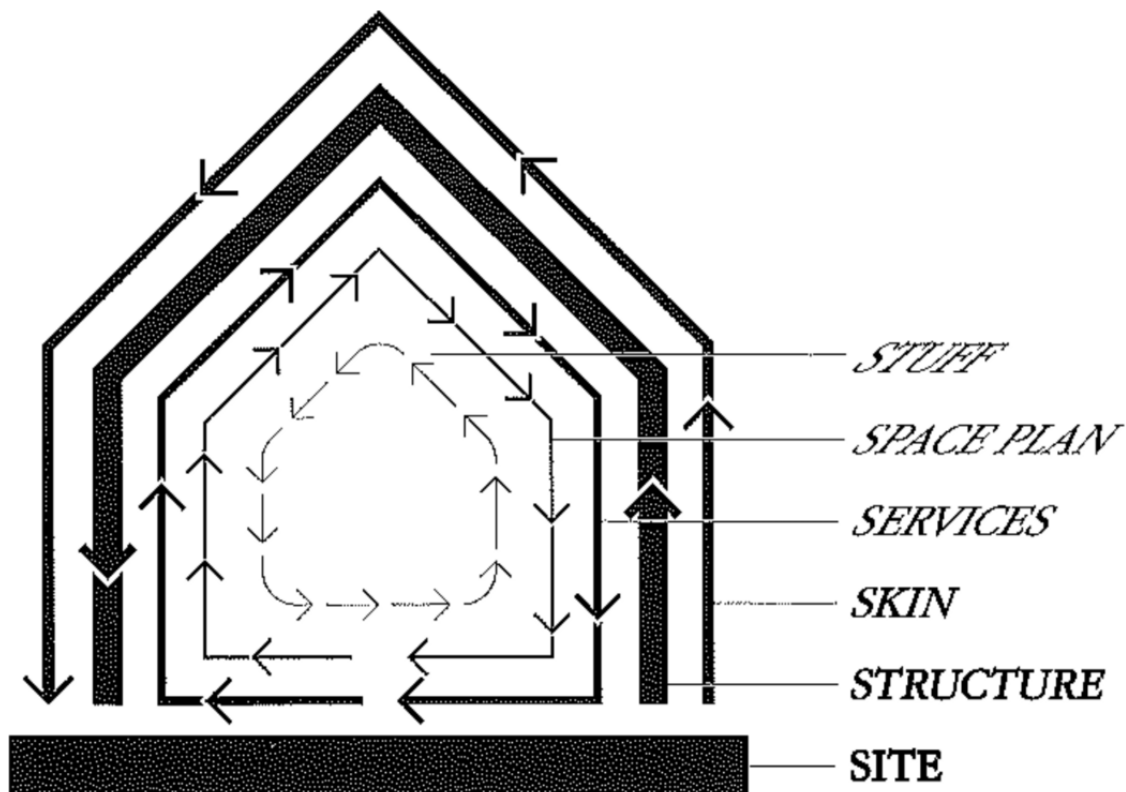
Figure 26 | Shearing layers of change (Brand, 1994)

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 6.8, the end-users of school buildings are mainly teachers and students. 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 27.

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

This results in the following three layers that are connected to end-users: 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.

In the following figure (Figure 28) Steigenga et al. (2015) show that the impact of the *space plan* in total over 50 years has an eminent impact on the costs. With the life expectancy being relatively low, the *space plan* has to be replaced once every 5 to 7 years (Steigenga et al., 2015). On the long term, this adds up to have a bigger impact on costs in this case than *services* or *structure*. This shows the influence that end-users can have over a longer period of time.
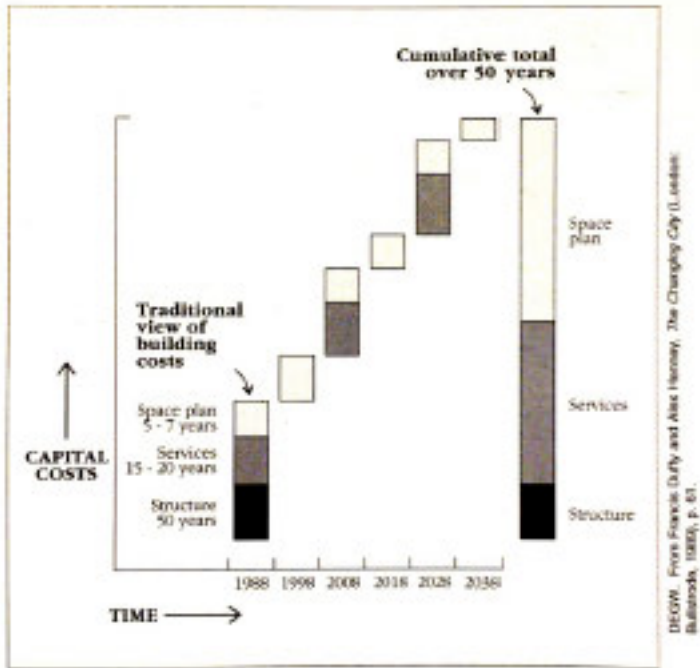
Figure 28 | Impact on costs of different layers (Steigenga et al., 2015)

Conclusion

In this sub-chapter the following sub-question has been researched: *What kind of building aspects are relevant to the end-users of schools?* The building aspects that appear most relevant for the end-users of schools are the following three layers: *skin*, *space plan* and *stuff* [2]. Even though these layers might seem to have little impact, their short life expectancy might have a big impact on the long term.

[2] Note to self:

Table 5: Adaptable aspects, building layers en decision-making

6.10 | Q10 - *What circularity levels can be achieved in schools?*

As defined in part IIa of this research, the target state or goal of the workshop is to define the circularity level that has to be implemented in the school building. This chapter will research ways to define the circularity level of a building. These will then be connected to the relevant building-scales as determined in previous sub-chapter. This way some tangible examples are defined that can eventually be used in the workshop to create a better understanding.

10R-ladder

The definition of circularity that is used in this research is *"The capacity to fulfill the loops "closed-reversible chains" for building materials through dynamics in the building configuration and operation"* (Hamida et al., 2022). This 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. The 10R-ladder is a way to provide insight in the circularity level of these loops and Figure 29 can be seen as a summary of this theory.
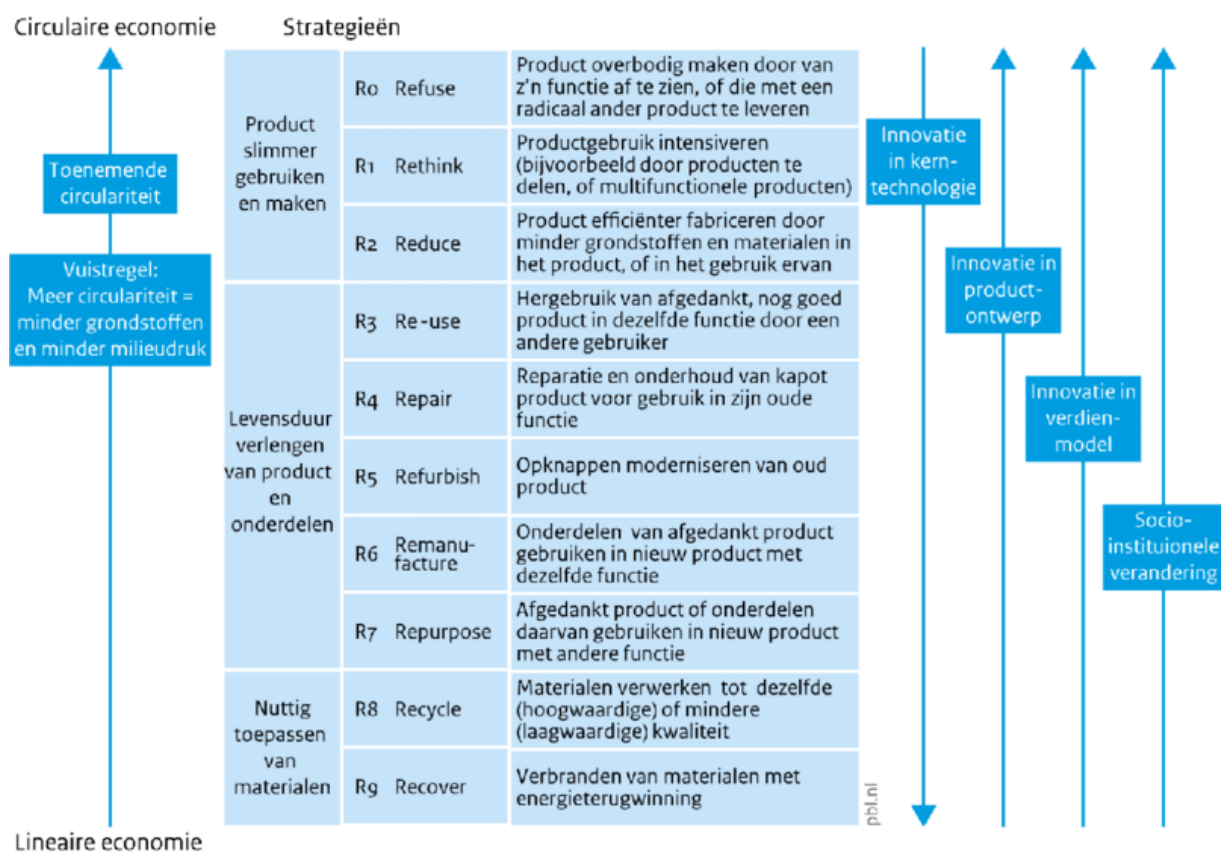
Figure 29 | 10R-ladder (Potting et al., 2016)

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. The relation of the different strategies to the material is visualized in Figure 30.
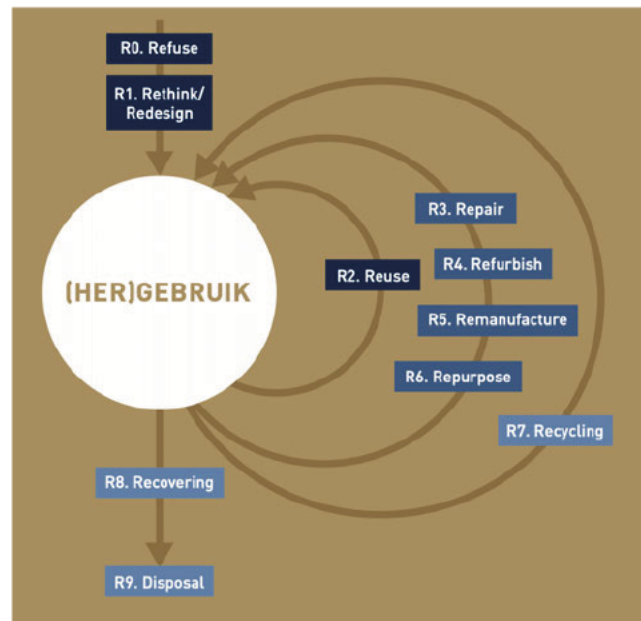
Figure 30 | 10R-ladder as loops (NRP, n.d.)

Application of the 10R-ladder

In the previous sub-chapter, the relevant building scales are defined. In Figure 31 these building scales are outlined, because these are the scales that will be focused on during the workshop. In the document, several applications of circular ways of building are mentioned including the circularity level based on the theory of the 10R ladder. Figure 32 also shows different applications of circularity regarding the building scales of the 6S model.

OVERZICHT PRODUCTEN & DIENSTEN
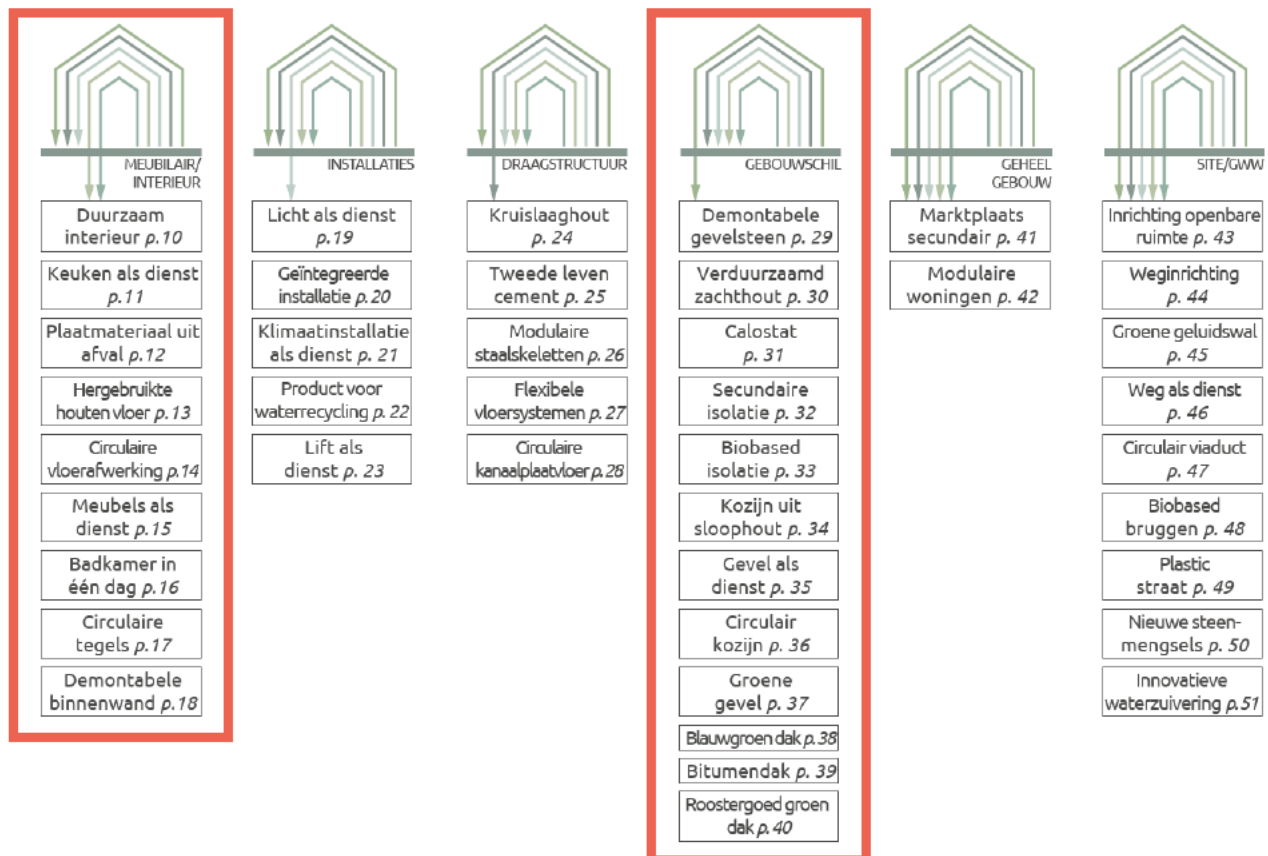
Figure 31 | Concrete examples of measures to be implemented in schools through engagement of end-users (Van Ekeren et al., 2020)

Table 3: Selection of Flex 2.0 indicators with direct relevance for material and product use

STRUCTURE	Dimensioning system: modular coordination
	Dimensioning system: facade-grid
	Extension/Reuse of stairs and elevators
	Load bearing capacity of floors
	Load bearing floor systems
	Self bearing facade
	Geometry of Columns
	Use of fontanel constructions
	Fire resistance of load bearing structure
	Interruptions in structure
	Connection detailing of foundation en ground bound installations
	Building technology of load bearing structure
	Thermal and acoustic quality of floor insulation
SKIN	Demountable facades
	Reuse windows
	Daylight entry
	Thermal and acoustic quality of façade insulation
	Connection detailing of facade components
SERVICES	Over dimensioning shafts
	Over dimensioning the capacity of installations
	Over dimensioning the capacity of facilities
	The way installation components can be disassembled
SPACE PLAN	Inter-changeability of fit out components
	Movable separation walls
	Connection detailing of partition walls
	Individual fit out / finishing

Figure 32 | Circular material or product use for 4 building scales (Geldermans & Rosen Jacobsen, 2015)

Part IIb | Conclusion

The target audience of the workshop are the end-users of schools, these are defined to be teachers and students, according to literature. These stakeholders are most related to the building scales *skin*, *space plan* and *stuff*. That is why the workshop will mainly focus on the those three building scales by Brand. Regarding circularity levels, the 10R ladder will be used to define this during the workshop.

7 | Reflection on P2

This chapter focusses on the problems or challenges that have occurred during the research until now and the challenges in the future of this research for the next half year.

This research is a merge of two subjects: Workshops and circularity. The combination of the two subjects as well as each subject by itself brings some challenges during this process.
The difficult aspect of the workshop-part of the research is the fact that knowledge from academic literature has to be transformed into a tool that can be used in practice. Therefore, it is really important to understand the literature in a way that I am able to apply it. On the other hand, the circularity-part is challenging since the academic literature should be made understandable for everyone, even people that aren't experts on this topic. To make a good translation from literature to understandable knowledge, it is also important to really understand the literature. This both leads to the final difficulty on this topic: The way to order and analyze the literature. Since the literature should be able to be applied and translated, it is important to get a good grip on the different topics. However, at the beginning of the research I have been struggling with this, especially since the two subjects both have their own spectrum of information with here and there a little bit of overlap. Still a part of the available sources should be read, but since a couple of weeks I found a way to do this and it has been working very good since.

Something that could compromise the planning is the summer break. According to the conceptual model, the workshop will be tested in a real case by 'ICS adviseurs', which means the involvement of the end-users of a school building. Typically school buildings are closed during the summer break, so it should be planned preferably before (June/July) and otherwise after (September) that time. However, this is also dependent on the cases available and the planning of 'ICS adviseurs'. With the deadline of this research approaching at the end of September, it would be best to plan the workshop before the summer break.

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Appendix

Appendix A | *Overview Workshop Forms*

Goal of Workshop Form:	Informing	Explanation	Exploring	Explanation	Concluding / Deciding	Explanation	Extra	
Delft Design Guide (Boeijen et al, 2014)	Define	Methods that can help to define for whom and for what problem / challenge you are going to design.	Discover	Methods that can help to discover insights and create understanding while designing.	Evaluate & Decide	Methods that can help to evaluate design proposals and make decisions while designing.	Models, approaches & perspectives	
	Collage	A visual representation of the context, user group or product category.	Contextmapping	User-centred design approach that involves the user as the 'expert on his own experience'.	Interaction Prototyping and Evaluation	A method that helps you to simulate and test how people will experience future interactions with your design.	Creative Problem Solving	A structured approach for generating novel and useful solutions to problems.
	Personas	Archetypal representations of intended users, describing and visualising their behaviour, values and needs.	Cultural Probes	A technique for learning about inteded users in a purely inspirational way based on their self-documentation.	Product Usability Evaluation	Serves to validate product usability, enabling you to understand the quality of your design in actual use conditions.		
	Storyboard	A visual representation of a story or narrative about your design in its context of use over time.	User Observations	Helps to study what your intended users do in a specific situation.	Product Concept Evaluation	Helps to understand how intended users or other stakeholders value your concept design.		
	Written Scenario	Tells a story about your intended users in a specific situation.	Interviews	Face-to-face consultations that can be useful for understanding consumer perceptions, opinions, motivation and behaviour concerning products or services, or to gather information from experts in the field.	Emotion Measurement (PREMO)	A non-verbal self-report instrument that measures users' emotional responses to products.		
	Problem Definition	Finding and defining the real problem is a significant step towards a solution.	Questionnaires	Research tools consisting of a series of questions and other prompts intended for gathering information from respondants.	Harris Profile	A graphic representation of the strengths and weaknesses of design concepts with respect to predefined design requirements.		
	List of Requirements	States the important characteristics that your design must meet in order to be successful.	Focus Groups	A group in which several topics concerning a specific product or issue are discussed.	EVR Decision Matrix	A decision tool to select the most promising sustainable solution form a number of design alternatives on the basis of the eco-costs and the expected market value of the product.		
	Business Model Canvas	A comprehensive visual tool to discuss business ideas. Enables to evaluate business ideas in an early stage and on a conceptual level.	Customer Journey Mapping	Helps to gain insight into all the stages a customer goes through while experiencing the use of a product or service.	C-Box	A matrix that helps to categorise and evaluate large numbers of ideas.		
	Marketing Mix or 4Ps	a combination of 4 instruments (product, price, place, promotion) with which a product manager or strategic product designer can influence a marketing strategy.	Mind Map	Graphical representation of ideas and aspects organised around a central theme, showing how these aspects are related to each other.	Itemised Response and PMI	A simple means of judging ideas quickly and intuitively.		
			Strategy Wheel	Visual representation and a quick tool to review a company's strengths.	DATUM Method	Enables to evaluate design alternatives usign design criteria.		
			Trend Analysis	Help to identify and analyse customer needs and business opportunities in order to develop business strategies, design visions and new product ideas.	VALUe	Advantage, Limitation, Unique elements. Used to evaluate a large set of earlydesign ideas in a quick and systematic way.		
			Function analysis	A method for analysing and developing the function structure of an existing product or new product concept. Helps to describe the intended functions of the product and relate them to its parts.	Weighted Objectives	Evaluation method for comparing design concepts based on the overeall value of each design concept.		
			Ecodesign Strategy Wheel	Helps to select and communicate strategies to minimise the environmental impact of product designs.	Cost Price Estimation	helps to roughly define the cost price of the design in an early stage of the design process.		
			Ecodesign Checklist	A list of questions that supports the analysis of a product's impact on the environment.				
			Process Tree	Schematic diagram of the activities that a product encounters during its lifecycle.				
			(Fast Track) Life Cycle Analysis	A Method to determine the total eco-burden of a product over its entire life cycle.				
			Human Power	To determine whether human power is a feasible power source for your design.				
			SWOT Analysis	A method that helps to systematically analyse the strategic position of a company's business and to develop a strategic marketing plan.				
			Search Areas	Helps to find business opportunities for developing new product ideas.				
			Ansoff Growth Matrix	A strategic marketing tool that specifies 4 alternative strategies for corporate growth based on different product-market combinations.				

Category	Method	Description
	Miles and Snow Business Strategies	A decision tool that identifies 4 generic ways in which companies can successfully adapt to and compete in an uncertain external environment.
	Porter Competitive Strategies	Helps companies to characterise their competitive strategy and define guidelines for achieving competitive advantage.
	Vrio Analysis	A useful method for determining the competitive potential of an organisation's resources and capabilities.
	Porter Five Forces	A framework for assessing the attractiveness (profitability) of an industry and deciding how the company should position itself and compete in that industry.
	Perceptual Map	Visual representations of what consumers thing about products or brands.
	Value Curve	Visual representations of what consumers thing about products or brands.
Develop		Methods that can help to develop ideas and concepts while designing.
	Fish Trap Model	Helps in generating and developing material concepts that determine the geometrical form of the design.
	Analogies & Metaphors	To find inspiration for new solutions derived from a mapping process between inspirational sources and a target domain.
	Synectics	Comprehensive method to facilitate creative problem solving using analogies and joining together different and apparently irrelevant elements.
	Brainstorm	A specific approach with rules and procedures for generating a large number of ideas.
	Brainwriting & Brain Drawing	Participants write/draw their ideas on a sheet of paper that is roulated, so that participants can build on each other's ideas.
	Morphological Chart	Helps to generate principal solutions in an analytical and systematic way.
	SCAMPER	A creativity method to create ideas.
	WWWWWH:	Who, what, where, when, why and how. A checklist of the most important questions to be asked to analyse your design problem.
	How Tos	Problem statements written in the form of questions that support idea generation.
Articulate & Simulate		Methods that can help to articulate and simulate design proposals while designing.
	Role-playing	A form of simulation that helps to develop and determine the interaction between the design and its intended users.
	Design Drawing	A versatile and powerful tool for design exploration and communication. It is an integral part of the decision-making process.
	Technical Documentation (TECDOC)	Unambiguous recording of designs, using standards-compliant digital 3D models and technical drawings.
	Three-dimensional Models	A physical manifestation of a product idea, a hand-built physical model that represents a final product.
	Video Visualisation	Enables to visualise future experiences or scenarios that show how a new design conceoept could potentially be used in or affect people's lives.

Gamestorming (Gray et al., 2010)

Category	Method	Description
Opening		Focused on framing and describing the bounds of that space and then jumping headfirst into it.
	3-12-3 Brainstorm	Quick format of brainstorming.
	The Anti-problem	Helps people get unstuck when they are at their wit's end regarding a specific problem.
	Brainwriting	A simple way to generate ideas, share them and build on them.
Exploring		For navigating, combining, interpreting, and otherwise working with ideas to discover something new.
	The 4 Cs	A quick way to gather and organize information about any subject using four common key concepts.
	The 5 Whys	mirrors that motive to move beyond the surface of a problem and discover the root cause, because problems are tackled more sustainably when they're addressed at the source.
	Affinity Map	Can help us discover embedded patterns (and sometimes break old patterns) of thinking by sorting and clustering language-based information into relationships.
Closing		the act of bringing things to conclusion, in our minds and on paper.
	$100 Test	Participants assign relative value to a list of items by spending an imaginary $100 together.
	20/20 Vision	Getting group clarity around which projects or initiatives should be more of a priority than others.
	Ethos, Logos, Pathos	To channel Aristotle's assessment of your argument.
General		These are the reliable techniques that never let you down.
	The 7Ps Framework	Every meeting deserves a plan. Note that a great plan can't guarantee a great outcome, but it will help lay down the fundamentals from which you can adapt.
	Affinity Map	Can help discover embedded patterns (and sometimes break old patterns) of thinking by sorting and clustering language-based information into relationships.
	Bodystorming	is simply brainstorming, but done with the body

Name	Description
Context Map	Designed to show us the external factors, trends, and forces at work surrounding an organization.
Cover Story	To think expansively around an ideal future state for the organization; it's an exercise in visioning. The object of the game is to suspend all disbelief and envision a future state that is so stellar that it landed your organization on the cover of a well-known magazine.
Draw the Problem	Defining the problem in a way that is not only clear but also compelling enough to make people care about solving it.
Fishbowl	An effective way to activate attention — to prime our natural listening and observing skills so that a more substantive conversation can take place.
Forced Analogy	Breaks these hard-wired categories and allows us to see things from a different angle, opening new possibilities in problem solving and idea generation.
Graphic Jam	an all-purpose visualization game that you can conduct before many other games as a warm-up, but it's also a useful game in itself.
Heuristic Ideation Technique	participants use a matrix to generate new ideas or approaches to a solution.
History Map	Shows you how to map moments and metrics that shaped your organization. It's also a great way to familiarize new people with an organization's history and culture during periods of rapid growth.
Image-ination	To generate new ideas about a topic you feel stuck on.
Low-Tech Social Network	To introduce event participants to each other by co-creating a mural-sized, visual network of their connections.
Mission Impossible	Participants take an existing design, process, or idea and change one foundational aspect that makes it "impossible" in function or feasibility.
Object Brainstorm	Brainstorm based on an existing object.
Pecha Kucha / Ignite	These fast, structured talks enable people to share ideas quickly and with a minimum of distraction.
Poster Session	Accelerates the presentation format by breaking it down, forcing experts to boil up their ideas and then present back to each other via simple images.
Pre-Mortem	A way to open a space in a project at its inception to directly address its risks.
Show and Tell	lets employees use objects for storytelling around things that are important to the organization.
Atomize	It is useful for unpacking large but poorly understood structures.
The Blind Side	to disclose and discover unknown information that can impact organizational and group success in any area of the company — management, planning, team performance, and so forth.
Build The Checklist	For groups that are charting out how they will work one of the most practical and useful things they can do is build a checklist.
Business Model Canvas	As a tool that you can use to examine and rethink a business model.
Button	Randomization keeps the participants' attention.
Campfire	Useful not only because it acts as an informal training game, but also because it reveals commonalities in employee perception and experience.
Challenge Cards	To identify and think through challenges, problems and potential pitfalls in a product, service or strategy.
Customer, Employee, Shareholder	The object of this game is to imagine possible futures from multiple perspectives.
Design the Box	Help facilitate any vision-oriented discussion, and has been used to describe topics ranging from "our future methodology" to "the ideal hire."
Do, Redo & Undo	asks a group to focus on this, and to think through the implications of dismantling and altering.
Elevator Pitch	Developing and communicating a vision for something, whether it's a new service, a company wide initiative, or just a good idea that merits spreading.
Five-fingered Consensus	a technique for managing the feedback loop between a facilitator and a large group.
Flip It	Designed to show players that perspectives are made, not born.
Force Field Analysis	a time-tested way to evaluate the forces that affect change which can ultimately affect our organizations.
Give-and-Take Matrix	To map out the motivations and interactions among actors in a system.
Heart, Hand, Mind	to examine an issue from another perspective, and find significance in the issue.
Help Me Understand	gives them a chance to externalize what's on their minds and have leadership be responsive in a setting outside the once-a-year leadership retreat.
Graphic Gameplan	Shows you how you'll get where you want to go with a project.
Impact & Effort Matrix	Possible actions are mapped based on two factors: effort required to implement and potential impact.
Memory Wall	To appreciate employee contributions, celebrate their accomplishments, and build camaraderie among team members.
NUF Test	Participants rate an idea on three criteria to what degree is it New, Useful, and Feasible?
Plus/Delta	to generate constructive feedback.
Prune the Future	uses a tree as a metaphor to show how the future of anything can be shaped, one leaf at a time.
Start, Stop, Continue	to examine aspects of a situation or develop next steps.
Who/What/When Matrix	You can connect people with clear actions they have defined and have committed to.
Card Sort	a practice used frequently by information architects and designers to gather and structure inputs for a variety of purposes.
Dot Voting	of the simplest ways to prioritize and converge upon an agreed solution.
Empathy Map	To quickly develop a customer or user profile.
Forced Ranking	Obligates the group to make difficult decisions, and each item is ranked relative to the others.
Post-Up	To generate ideas with silent sticky note writing.
Storyboard	Asks players to envision and describe an ideal future in sequence using words and pictures.
WhoDo	To brainstorm, plan, and prioritize actions.

Name	Description
Show Me Your Values	To get a sense of how employees perceive the values that drive an organization, an initiative, a system-wide change, or any other topic.
Stakeholder Analysis	At the beginning of projects big and small, it may benefit a team to conduct a stakeholder analysis to map out who their stakeholders are—so that they can develop a strategy for engaging them.
Spectrum Mapping	To reveal the diversity of perspectives and options around any given topic and to organize them into a meaningful spectrum.
Trading Cards	Ice-breaker.
Visual Agenda	When you create a visual agenda, people took it over and linger on it longer. They actually read the desired outcomes and review the steps they'll take to get there.
Welcome to My World	Gives players an opportunity to better understand other players' roles and responsibilities.
Make a World	To create a three-dimensional model of a desired future state.
Mood Board	To create a poster or collage that captures the overall "feel" of an idea.
Open Space	A method for hosting large events, such as retreats and conferences, without a prepared agenda. Instead, participants are brought together under a guiding purpose and create the agenda for themselves in a bulletin-board fashion.
Pain-Gain Map	To develop an understanding of motivations and decisions.
The Pitch	A role playing game designed to bring attention back to real world and focus on feasible and viable aspects of concepts.
Product Pinocchio	To establish, refine, and evolve the features of a product or service so that it becomes more valuable to the end user.
Post the Path	To quickly diagnose a group's level of understanding of the steps in a process.
RACI Matrix	By creating a RACI (Responsible, Accountable, Consulted, Informed) matrix, a group will tackle the responsibility problem directly.
Red/Green Cards	Provide a simple means for channeling this feedback.
Speedboat	a short and sweet way to identify what your employees or clients don't like about your product/service or what's standing in the way of a desired goal.
SQUID	Sequential Question and Insight Diagram. It is created progressively over the course of a meeting with sticky notes, capturing questions and answers as the group moves through the space.
Staple Yourself to Something	to explore or clarify a process by following an object through its flow.
SWOT Analysis	A long-standing technique of looking at what we have going for us with respect to a desired end state, as well as what we could improve on.
Synesthesia	participants examine a topic through a sensory lens, and let this inform their decisions and designs.
Talking Chips	By using simple "talking chips" as a currency for contribution, a group can self-manage the flow of participation.
Understanding Chain	a group shifts from a content focus to an audience focus, and draws out a meaningful, linear structure for communication.
Value Mapping	To build a visual matrix that quickly and clearly defines areas of interest for something.
The Virtuous Cycle	To discover opportunities to transform an existing, linear process into a more valuable and growing process by taking a different viewpoint.
Visual Glossary	To clearly define a set of terms so that a group has a common vocabulary.
Wizard of Oz	Role-play exercise, two people prototype a machine-human interaction.

The WorldCafe — a method for improving large-group discussion by borrowing concepts from the informal "café" conversations that we have all the time: round tables, crosspollinating ideas, and pursuing questions that matter.

Kennismaking — *Wat je geeft ontvang je terug.*		Brainstorming — *Durf te dromen.*		Resultaat / Praktijkgerichtheid — *Focus op een concreet en helder doel.*		Energizers — *Vergeet nooit te lachen.*	
Naam	**Omschrijving**	**Naam**	**Omschrijving**	**Naam**	**Omschrijving**	**Naam**	**Omschrijving**
De Kennismakingsreceptie	Actief kennismaken en een positief leerklimaat cre ren.	Diepgaande Verkenning	Op inspirerende manier een onderwerp diepgaand verkennen.	En in jouw organisatie?	Onderwerpen in een opleiding koppelen aan de eigen organisatie.	Stamp 't in de Grond!	Mensen in 5 minuten uit het denken naar een helder hoofd helpen.
4 Op Een Rij	Op een speelse manier elkaar persoonlijker leren kennen.	Stillewandiscussie	Democratische manier van brainstormen waarbij iedereen aan bod komt.	3 Posities	Beter omgaan met weerstand in gesprekken waarbij door zelfonderzoek.	Knoop Ontwarren	Veel bewegen en puzzelen!
Ik Stel Aan Jullie Voor	Meteen interactief kennismaken en presenteren aan elkaar.	Wat Weten Wij Al?	Leuke manier om snel inzicht te krijgen hoeveel kennis een groep heeft.	Sparringpartner Praktijkopdracht	Elkaar helpen met het succesvol schrijven van een praktijkopdracht.	Whoosh	Focus op elkaar houden in de chaos en genieten van faalplezier.
Object Van Thuis	Voorstellen aan de hand van een persoonlijk object.	Feit Of Interpretatie?	Ervaren van het verschil tussen feiten en interpretaties.	Advocaat van de Duivel	Cursisten helpen elkaar meningen helder te krijgen/aan te scherpen.	"Ja, maar …"	Grappig omgaan met de 'ja-maar' types in je werk.
De Doos	Op een persoonlijke manier voorstellen.	Ik Win Als Jij Wint	Bereiken van commitment bij verdeeldheid over een beslissing.	De Kettingbrief	Cursisten leren binnen een vaste structuur te schrijven.	Het Soeprecept	Raadspel over welke emotie wordt gebruikt bij het voorlezen.
Een Sprankelend Moment	Positieve energie opwekken tijdens de kennismaking.	Puzzel De Tekst	Actieve verwerkingsopdracht om tekstopbouw te herkennen.	De Uitsmijter	Spelen door het aannemen van de gedragsstijl van een ander.	Tennisbal	Ervaren dat je beter slimmer dan harder kunt samenwerken.
De Ideale Baan	Ontdekken wat cursisten nu ideaal aan een baan vinden en wat ze nog missen in hun huidige functie.	De Theaterstoelen	Ontdekken hoe je cursisten bij conflicthantering.	Autonomievervulling	Ervaren hoe is om autonomie te stimuleren.	De Duimstok	Ervaren dat samenwerken en gelijktijdig handelen niet altijd meevalt.
De Eerste Indruk	Direct inzicht geven in eigen aannames.	Placematdiscussie	Opwekken van een groepsdiscussie over een onderwerp.	What's the news?	Het nieuws gebruiken tijdens lesdagen.	Post-its Veroveren	Wie verzamelt de meeste post-its?
Achterstevoorstelrondje	IJsbreker die de tongen letterlijk en figuurlijk losmaakt.	Brainstormcarrousel	Op een interactieve manier samen kennis verzamelen.	De Rugzak	Wat lukt al bij de cursisten? Ervaringen tussentijds checken.	Het Papier	Een speelse inleiding op thema's als luisteren of communicatie.
Pitch Yourself	Kennismaken met elkaar en met het ontvangen van feedback.	Regisseren Maar	Cursisten actief betrekken bij een rollenspel.	Klantreis in Beeld	Een 'uitstapje' waarin een klantreis in beeld wordt gebracht.	De Begroeting	Het effect van non-verbale communicatie laten ervaren.
Kennismaking Op Een Rij	Actief kennismaken door verbinding met elkaar te leggen.	Alle Ideeën	Alle cursisten krijgen de kans al hun idee n te spuien.	Communicatie-combinatie	Schriftelijk en verbaal/non-verbaal communiceren.	Robotica voor Beginners	Een grappige manier om mensen weer te activeren en te laten lachen.
De Interpreteerder	Een non-verbale kennismaking om te laten zien wat eerste indruk doet.	Loesjeposter	Een geintje met een seintje: cursisten geven luchtig hun kritiek.	Wie ben ik?	In staat zijn binnen 5 minuten je eigen profiel te presenteren.	Stoelendans	Luchtige en energieke energizer voor grote groepen.
Karikatuur	Elkaar inzicht geven in de eigen leerwens en huidige werkdynamiek.			Wat wil ik leren?	Koppelen van concrete leerwensen aan de inhoud.		
Kennisoverdracht — *Alles begint met een 'open mind'.*		**Inspiratie en Creativiteit** — *Durf uit je 'comfort zone' te gaan.*		**Evalueren / Borging** — *Schrijf nieuwe ideeën op.*			
Kenniscarrousel	Door zelf als cursist kennis uit te leggen, beklijft deze beter.	Onderzoek Jouw Inspiratie	Nagaan hoe inspiratie voor jou werkt.	Waar Sta Ik Op Dit Moment?	Creatieve afsluiting waarbij cursisten tekenen hoe ze er nu voorstaan.		
Puzzel het Model	Een logisch model zelf laten ontdekken door redeneren en analyseren.	Beeldend Presenteren	Ervaren hoe het is om beeldend te presenteren.	Rapportcijfer	Meting voor, tijdens, na de training waarbij cursisten hun niveau beoordelen.		
Blended Theorie	Actief theoretische kennis behandelen in een blended training.	Sterk Beeld	Een beeldende werkvorm die de eigen kracht en kwaliteiten laat zien.	Improviseer met een Kaart	Associatief presenteren ervaren.		
Extreme Hobby	Leren open vragen stellen.	Jongleren Leren	Ervaren wat de eigen leerstijl is en hoe de andere stijlen te gebruiken.	Teken Je Leermoment	In beeld brengen van de leermomenten.		
Memoryspel	Speelse en actieve manier om theorie te herhalen.	Wat Zijn Jouw Waarden?	Ervaren wat voor cursisten belangrijk is in het werk of privé.	Ik wil een Tip!	Geven van tips om een belangrijk leerpunt in de praktijk toe te passen.		
Levend Kemkwadrant	Speelse en actieve werkvorm om inzicht te krijgen in eigen kwaliteiten.	Caesar en Cleopatra	Hoeveel aannames doen cursisten bij een verhaal?	Ik zeg 'ja' tegen	Schrijfwerkvorm die een leidraad biedt voor de dagelijkse praktijk.		
Wel of Geen Koffie?	Ervaren van miscommunicatie en hoe snel dat gebeurt in de praktijk.	Meebewegen met Handen	Ervaren van meebewegen met weerstand.	Het Storyboard	Via een 'striptekening' opgedane leerpunten in praktijk brengen.		
Balanceren met Ballonnen	Ervaren van de werking van belemmerende en helpende gedachten.	Non-verbale Kracht	Uitbeelding door cursisten die veel positieve energie genereert.	Oneliner	Cursisten kiezen een oneliner die hen raakt.		
Online Quiz	Actieve verwerkingsopdracht om kennis te toetsen.	De Loterij	Observeren van gedrag en geven en ontvangen van feedback.	Goede voornemens	Inhoudelijke afsluiting met een brug naar de eigen praktijk.		
Statistiek Jeu de Boules	Levendiger en begrijpelijker maken van droge lesstof als statistiek.	Moodboard met Kwaliteiten	Bewustwording van kwaliteiten, van moodboard naar het verhaal.	De Kantoortuin	Energieke afsluiter waarbij de cursisten hun ontwikkelpunt uitbeelden.		
Vragenspel	Op een actieve manier kennis delen.	Ont-saai-en	Het saaie beeld van een beroep kleur geven.	De Stap Die Ik Ga Zetten	Focussen op wat je wilt en op de stap die nodig is om dat doel te bereiken.		
Ik Heb Gehoord Dat	Theorie kernachtig samenvatten en herhalen.	Zelfzorgrecept	Inzicht geven in de eigen behoeftes om voor zichzelf te zorgen.	Ansichtkaart	Na afloop van de training ontvangen cursisten een reminder thuis.		
		Liegbeest	Over welk beroep zou je wel willen liegen en wat zegt dit over jou?				

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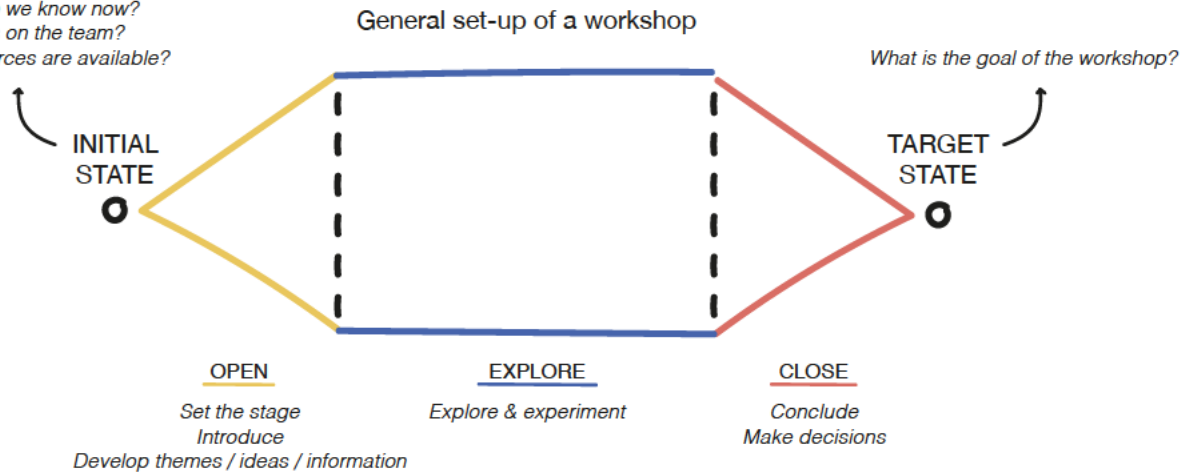
1. Kan je kort vertellen wat jouw rol is binnen ICSAdviseurs?
      - Wat zijn je dagelijkse bezigheden?

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?
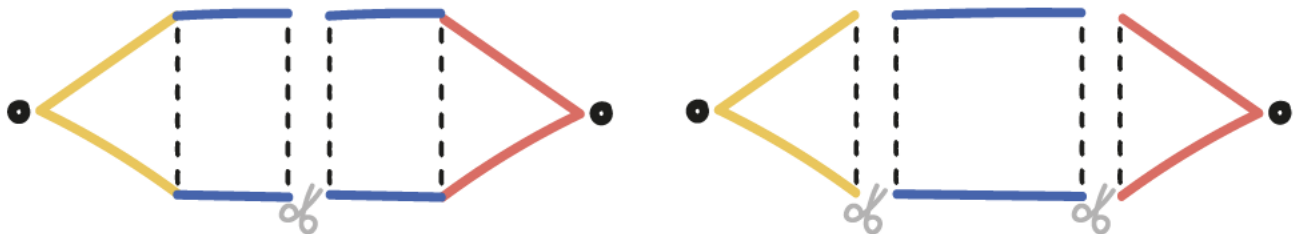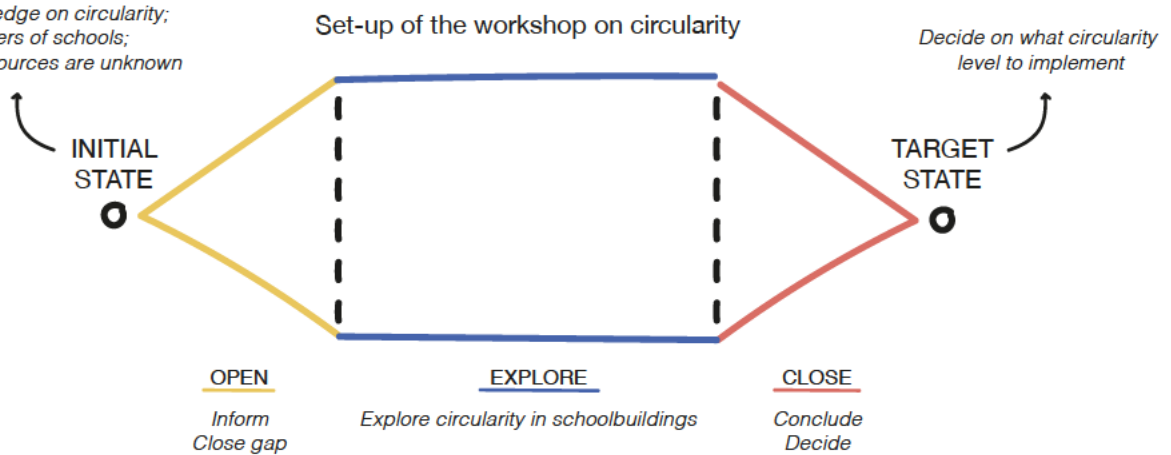
19. Ω Dit is de algemene workshop-opzet [uitleg].
20.

General set-up of a workshop

What do we know now?
Who is on the team?
What resources are available?

INITIAL STATE

What is the goal of the workshop?

TARGET STATE

OPEN
Set the stage
Introduce
Develop themes / ideas / information

EXPLORE
Explore & experiment

CLOSE
Conclude
Make decisions

Set-up of the workshop on circularity

Little knowledge on circularity;
End-users of schools;
Available resources are unknown

INITIAL STATE

Decide on what circularity
level to implement

TARGET STATE

OPEN
Inform
Close gap

EXPLORE
Explore circularity in schoolbuildings

CLOSE
Conclude
Decide

Welke opzet / configuratie heeft jouw voorkeur en waarom?

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