C2 - Living Lab

Climate Adaptive Sloterdijken

Acknowledgements

To bring this Living Lab to life, we collaborated with many parties. For instance, weekly meetings with our case-owners from SPATwater, which were sometimes also attended by members of the Green Business Club Sloterdijken, have contributed enormously to the quality of the research and the trajectory that has been followed. We therefore see 'collaboration' and 'interdisciplinary' as keywords that have made our research a success.

First of all, we would like to express our thanks to our academic coach, Tim Zonjee. During weekly meetings and individual conversations, he helped us with both the scientific angle of the Living Lab and advice on how to make group work a success.

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Finally, we would like to thank all the people who participated in our co-creation session, engagement experiments or expert interviews. We would like to thank Ivo Steunebrink of Gemeente Amsterdam for making the Buurtkamer available to host our co-creation session. We would also like to thank the Green Business Club Sloterdijken for organizing a tour of businesses within Sloterdijken, and offering help and advice at all times.

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Executive summary

Amsterdam's Sloterdijk business park is vulnerable to the negative effects of climate change, such as increased heat stress and extreme weather events. To address this, a group of MSc MADE students worked with hydrology consultancy SPATwater and the Green Business Club Sloterdijken to investigate how to make the business park climate adaptive. The research process included visits to the park, interviews with stakeholders and experts, surveys, literature research, experiments and a co-creation session. Using the self-designed Triple E Framework, the team focused on engaging, enabling and empowering people who use Sloterdijken in a professional capacity to become climate adaptation drivers. The project was conducted using the Living Lab methodology, which involves working with stakeholders to create and validate solutions in a real-world context. A co-creation session was held with the municipality, businesses from the area, experts and umbrella organisations. In it, ways of bringing the Triple E Framework to life were conceived together with all these stakeholders. Based on interviews, co-creation and stakeholder feedback, a product was designed with five steps to achieve the goal of enabling people who use Sloterdijken in a professional capacity to become climate adaptation drivers. The final product is a website with information and tools that allow businesses in the park to learn about and start climate adaptation. The website includes videos, text, calculation tools and animation to encourage bottom-up climate adaptation.

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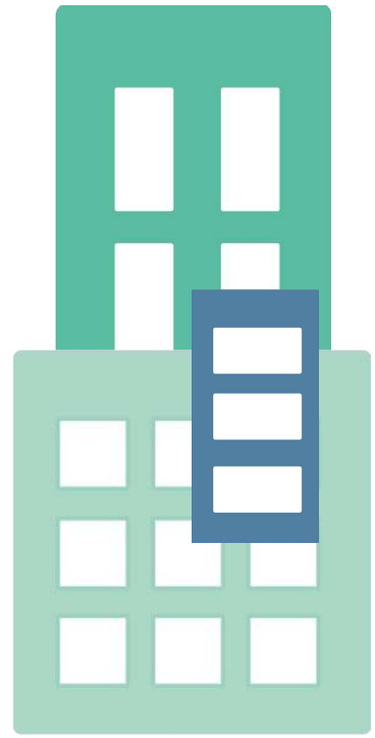
Background



1.1 Introduction

One of the major challenges for cities in the coming decades is to adapt to the negative impacts of climate change (Mauree et al., 2019). Two important effects that are caused by climate change are the increasing global average temperature leading to more heat stress, and more frequently occurring extreme weather events, such as intensified periods of precipitation and drought (Castanos, 2020; Masson et al., 2020). Areas that are especially vulnerable to these impacts and which should adapt to these effects are business parks, which comprise 1/6th of the Dutch built environment (Castanos, 2020).

Business parks consist of a range of facilities such as office buildings, warehouses, and transportation networks (Le Tellier et al., 2019). Higher temperatures and extreme heat can impede or even prevent production processes and business, as machinery can get overheated and employees can experience heat stress, reduced concentration levels and other types of health issues (Klimaatadaptatie Nederland, n.d.). Additionally, business parks are characterised by a high level of impermeable surfaces (Castanos, 2020),

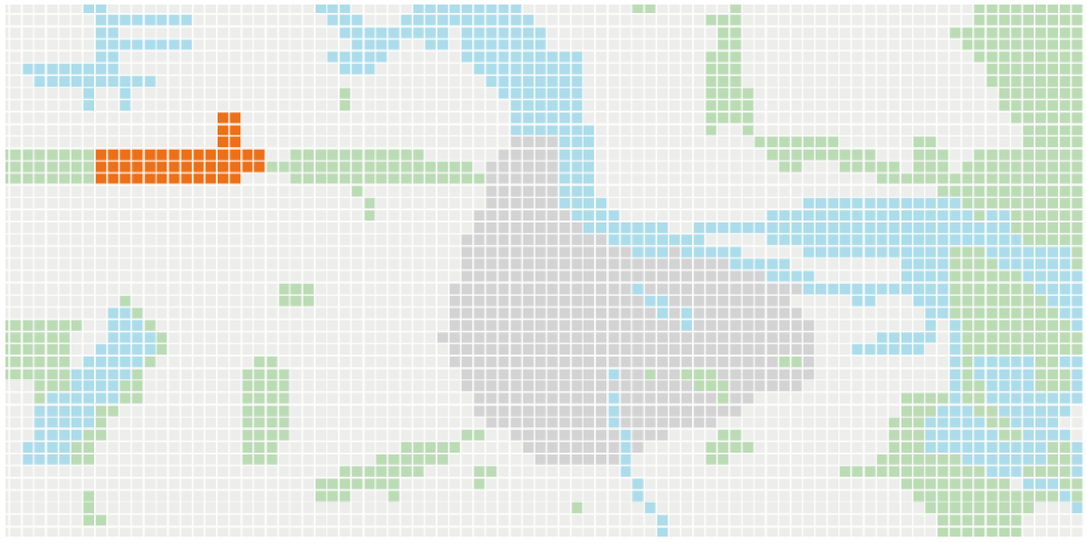


Fig. 1: Sloterdijken Centrum & II in Amsterdam. Author: Gabriel Morales

which prevents rainwater to infiltrate into the ground, resulting in a higher risk of pluvial flooding if extreme weather occurs (Rubinato et al., 2019; Grežo et al., 2020). These challenges are further aggravated by the often-lacking greenery in business parks (Castanos, 2020), which could provide a cooling effect on the surrounding (Takakura, Kitade & Goto., 2000) and can allow water to infiltrate into the ground more easily (Bult, 2020). Therefore, to combat these challenges, it is important to discover how to make business parks climate-adaptive to protect businesses and ensure long-term (economical) success (Castanos, 2020).

SPATwater, a hydrology consultancy company and case-owner of this project introduced us to a business park in the Netherlands that is vulnerable to the negative impacts of climate change: business park Sloterdijken, located in Amsterdam. According to the Municipality of Amsterdam (2022a), several roads and areas in Sloterdijken are known to be flooded after intense rainfall and the average perceived temperature in the densely built areas was 12 C° higher than in its surroundings. As 82% of the business park consists of impervious surfaces and there is less than 15% greenery (SPATwater, 2022), the impacts of climate change are expected to worsen, which highlights the need for climate adaptation. Although many climate adaptation measures and solutions are known, not enough effective adaptation strategies have been applied to address climate-related problems in business parks (Lenzholzer et al., 2020). The technical solutions to become more resilient are available, but it can be challenging to get stakeholders involved and invested in climate change-related issues, which are often considered a 'tragedy of the commons' that no one is responsible for (Paavola, 2011). We, a group of students from MSc MADE therefore conducted research on *how to make the business park of Sloterdijken more resilient against the impacts of climate change, while focusing on stakeholder engagement.*

We performed this project in the form of a Living Lab, a method that focuses on collaboration between different stakeholders in real-life physical environments, where new technologies, services, products and systems are created, prototyped, tested and validated (Hossain, Leminen & Westerlund, 2019), which is further elaborated upon throughout the report. Due to the complex nature of the problem and the broad research aim we received

from our case owners, a fundamental part of this research consisted of the determination of the scope and focus of this research. As such, this project consisted of several phases in which the first part specifically focuses on determining the final problem statement, research scope and target group.

1.2 Reader's Guide

In this report, you will find the description of our *background*, *process* and *product development*.

In the chapter hereafter, chapter 1.3, we will elaborate more on the *background*, (spatial) context, problem definition and the determined target group and corresponding research question. In chapter 1.4, the theoretical background including the Theory of Change, the Stakeholder Engagement Circle and the Living Lab approach of the report will be elaborated on.

In chapter 2, our *process* will be described, entailing plan development (2.1), stakeholder mapping (2.2) and the co-creative design part (2.2)

In the final chapter, chapter 3, our *product and product development* will be tackled, including chapter 3.1 describing the initial product design phase, 3.2 on implementation and evaluation, 3.3 on refinement and 3.4 on dissemination.

In the discussion in chapter 4, our findings are critically reflected upon and recommendations for future research are given.
In chapter 5 we reflect upon our group roles (5.1) and team process (5.2).

1.3 Background and Context

Study area

Amsterdam Sloterdijk is a business and residential district located in the western suburbs of the city of Amsterdam in the Netherlands. Within this project, we specifically focus on the areas Sloterdijken Centrum and Sloterdijken II, further referred to as Sloterdijken, as indicated in figure 2. The Sloterdijken II area is characterised by a typical business park layout: large box-shaped buildings with flat roofs and mostly production facilities. Sloterdijken Centrum comprises a mix of high-rise office buildings, hotels and increased residential facilities.

Fig. 2: The focus area of the project

According to the Gemeente Amsterdam (2022a), several roads and areas are known to be flooded after intense rainfall (figure 3) and the average perceived temperature inside the more densely built areas was 12 degrees higher than in the surrounding greenery (figure 4). In recent years, the area has undergone significant development, with new buildings and

infrastructure being built to support the growing population and business community. Currently, the area is also in full redevelopment with the aim of densification by increasing the number of residential facilities, from 900 people living there now to 15.000 in 20 years' time (Gemeente Amsterdam, 2022b). Sloterdijken is home to a number of commercial and industrial businesses, as well as some residential properties and the area spans a surface of around 130 hectares (SPATwater, 2022).

Figure 3: Height of flood after 70 mm rainfall in 1 hour

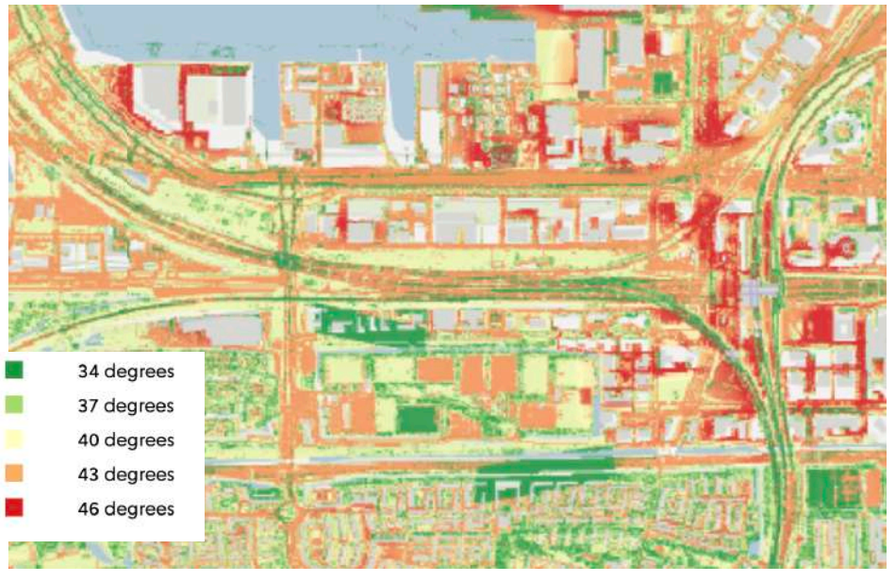


Figure 4: Average perceived temp. when 25 degrees Celsius

What is climate adaptation?

Climate adaptation in business parks involves taking action to reduce the vulnerability of businesses and their operations to the negative impacts of climate change, such as increasing frequency of extreme weather events and higher average temperatures. It consists of the process of adjusting to changing climatic conditions through changes in practices, processes, and structures (Smit & Pilifosova, 2003, p.879). Climate adaptation can take many different forms. It can be anticipatory, occurring before impacts of climate change are observed, or reactive as a response to climate change impacts. In most circumstances, anticipatory adaptations will result in lower long-term costs and be more effective than reactive adaptations (Lobell, Baldos & Hertel, 2013). Figure 5 gives an example of a climate adaptive measure.

Figure 5: A green roof

A multi-faceted problem

Climate adaptation in business parks is a complex and multi-faceted problem that requires a holistic, integral approach with multiple stakeholders working together. Business parks are often home to a diverse range of businesses, each with its own unique needs and challenges when it comes to adapting to climate change (Le Tellier, 2019). To effectively address the impacts of climate change in business parks, it is necessary to

Name	Function	Organization	Type
Freya Macke	Senior Advisor Climate Adaptation	Arcadis	Expert
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Lianne van Ruijven	Junior Consultant	Rebel Group	Expert
Stan Verstraete	Projectmanager Sustainable Area Development	Businesspark Waarderpolder	Expert
Kasper Spaan	Senior Policy Advisor Climate Adaptation	Waternet	Expert
Thom Bult	Policy Advisor Climate Adaptation	Gemeente Ijsselstein	Expert
Rico Theunissen	Sustainability Advisor	BREEAM	Expert
Marcel de la Rose	President of association	Westpoort	Expert
Coert Zachariasse	Sustainable Area Developer	Delta Development Group	Expert
Kelly Pronk	Employee	GVB	Local business
Ron Zadelaar	Employee	Eigen Haard	Local business
Norbert van Schie	Owner	Drukkerij de Bij	Local business
Willem Jubels	Owner	Printerette	Local business
Anonymous	Employee	Pantar	Local business
Anonymous	Employee	APG	Local business
Anonymous	Employee	Antikraak	Local business
Roel Kupers	Senior Projectmanager	Gemeente Amsterdam	Municipality
Ivo Steunebrink	Gebiedsmakelaar	Gemeente Amsterdam	Municipality
Lieke Doodeman	Adviseur Water	Gemeente Amsterdam	Municipality

Table 1. List of interviewed people

consider a wide range of factors, including the physical and environmental characteristics of the park, the types of businesses and industries located there, and the needs and concerns of the people who work and live in the area (Hwang, Zhu & Tan, 2017). Effective climate adaptation in business parks can involve a combination of measures, such as infrastructure improvements, changes in urban planning developments, and the implementation of innovative solutions (El m'hadi & Cherkaoui, 2022). It may also involve collaboration with various stakeholders, such as local governments, businesses, and community groups, to identify and implement effective adaptation strategies.

To get a better understanding of the area and to further define our problem context & definition, we visited the Sloterdijken area several times and conducted our first interviews with experts on climate adaptation, local businesses, the municipality of Amsterdam and other relevant stakeholders (appendix E). We aimed to speak to a large variety and diversity of people and stakeholders in the business park, but unfortunately, one group is still missing to date. Although we made extensive attempts to get into contact with investors and large property owners - through acquiring Kadaster data, writing multiple emails and also just calling their front office - all of our attempts did not result in contact. From the many other interviews we have conducted with, among others, local businesses, experts in the field of climate adaptation, BREEAM professionals and experts on financing such projects, interesting insights and evident challenges became apparent. An overview of the individuals interviewed is given in table 1.

Target group

First, we discovered that in existing research on climate adaptation in business parks, different aspects and stakeholder groups have been performed. For example, in research by Bult (2020), the perspective of property owners has been studied as to what limiting factors exist for their support in implementing climate adaptation. Castanos (2020) on the other hand focused on getting a more nuanced understanding of the different motivations that local businesses have towards participation in climate adaptive projects. Next to that, larger ongoing research of several

knowledge institutes has a more governmental focus as they study the possible cooperation between local governments and businesses (Hanzehogeschool Groningen, 2022). This existing research has focused on different stakeholder perspectives when it comes to climate adaptation in business parks, but the stakeholder group of local employees however has not yet been researched before (Macke, 2022). According to Murray-Webster & Simon (2006), considering and understanding local stakeholders and then acting to engage them is generally considered as being one of the most critical parts of any change initiative.

Therefore, we decided that our target group of this research is geared towards a specific stakeholder group: anyone who uses the Sloterdijken area in a professional capacity. This includes all levels of employees that physically work in the area of Sloterdijken. The main reason for choosing this target group is because of its theoretical relevance, as focusing on the employees of a business park has not been researched as of yet (Macke, 2022). The particular interest in choosing people that use business park Sloterdijken in a professional capacity is supported by the theory of indirect stakeholder influence. Where research on stakeholder engagement and associated matrices only focuses on stakeholders' direct influence, it overlooks the indirect influence they can have (Polonsky, 1996). Stakeholders with indirect influences are defined as bridging groups which might not directly be the final target group but can have strong indirect influences in the process (Westley & Vredenburg, 1991). Brunåker & Kurvinen (2006) highlight that by emphasising the voice of local employees organisational change is better understood and it showed to be a fruitful way to understand local development initiatives. Active stakeholder involvement seemed to be a tangible action where significant improvement could be made for the better, which fitted in the timeframe of our project and the extent of our capabilities.

Problem analysis

While focussing on our target group, we discovered unexpected challenges that were perceived by this stakeholder group.

First, climate adaptation is a subject which comes with a lot of uncertainty and businesses in business parks often are not aware of the impact of climate change and the potential effects of climate adaptation. Verstraete (2022) even indicated that in his work as the driver of such climate adaptive changes, he refrains from using the term because it brings about a lot of confusion with local businesses and their employees. This was in line with other interviews with employees working in the area, where almost none of them were aware of the term climate adaptation and what it entailed and they did not know which solutions to the problem existed. When it comes to sustainability, more generic and widespread concepts such as circularity or renewable energy were themes that businesses were working on (Pantar, 2022; Drukkerij de Bij, 2022). The possible effects of climate adaptation were not clear for most of the interviewees of local businesses. After explaining what it meant and how it could impact them, they all indicated that extra information through e.g. the municipality would be very welcome.

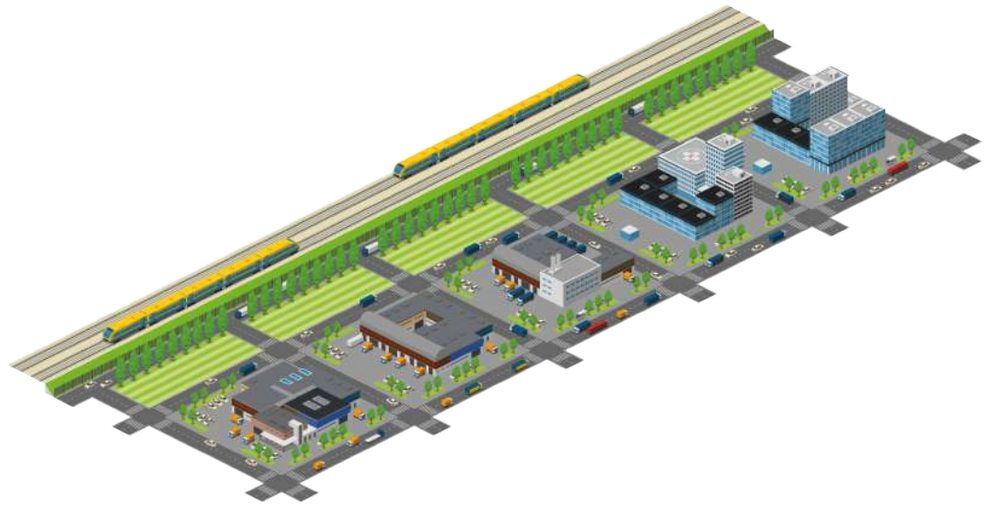

Figure 6. An animation of a typical business park

Second, employees of businesses in Sloterdijken do not feel as if it is their responsibility to become climate-adaptive. A clear link was recognized with the split incentive which is a phenomenon in which the party bearing the cost is not the party benefiting from investment (Bird & Hernández, 2012; Bult, 2020). Often it is required of the property owner to invest in climate

adaptive measures, whilst the business occupying the space is the one benefitting from it, which impedes the investment in the first place (Macke, 2022; La Rose, 2022). Also, it is imperative that all different stakeholders involved are in favour of the same project at the same time as only focusing on single plots or small parts are not going to make a substantial difference (Macke, 2022; Verstraete, 2022). The effects of climate change are not limited to business plot borders but are noticed in both private and public spaces that are lying next to each other and therefore, different actors need to work together to manage such projects. When talking to local employees, this lacking or mixed sense of responsibility was also visible.

None of the businesses indicated that it was solely their responsibility (GVB, 2022; Drukkerij de Bij, 2022; Antikraak, 2022; Printerette, 2022; Pantar, 2022; Eigen Haard, 2022), even for the businesses that owned their own facilities (Eigen Haard, 2022). Also, the municipality was mentioned as the most important stakeholder in making the region climate adaptive (Pantar, 2022). Linked to this is the fact that businesses that are renters are less interested in contributing to long-term investments because of the fact that they are renters and therefore could also be unsure of whether or not they are going to stay for longer (Printerette, 2022; La Rose, 2022). There was only one case in which the renters worked together with the property owner to make the current building more sustainable, and also somewhat climate-adaptive (APG, 2022). This is however a (positive) exception to the rule.

Thirdly, it became clear that climate adaptivity is currently not yet top of mind with such businesses and their employees in general (Verstraete, 2022). Some businesses in the area however are slightly more aware of the impact, as they are currently already experiencing certain problems, mostly due to increased heat. Drukkerij de Bij for example already experienced problems with their production process for which a certain temperature was needed but which was exceeded during hot days (Drukkerij de Bij, 2022). Also at Pantar, the work schedule had to be changed to adapt to the increased temperatures last summer (Pantar, 2022). When asked about a long-term strategy or plan for this, however, they expressed that this was either not something they were actively working on, or they were working on implementing other unsustainable measures such as air conditioning. Also, different businesses indicated that currently, they do not experience these challenges which were often related to the typology of the building or the fact that the building was built on a bit higher ground (Printerette, 2022; Eigen Haard, 2022). From this, it can be derived that although it is clear from different stress tests that there could be and already are problems related to water and heat, users of Sloterdijken in a professional capacity do not feel a sense of urgency about what these coming challenges could mean for them nor are the ones that are already experiencing it considering climate adaptive measures.

Lastly, throughout all interviews, the problem of lacking financial means and its importance also became apparent. On the one hand, it is important to have a very clear and strong business case when it comes to such investments (Voeten, 2022; Verstraete, 2022; Macke, 2022). Currently, the value of such greenery measures and being better protected from climate adaptive challenges is not clear to most parties, although businesses are often considered rational actors in such situations (Castanos, 2020). For an entrepreneur, it should be very clear what's in it for them and also in talks with property owners, this is an important subject (Verstraete, 2022). When it comes to financial means for investments in sustainability measures, some local businesses indicated that there would be a budget for sustainability in general but not necessarily for climate adaptation as they do not see the use of it (Printerette, 2022; Eigen Haard, 2022; Drukkerij de Bij, 2022). Next to that, it is also unclear what the municipality can offer in this regard. Verstraete (2022) indicated that it is crucial to approach the municipality as a group of businesses with a common goal of climate adaptation in order to acquire funds and that it is difficult for separate business entities to get municipal funding. Also, this mix of public and private cooperation and funding has been expressed as a key driver of successful adaptation projects (Macke, 2022).

Therefore, during the initial problem definition phase, we discovered that the main barriers to future-proof a business park were not the lack of innovative solutions to adapt to the changing climate or the absence of available climate adaptation strategies, but were rather rooted in:

MAIN PROBLEMS

1. A lack of knowledge on climate adaptation
2. None to little sense of responsibility
3. None to little sense of urgency
4. A missing incentive for

These issues make it challenging to implement effective climate adaptation measures and strategies that are tailored to the specific needs and challenges of the business park Sloterdijken. To overcome these barriers, a concerted effort is required to build the necessary capacity, resources, and commitment towards future-proofing Sloterdijken.

Research Question

Our aim with this Living Lab is to make Sloterdijken more resilient against the impacts of climate change, while focusing on stakeholder engagement. As derived from the previously defined barriers to adopting climate adaptive measures, such as the lack of knowledge, urgency and responsibility, and to overcome the knowledge gap concerning the active engagement of employees in becoming changemakers in the field of climate adaptation, we decided to focus our living lab project on answering the following question:

How can we actively involve our target group - everyone that uses Sloterdijken in a professional capacity - within the topic of climate adaptation, to kickstart the movement towards a future-proof business park?

Figure 7. Photo of the Sloterdijken Area

Figure 8. Photo of Sloterdijken Area

1.4 Theoretical Framework

Theory of Change

To close the knowledge gap that is introduced in the previous section while focusing on our specifically defined target group, we have used the Theory of Change (ToC) to structurally model our project aim, as it helps to focus on "how to make a change happen" rather than "what a project should do". The ToC is a planning tool that helps to understand and communicate the sequence of events to achieve a particular goal or outcome. It involves defining a long-term goal or vision, in our case creating a climate adaptive business park in Sloterdijken, and working backwards to identify what steps are needed to be taken along a causal pathway to achieve it (Pringle & Thomas, n.d.). According to Bours, McGinn & Pringle (2014), ToC is well-suited for addressing complex, multifaceted, and long-term issues of which climate adaptation in business parks is an example. A ToC includes the desired change, and the intermediate steps necessary to achieve the desired outcome (Connell & Kubisch, 1998). It also identifies the assumptions and logic supporting the belief that the identified steps will lead to the desired outcome. Figure 9 gives an overview of how the ToC is adopted in this research, for which the different parts will be explained in the coming part.

Desired change

The overall goal of the Living Lab project is to kickstart the movement towards a climate-adaptive business park Sloterdijken. To achieve this goal, our desired change is to actively involve everyone that uses Sloterdijken in a professional capacity. We believe that if the stakeholders are actively involved in the topic of climate adaptation in business parks, they can foster the adoption and implementation of innovative solutions and disruptive strategies in Sloterdijken, to enhance the park's ability to adapt to the impact of climate change. To achieve this result, a range of intermediate steps are defined in the domains of change.

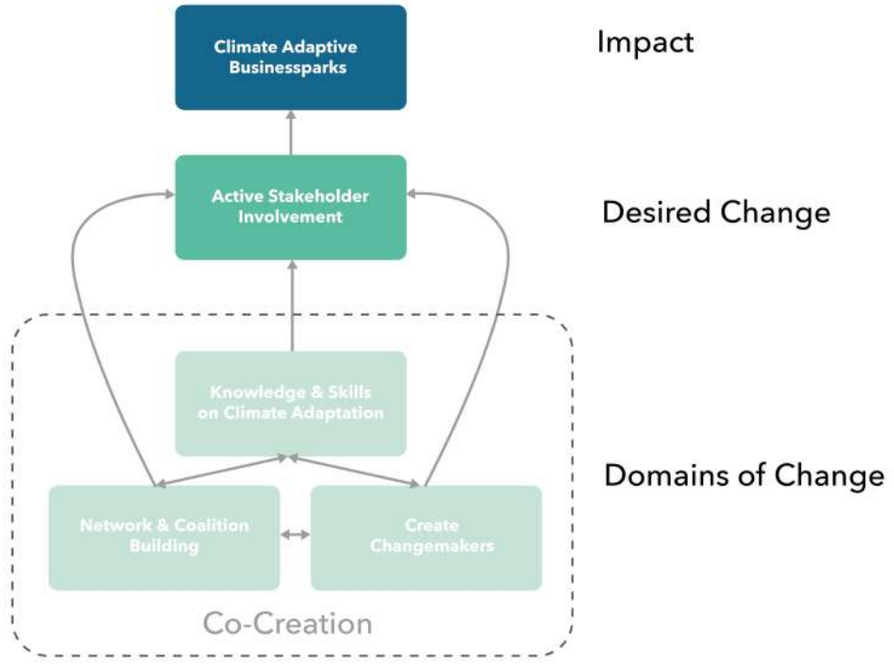

Figure 9. The ToC model for this Living Lab

Domains of change

The conditions that must be in place to achieve the desired change are referred to as the domains of change. In other words, where do we want our change to take place? To reach active stakeholder involvement, three important domains of change are identified, which are all linked together and derived from the problem analysis and site exploration.

Knowledge & Skills on Climate Adaptation

The first domain is Knowledge & Skills on Climate Adaptation. Currently, there is a lack of knowledge on the potential threat of climate change when the area does not take any action. Additionally, not much is known about potential solutions. For example, S. Vertraete (2022) mentioned: "Avoid the term climate adaptation, people do not understand it". It is of great importance that stakeholders are informed and educated about how the implementation of certain innovations can reduce for example the risk of flooding and why certain actions could lead to improved resilience. If the knowledge and skills on climate adaptation of our target group is improved, it would allow for more active involvement in the transition.

Network & Coalition Building
The second domain is Network & Coalition Building. Cooperation is often key to successfully implementing change initiatives (Brunåker & Kurvinen). Multi-stakeholder networks are an organisational structure that allows for collective action beyond personal interests. Those multi-stakeholder networks are generally issue-driven, meaning that urgent and complex issues force them to cooperate although they might be sceptical of the idea themselves (Roloff, 2008). By creating a network and coalition within our target group, it is perceived that the likelihood of active stakeholder involvement will increase.

Create Changemakers
The third domain is Create Changemakers. Changemakers are individual employees or organisations who want to make a difference in making a business park more resilient against climate change. We believe that it is important to have local changemakers when active stakeholder involvement is desired, as changemakers generally have a better understanding of the possibilities and the local community and its needs. They are often familiar with the specific challenges and risks that their businesses face and often have a strong relationship with other key stakeholders in the community. Local changemakers might also have access to resources and support from government agencies. Therefore, we want to create something that allows our target group to become a changemaker, which could kickstart the movement towards climate adaptation.

Pathways of change
To start the movement that is indicated in the domains of change, we need to think about which pre-conditions need to be in place. As mentioned in the problem definition, there needs to be an increasing sense of urgency & responsibility among the target group, financial resources and incentives should be present and information on climate adaptation should be available. One of the most important aspects of living lab research is to co-create together with the stakeholders involved. Co-creation is a way of collaboration in which all stakeholders can contribute their knowledge, skills, and resources to the project which can lead to the development of new ideas and solutions that may not have been possible through individual efforts (Voorberg, Bekkers & Tummers, 2015). Using co-creative design as an approach to develop comprehensive ideas for the domains of change identified, the solutions are tailored to the specific needs and challenges faced by the stakeholders, which makes these solutions more likely to be accepted and embraced by those who will be using them. Therefore, our pathway to change mainly focuses on a collaborative exploration of the problem and solutions regarding the domains of change, to find the best ways to actively engage our target group and to future-proof the business park of Sloterdijken.

Stakeholder Circle Theory
Because we specifically focus on stakeholder involvement within our project, it was considered important and useful to use a well-established and existing stakeholder analysis tool that helps to identify the stakeholders that have an interest in or are affected by the transformation towards a climate adaptive business park. The Stakeholder Circle Theory is a methodology that guides the identification and prioritisation of key stakeholders in a project, to ensure that their needs and expectations are understood and managed (Bourne, 2008; Varvasovszky & Brugha, 2000). Involving stakeholders in the early stages of a project helps to design tailor-made solutions that consider their views and minimise the risk of lacking participation or potential counter-reactions (Roseland, 2000), by better understanding the role, influence and necessary engagement of the stakeholder in climate adaptation projects in business parks. The Stakeholder Engagement Theory consists of five steps (Bourne, 2016; Walker et al., 2007):

1. **Identify**: In the first step, all individuals or organisations that have an interest in the project, including employees, local government, and building owners are identified.

2. **Prioritise**: This second step involves evaluating the relative importance of different stakeholder groups or identifying which stakeholders have the most direct impact on the project. Prioritise: This second step involves

evaluating the relative importance of different stakeholder groups or identifying which stakeholders have the most direct impact on the project.

3. **Visualise**: The third step is to visualise the stakeholders on a power/ interest matrix, which helps to determine which stakeholders should be monitored, kept informed, kept satisfied, or managed closely.

4. **Engage**: The fourth step is to engage with targeted stakeholders through methods such as surveys, focus groups, or one-on-one interviews to gather their input and feedback.

5. **Monitor**: The final step is to monitor the effectiveness of implemented strategies on the stakeholders and identify if any changes or shifts in stakeholder needs and interests appeared.

Where the previous chapter focused on getting a deep understanding of the background of the problem and specific challenges at play in the Sloterdijken area, the next chapter will focus on the process of working towards the development of our product and an initial prototype. For this part of the research, a Living Lab approach is used to structure the rest of the report. In this chapter, we will first shortly elaborate on the Living Lab approach. Afterwards, we walk through the different steps and plan objectives of the Living Lab approach that have been adopted which guided our way to our product in the next chapter.

2

Process

A Living Lab Approach

A living lab approach is a user-centred, open innovation ecosystem that involves public-private-people partnerships (Schliwa & McCormick, 2016). It integrates research and innovation processes in real-life communities and settings and aims towards innovation, knowledge development, and urban sustainability (Steen & van Bueren, 2017b). To achieve this, it is important that all the participating stakeholders in a living lab have decision-making power. A Living Lab circle is characterised by different steps as shown in figure 10. Before starting the Living Lab circle, there is a process of initiation which is similar to the steps taken in the previous chapter. After completion of the circle, there is a replication phase which will be touched upon at the end of chapter 3. When looking at the actual steps of the Living Lab circle, the steps are plan development, co-creative design, implementation, evaluation, refinement, and dissemination. These steps however do not have to appear in that order, and living labs are a continuous cycle of iterative processes in which you switch between the different steps (Steen & van Bueren, 2017a). For structuring this chapter on our process and also the development of our product (Chapter 3), the different steps taken according to the circle will serve as a guiding structure. For each step, we will first explain what the step entails followed by what we have done in our research. Additionally, we elaborate upon the skills we adopted from the process.

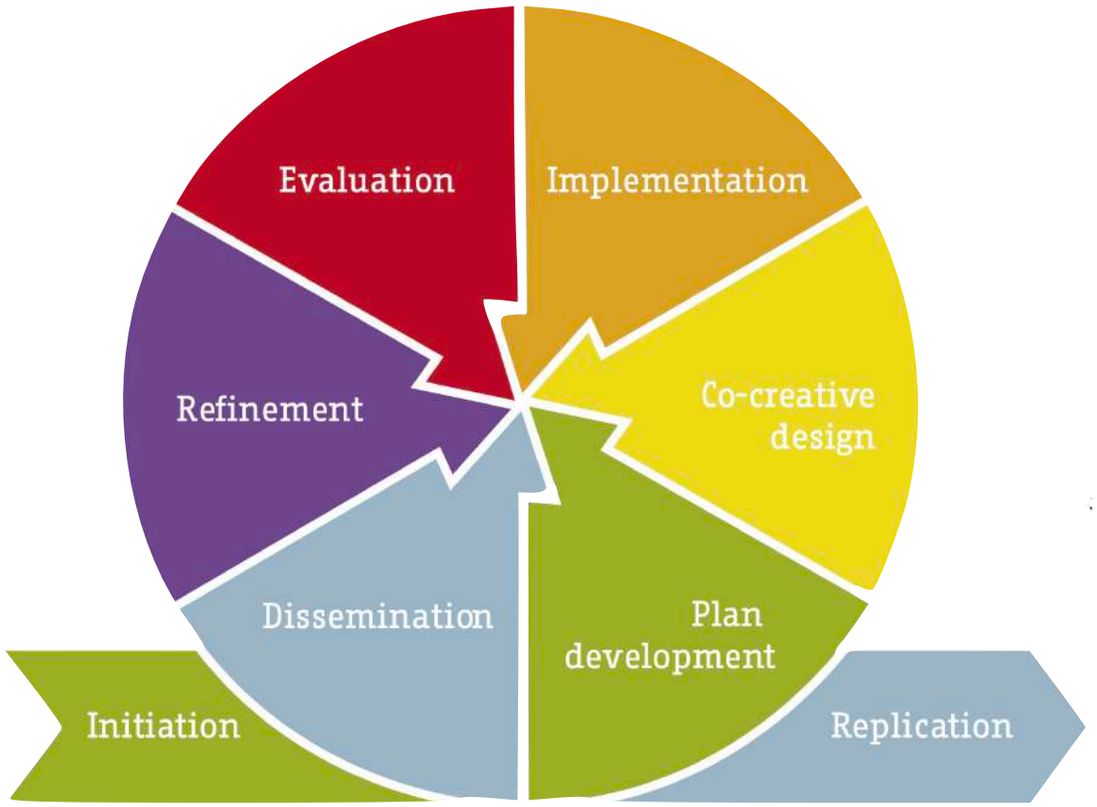

Figure 10. The Living Lab circle

2.1 Plan Development

During the plan development phase, the goal is to generate a first idea and direction for a potential product to develop (Steen & van Bueren, 2017a). As aforementioned, considering and understanding stakeholders is generally agreed upon as one of the most critical parts of any change initiative (Murray-Webster & Simon, 2006). Therefore, during the plan development phase, we tried to identify our stakeholders who were involved in the project and who were considered to be essential regarding active stakeholder involvement. In our living lab, stakeholders are defined as persons or groups whose interests and activities strongly affect and are affected by the issues concerned, who have a 'stake' in a change, who control relevant information and resources and whose support is needed to implement the change (Morgan & Taschereau, 1996).

Stakeholder Overview

In the context of a Living Lab approach, stakeholders can be broadly classified into four categories: public actors, knowledge institutes, private actors and users (figure 11). In our project, we identified the following stakeholders as essential to consider throughout the entire process towards designing a final product:

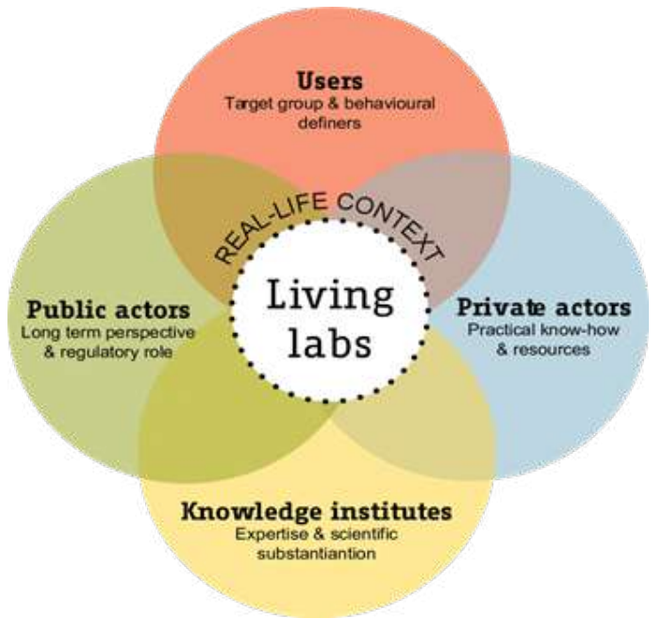

Figure 11: Stakeholders in LL (Steen & van Bueren, 2017a)

Public Actors

First, the municipality of Amsterdam is considered, which is aiming for a more climate-resilient city to secure and protect its citizens and economy and thus plays an important role in promoting climate adaptation in business parks. They are an important stakeholder to take into account as they can, for example, develop and implement policies and regulations, provide funding for adaptation projects, facilitate collaboration and provide information on the topic.

Secondly, the Green Business Club (GBC) was involved from the beginning onwards. The GBC Netherlands is an impact organisation that promotes sustainability collaboration in specific office areas, which started twelve years ago in Amsterdam South and now has grown to sixteen local clubs, such as GBC Sloterdijken. The GBC Sloterdijken works together with local businesses to make a sustainable impact by sharing knowledge on concrete projects in the field of sustainability, including climate adaptation and fostering cooperation between businesses. The GBC played a key role in our project by sharing our Living Lab challenge within their network and connecting us with relevant stakeholders. They also provided a platform for us to present and share our ideas and developments throughout the project, which allowed us to receive feedback and improve our process. The GBC's network and effort were valuable assets to our project, and their collaboration was instrumental in its success.

Knowledge institutes

These are individuals, organisations, or institutions that specialise in researching and providing guidance on climate adaptation in business parks. For example, in our project, we consulted with experts such as Waternet, Samen Klimaatbestendig, and the Rebel group, who brought a wealth of expertise, resources, and insights to the table. Their knowledge and experience helped us to explore the possibilities of climate adaptation in business parks and to find effective strategies for it. These experts and organisations are valuable partners in climate adaptation projects, as they bring a deep understanding of the challenges and opportunities related to adapting to the impacts of climate change in business parks.

Private Actors

First, SPATwater is considered, as they are the case owners of this project and have a professional interest in the successful development of a product. Additionally, the companies within the area of Sloterdijken that are potentially affected by the results of the climate adaptation in their business park are informed and consulted, who are included in our target group and linked to the user's stakeholder group below.

Users

The users are the individuals that will use our final product that is developed in the living lab. The users are previously defined as our target group of this research – everyone that uses Sloterdijken in a professional capacity - on which specific focus was given within this living lab project.

During the entire project, starting from the development phase, we had to interact with a great variety of stakeholders having different interests and needs towards the project aim. As our aim was to constantly collect their opinions and input to shape a shared vision and jointly design the process, we learned to build trust and relationships with our stakeholders. With this, we were able to develop and evolve the ideas we already had through cooperation and changing our direction when needed. E.g., SPATwater, our case owner, was really eager to have a stakeholder map, so we discussed with other stakeholders such as the Green Business Club about the feasibility and relevance of a stakeholder map of our target group, and together we decided to opt for that.

Stakeholder Mapping

Throughout the living lab process, we continuously engaged with all the stakeholders identified above, but we particularly focused on our target group as they have not yet been studied in the context of climate adaptation (Macke, 2022). To better understand this group, we performed a detailed stakeholder mapping according to the Stakeholder Circle Theory, to gather information about their needs, preferences, and potential impacts on our project. This stakeholder mapping served as the foundation for our plan development, helping us to create a production direction that was tailored to the needs of our target group by engaging with and understanding the perspectives of our target group.

Identify Stakeholders

To get in touch with our target group, an extensive list of all businesses in Sloterdijk was created and updated regularly based on a thorough analysis of Google Maps - in which all registered businesses were added, and several site visits - from which certain businesses were added or removed based on actual presence. In total, 247 companies were discovered and added to the list, including relevant information about the company, such as the name, address and contact details.

Prioritise Stakeholders

A common technique to prioritise stakeholders within a certain change initiative is by mapping them on a matrix based on power and interest (Mathur et al., 2007), to identify the stakeholders that have the largest direct impact as explained in the Stakeholder Circle Theory. To acquire data from the companies on their power and interest in the topic of climate adaptation, a survey was created with 20 questions. The survey was created and published using Google Forms, which was afterwards sent to all 164 companies in the stakeholder list from which the email addresses were known. Besides, multiple posters with a QR-code leading to the survey were spread around the area of Sloterdijk and company visits were performed in which employees were asked to fill it in.

The survey primarily consisted of multiple-choice questions or statements related to either power or interest, which could be answered using a Likert scale – specifying the level of agreement or disagreement from 1 to 5 on a symmetric scale. An overview of the survey is provided in Appendix A. This appendix includes the questions that were designed to assess the level of power and interest of stakeholders and provides an explanation of why that question is used for its purpose. In that appendix, the method of how we calculated the total score for power and interest for each business based on their responses is explained, which allows for the visualisation of stakeholders in the matrix. In total, 27 companies responded to the survey.

Visualise Stakeholders

Based on the survey results, a stakeholder map was created (figure 12). On the X- and Y-axes it is shown how much interest and power employees of certain companies think they have regarding climate adaptation. In the graph, stakeholders are mapped on the power/interest grid and placed into a quadrant with a recommendation on how to engage with them throughout the project. This is a recommendation for anyone working on climate adaptation or similar projects - it tells you what companies to keep satisfied, manage closely, monitor or keep informed. Such an analysis will promote effective dialogue with all stakeholders and serve as a guide for building the right relationships (Styk & Bogacz, 2022).

Although only approximately 11% of the companies that were included in the stakeholder list of Sloterdijken replied to the survey, this map gives an indicative answer on where other companies are possibly located on the axes of interest and power. From the stakeholder map, it can be derived that the largest number of companies are in the 'keep informed' part. This entails that there are companies with considerable power, but they have little interest in climate adaptation, which is in line with our findings in the problem analysis. This visualisation is therefore used as a starting point on the discussion of their relation to climate adaptation in the business park of Sloterdijken.

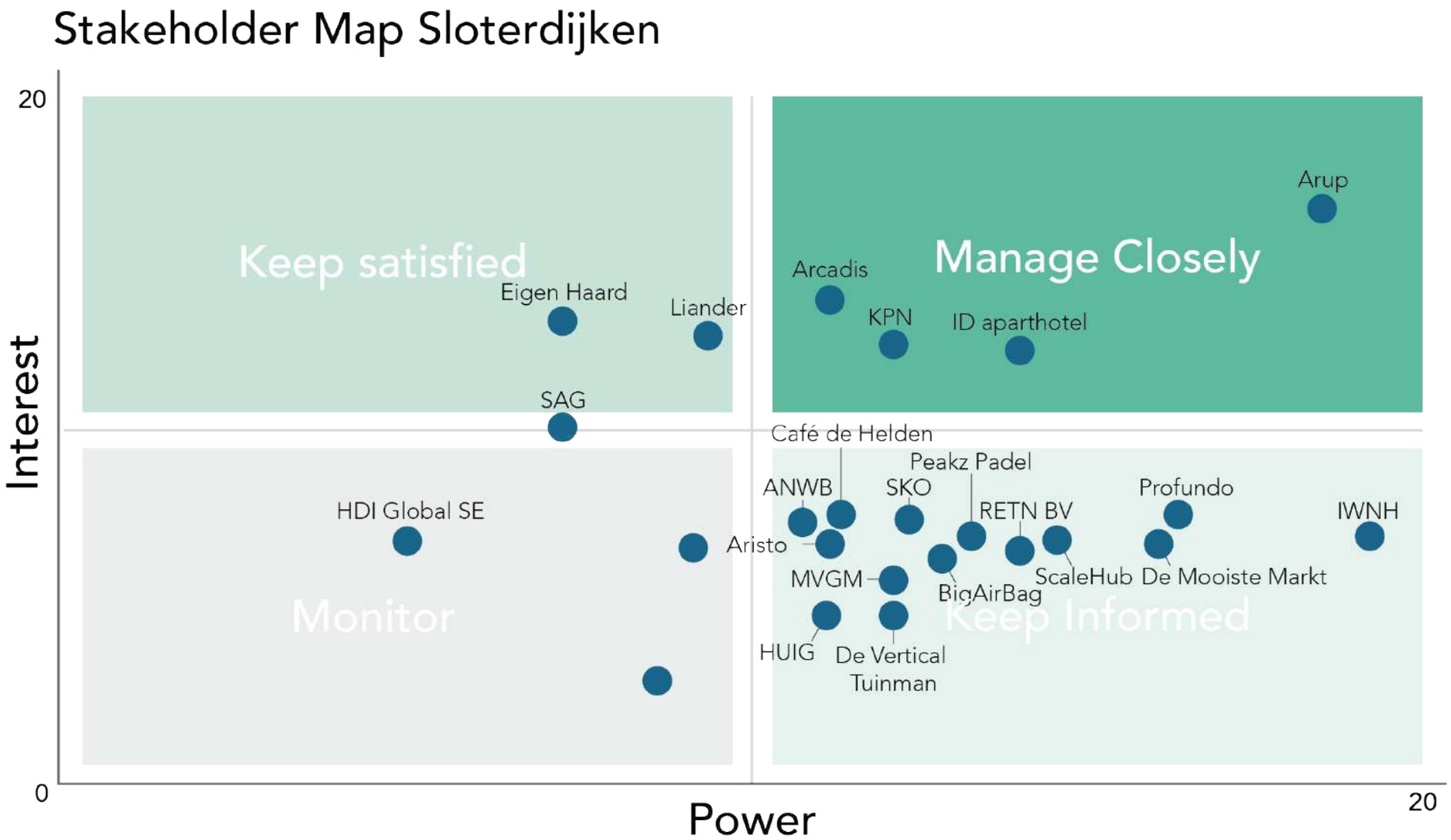

Figure 12: Stakeholder Map Sloterdijken

To achieve our goal of active stakeholders' involvement to kickstart the movement towards climate adaptation, it would be ideal if everyone in our target group were highly interested in climate adaptation and had the power to make a change. How to move stakeholders into this "manage closely" corner, is the question that remains to be solved further during our research. An interesting insight that showcases a potential increasing interest in climate adaptation is that one-third of the respondents indicated that they wanted to get to know more about the GBC and were potentially willing to become a participant and cooperate with them. By further engaging stakeholders and providing them information and resources they need, we can potentially increase their involvement in further climate adaptation efforts. To do so, a co-creative design is used which is elaborated upon in the section of engagement experiment and co-creation.

Developed skills during stakeholder mapping

Different skills have been developed during the engagement experiment, both on an academic and personal level:

Academic

The stakeholder mapping provided a good opportunity to develop our data handling skills and use of the software R. The basis of the stakeholders map has been created with this software which helped us to not only develop our quantitative research skills and not only qualitative.

Personal

For the stakeholder mapping, we went on the streets and into companies offices to spread a poster with a QR code to the questionnaire. It gave us insight into a practical aspect of doing research and convincing people to hang up the poster and fill in the questionnaire. What we have learned is that the poster did not necessarily work, as people were more prone to fill in the survey when you would engage into a conversation with them.

Other survey results

Aside from the stakeholder mapping, some survey results gave valuable insights into how climate adaptation is perceived among businesses. For example, 62.9% of the respondents indicated that they disagreed or fully disagreed with the statement that enough information is provided by the municipality on the risk of climate change on their building office. This indicates the importance of increasing the knowledge of our target group on the need for climate adaptation. Additionally, 66.6% did not agree or did not fully agree to the statement that the impacts of climate change will pose a future risk to their office buildings. However, it is clear from different tests executed by the Municipality of Amsterdam that the area is vulnerable to these effects as was visible in figure 3 and 4 in the Background and Context part of this report. Apparently, the stakeholders are not aware of the potential threats and damage that extreme heat and extreme weather can cause. Lastly, 80.8% of the respondents indicated that the owner of the office building was considered as the main responsible for making the office building more sustainable, making them therefore likely also responsible for climate adapation.

Product Direction - The Triple E Framework

Before entering into the co-creative design phase, we ended the plan development phase by synthesising all the findings of the problem analysis and stakeholder mapping into a framework consisting of three components to act as a direction for our product. The three components of the framework are to educate, engage and empower our target group. These three components were chosen for different reasons:

Educate: as learned during the problem analysis phase, businesses in the area suffer from a general lack of knowledge on climate adaptation. Connected to that is a low sense of urgency, even though it is known that some businesses are currently located in areas that are more exposed to risks coming from the effects of climate change. Also from the surveys sent to the businesses as part of the stakeholder mapping, it became apparent that local businesses and their employees are not aware of the threats or opportunities when it comes to climate-related challenges. Therefore, having a strong educational part in our product is an important first component.

Engage: from our interviews, it became apparent that one of the barriers towards implementing climate adaptation is the lacking sense of responsibility among people working in the area. Also, the stakeholder mapping showed that the largest portion of businesses are currently in the 'keep informed' part of the stakeholder mapping which means that if their interest would be increased, they would become more valuable stakeholders in making the area climate adaptive. To spark a change and kickstart a climate adaptive movement, it is, therefore, necessary to engage our target group on the topic to decrease the lacking responsibility and to move more employees and businesses towards climate adaptation.

Empower: our target group should not only be educated and engaged but also be provided with the tools to eventually take action. Through our interviews in the problem analysis phase, we have learned that climate adaptive projects are complex with many different stakeholders that need to be involved, convinced and aligned. For this, it is important that our target group is provided with the right tools to actually make a change when engaged and educated, for example by means of more insight into the financial side of climate adaptation as this is currently one of the main challenges.

Figure 13 provides an overview of our product direction with which we will enter into the co-creative design phase.

Figure 13. Triple E Framework

2.2 Co-Creative Design

Once the product direction and Triple E framework were established, it was possible to move into the co-creative phase of the Living Lab circle. When creating a product following a living lab approach, it is vital to work together with your target group and stakeholders to gather input through different methods in the form of co-creative design (Torfing, 2016). To develop the different parts of the Triple E framework, two different methods have been adopted to come to a co-creative design. In the following part, we will first explain the different steps taken for an engagement experiment executed with our target group. Although this experiment focused mostly on the Engage element of our framework, it also gave an opportunity to Educate our target group and to gather valuable extra input on their thoughts and beliefs on the topic. Next, a co-creation session was organised in which we brought together local government, businesses, business clubs and knowledge institutions. During the session, the focus was on collectively developing the Educate and Empower components of our Triple E framework. Both parts will end with key lessons from both methods as well as our own personal learnings and skills acquired.

Engagement experiment

Designing the experiment

The engagement experiment follows from step four and five of the Stakeholder Circle Theory as previously explained and adopted in the stakeholder mapping. The aim of the 4th step of the Stakeholder Circle Theory is to engage with stakeholders through effective and directed communication tailored to that specific group (Bourne, 2016). Afterwards, the effectiveness of the communication should be monitored according to step five (Bourne, 2016).

Figure 14: Team member with a rationally styled poster

The goal of the experiment was to measure the effect of different types of communication styles (step four) on the likelihood of our target group participating in a climate adaptive project through a pre-and post-experiment survey (step five). By reviewing existing literature on different communication styles and through information gathered in the conducted integ climatic changes. As explained by Macke (2022), an effective method to engage local businesses with the topic of climate change is to inspire businesses on how they can contribute to changing their surroundings into a healthier, better-looking, greener and more flourishing environment. Also in de Waarderpolder, which is a (self-proclaimed) successful case study of a climate adaptive business park, he importance of continuously inspiring local businesses on the possibilities for their surroundings and putting front runners in the spotlight has shown to be an effective way of engagement communication (Verstraete, personal communication, 2022).

Rational communication style

This communication style is grounded in the belief that communication about climate change-related issues is most effective when presented in a highly fact-based manner, with facts and figures telling people about threats of climate change, but also the possible solution (Arlt, Hoppe & Wolling, 2011). This approach is rooted in the assumption that businesses act on a rational basis and are mostly focused on maximising risks versus rewards. As put by Crick et al. (2018, p.6): "General motives for private sector adaptation to climate change include keeping costs down, minimising disruption to production and services, maintaining or increasing value and profitability, and improving capacity to do business". According to Davies et al., 2018, in the case that businesses would be willing to invest in measures with more ecosystem services, a clear business case should be presented upfront with costs and (financial) benefits. This communication style was also further substantiated through expert interviews in the beginning phase of this project, which underlie the importance of making the effects of climate adaptive measures highly tangible. Questions such as: 'How much will it cost? What are the tangible effects in terms of litres of water storage or energy saving? Is there a return on investment?' are essential to answer (Voeten, 2022; Bult, 2022).

Inspirational communication style

This communication style is inspirational and plays into the sentiment (Manzo, 2010).The effects of climatic changes are often perceived with little sense of urgency and as something that will affect people far away and not the people themselves and their direct environment (Leiserowitz, 2006). Lorenzo et al. (2007) state that to combat climate change this missing sense of urgency and limited involvement with the topic on an emotional and individual level are found to be an essential and often missing link for creating behaviour change. To back this, Roeser (2012) argues that whereas emotions are generally left out of communication and policy creation because of their irrational nature, using sentiment and emotional attachment to the topic is the missing link in effective communication regarding climatic changes. As explained by Macke (2022), an effective method to engage local businesses with the topic of climate change is to inspire businesses on how they can contribute to changing their surroundings into a healthier, better-looking, greener and more flourishing environment. Also in de Waarderpolder, which is a (self-proclaimed) successful case study of a climate adaptive business park, the importance of continuously inspiring local businesses on the possibilities for their surroundings and putting front runners in the spotlight has shown to be an effective way of engagement communication (Verstraete, personal communication, 2022).

Communication experiments can take different forms. Through extensive research of different papers, the experiment for this Living Lab will be created on the basis of a previously conducted experiment on the topic of climate change in which different communication styles were tested through a poster experiment. (Roser-Renour & Maibach, 2018; Schroth, Angel, Sheppard & Dulic, 2014; and Devine-Right, 2013). Although each of the experiments was performed in a different way or form, these experiments all attempted to show what the preferred way of communicating and tone of voice was in influencing people's attitudes and subjective norms. Therefore, we designed two posters for this experiment. In both posters, the same type of measures are proposed (adding a green roof, a row of trees/greenery and transforming normal parking spaces into green water-absorbing parking spaces). For the rational approach, the poster portrays the problem and proposed solutions in a very factual manner with clear numbers for the problems and calculated costs and benefits for the different solutions implemented but without imagery. These costs and benefits are calculated with an excel model that was built for this Living Lab for which the background sources and assumptions can be found in Appendix B. The inspirational approach shows a before and after visualisation of what the area could look like when these measures were to be implemented. Figure 15 shows the rational poster and figure 16 shows the inspirational poster used in the experiment. Although this experiment was devised for gaining more knowledge on the *Engage* part of the framework, it also posed an opportunity to *Educate* our stakeholder group directly.

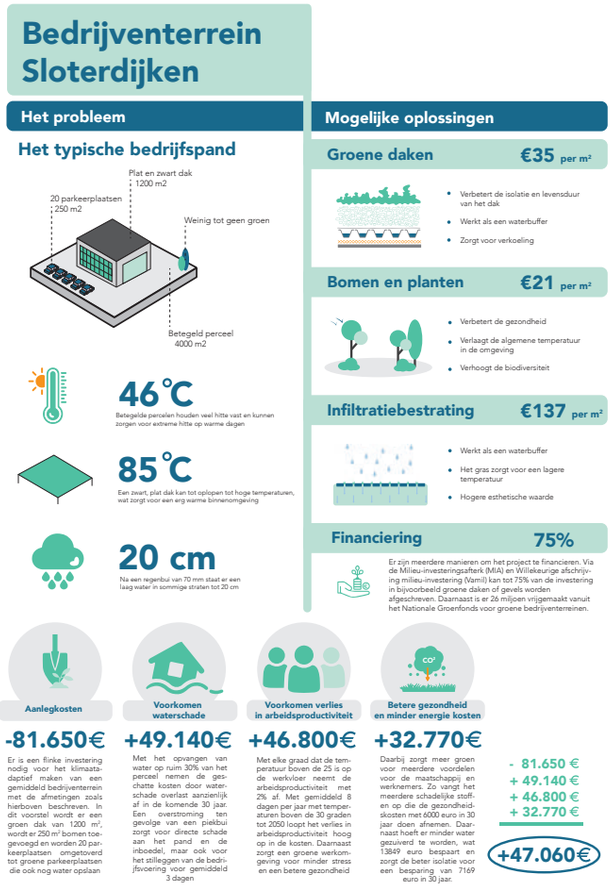

Figure 15: Rational Poster

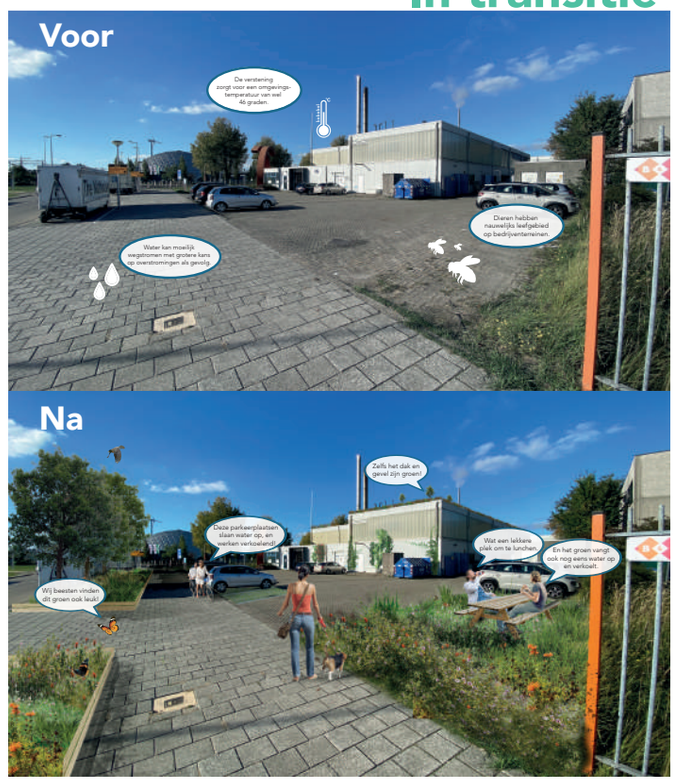

Figure 16: Inspirational Poster

Designing the pre- and post-experiment survey

A way to monitor the effectiveness of these two communication styles is a pre-and post-test survey (O'Neill & Hulme, 2009; Godfrey & Feng, 2017). The pre- and post-experiment survey used in this project is grounded in the Theory of Planned Behavior (TPB) and is based on provided guidelines on how to construct a theory of planned behaviour questionnaire by Ajzen (2006). In the Appendix, more background information on the TPB and information on how the survey was constructed can be found. The survey tests a measure of belief and the value attached to this belief. The measure of belief is focused on whether it is very unlikely/likely that the respondent would contribute to making Sloterdijken climate adaptive. The statement regarding the value then focuses on whether it was good/bad to contribute to climate adaptivity. Both statements were tested against a 7-point Likert scale. A more extensive explanation of the setup of the survey and the steps followed to execute it can be found in the Appendix.

Gathering and analysing the results

The experiment was set up at the Spar in front of the Sloterdijk station during 12:00-13:00, as this is the main location where people working in the area, our target group, go get lunch. During the experiment, we focused on showing an open and transparent attitude towards our target group and using appropriate language to approach them, to build trust among each other. The experiment has been conducted three times, on 31-10-22, 10-11-22 and 11-11-22 with a total of 41 respondents of which 22 have been shown the inspirational poster and 20 the rational poster. Figure 17 gives an overview of differences in responses, where the numbers on the y-

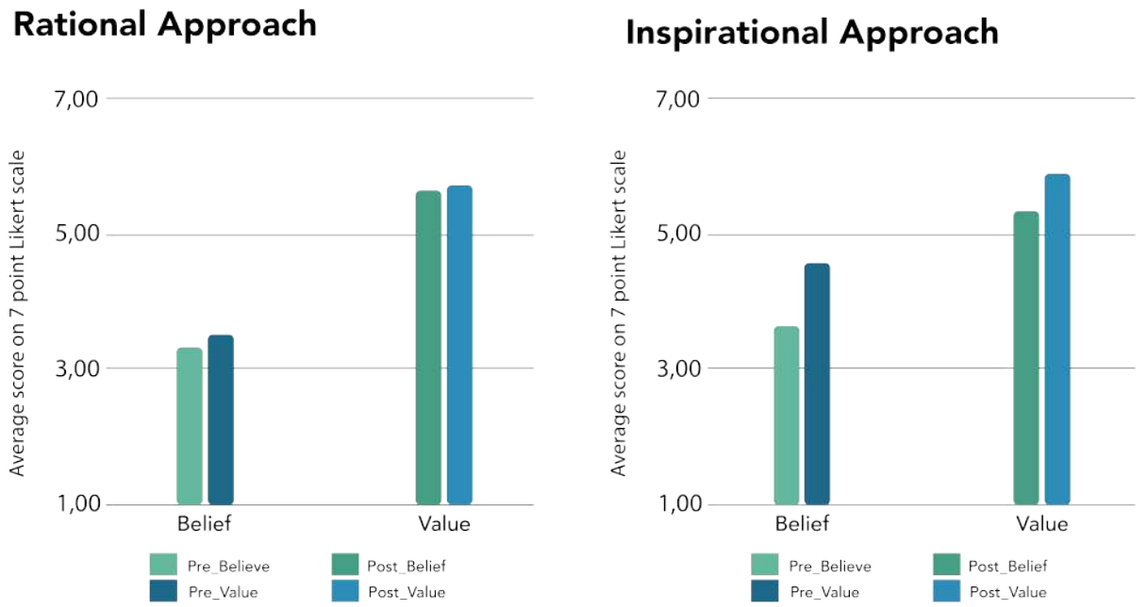

Figure 17: Results of both approach

axis indicate the average score on the 7-point Likert scale (1 being very unlikely - 7 being very likely for belief and 1 being bad and 7 being good for the value of this belief).

From the results of this survey, it can be concluded that both the rational as well as the inspirational approach have a positive effect on the likeliness to contribute to a climate adaptive project in Sloterdijken but that the inspirational approach has a larger effect (26,25% increase for the inspirational approach as compared to 6,35% for the rational approach). This stronger effect is also visible when looking at the value that is given by the respondents (whether it is good/bad that they contribute to a climate adaptive project in Sloterdijken) as with the inspirational approach, the increase in value given to this is larger (10,17% increase for the inspirational approach as compared to an increase of 0,93% for the rational approach). Due to the size of the test group, it is not possible to say whether these results are statistically significant.

Takeaways for end-product

When it comes to the engagement part of the product, the experiment has shown that an inspirational approach in which possible changes are visualised is more effective towards engaging our target group of people using Sloterdijken in a professional capacity with the topic of climate adaptivity. These findings can be used throughout our tool and our other parts of this tool like education, where conveying the message in an inspirational way can lead to higher levels of engagement.

Developed skills within engagement experiment

Different skills have been developed during the engagement experiment, both on an academic and personal level:

Academic: We developed our knowledge of communication styles. Being involved in the MADE program that actively focuses on sustainability from a more technical and engineering perspective, it was very interesting to learn more about different communication styles that exist and the nuances that apply to different target audiences. We learned that having the correct knowledge is of course vital for making the correct change, but that this is not necessarily how you should convey the information.

Personal: The engagement experiment was really hands-on as we were physically on the street trying to get people to participate in our research subject and spark their interest. This practical aspect was different from our normal academic experience and put us out of our comfort zone. Although slightly awkward at first we had to accept the uncertainty of how our target group would respond, and eventually it felt good to experience that you have made a some impact by interacting with people on the topic and we learned that on the street level, you learn considerably more from interaction with people than you could while spending time behind your desk.

Co-Creation session

Next to the engagement experiment, the second part of our co-creative design process was focused on hosting a co-creation session. Where the main focus of the experiment was on the Engage part of the Triple E framework, the focus for the co-creation session was on the Educate and Empower parts. The co-creation was divided into two rounds: a creative brainstorming round based on the 'Cherry on Top' Method to focus on how our target group could be best educated and a round of role-playing to focus on how to best Empower our target group. In the following part, the reasons for choosing a co-creation session as a co-creative design method will first be explained followed by a summary of the session.

The need for co-creation

Creating climate-adaptive business parks is a multi-stakeholder affair and although the target group for our product is one stakeholder group, the perspectives of the other stakeholders cannot be overlooked in designing our product. A co-creation session brings together knowledge institutes, local governments, businesses and society and is grounded in the principle to involve all relevant actors in the collaboration, allowing them to share their knowledge with each other and thus learn from each other (Torfing, 2016). A co-creation session promotes a culture of innovation because people who are normally not involved are now heard, which helps to create a change from the bottom-up (Sørensen & Torfing, 2015) which is also the focus of our research. Because co-creation sessions allow for participatory practice to be incorporated (Eckhardt, J. et al, 2021), it allows us to gather input for our product that is tailored towards a specific target group, but also ensures that it is congruent with the wants and needs of other stakeholders involved.

The setup of the co-creation session

Our co-creation session was hosted in 'De Buurtkamer', the local community centre of Sloterdijken. To ensure a successful co-creation session, Steen & van Bueren (2017) state that the participants who at least need to participate are private actors, public actors and knowledge institutions. During our co-creation session, 10 participants were present ranging from local employees (3), experts in the field of climate adaptation and water 3), representatives from the governmental bodies (2) and representatives from the local business association. Among them, a representative was present from Arcadis, one of the companies indicated as the ones we should 'manage closely' as part of our stakeholder mapping. In line with the Living Lab Way of Working strategy, the setting was kept informal: there was tea, coffee, cookies and some music playing in the background (Steen & van Bueren, 2017b). Also, an introduction presentation was given built around the principles of the Facilitator's Guide for Co-Creation Sessions (Mulder & van den Berg, 2019). We explained the why's of our research and context, and what we have done so far but also expressed our own knowledge limitations to foster an environment of trust. During the rounds, we led and guided the conversation but also provided scaffolds and a clean slate, as proposed by Sanders & Stappers (2008). Next to 1-2 team members adopting such a guiding role, the other team members would sit down during the two rounds with the groups to take notes and provide a supporting - but not an intervening - role.

First round: Cherry on Top method

The first co-creation method used was the Cherry on Top method which allows getting the conversation to go and provides structure. The purpose of the working form is to find out common points/images of a group of participants (with different backgrounds) and to get creative ideas flowing (SLO, 2019). The goal of this first round was to focus on how our target group could be best educated on the topic of climate adaptation in business parks. This method was chosen because information about climate adaptation is abundant, but new creative ways are needed to educate our target group on this subject. The participants of the session were divided into groups of 4-5 and were given five minutes to come up with as many ideas in silence and place them on a quarter of a ring, or figuratively a 'piece of a pie'. After coming up with as many ideas as possible, the group was given 10 minutes of discussion on their ideas. The group decided together which ideas were the best and

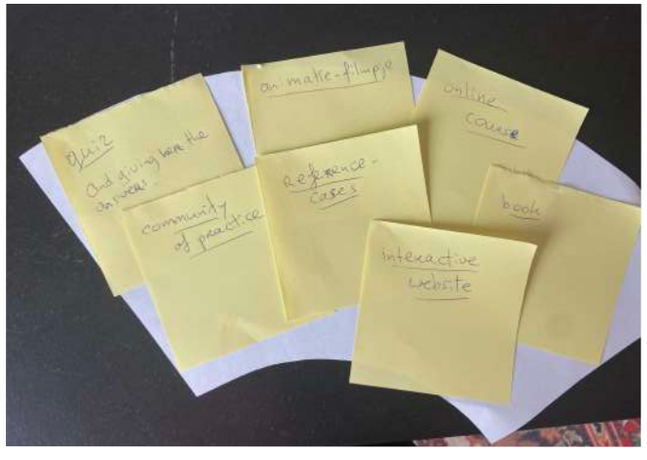

Figure 18. Output from Cherry on Top

they put them in the middle of the ring, or figuratively the 'cherry on top' which can be found in Appendix D. Afterwards, all different groups were asked to present their discussion, of which table 2 provides the main results. A more detailed overview of the results can be found in Appendix D.

Group 1	Group 2
o Organise a competition/action o Specify your approach on your target group o Unify all people who are motivated to undertake action. Make them organise events (such as a rooftop tour) o Concrete call to action/info	o Create a campaign that 'sticks' o Repeat this campaign (with a link to a website) everywhere. Especially in public places such as public transport hubs and toilets. o Let people have a say in what will happen to the area by voting.

Table 2. Main result of Cherry on Top method

Takeaways for the end product

Although the results of the two groups are quite different, there seem to be some overlapping conditions for how the focus group should be educated. Both groups seem to think that making education interactive will make people more enthusiastic about learning. Group 1 suggests organising a competition, and Group 2 goes a step further by stating that it would motivate people to learn if they can actually influence the process. Another lesson that can be drawn from these results is the need for a platform for climate adaptation. Group 1 makes this very clear by suggesting that people who are motivated should unite, while Group 2 strives for a campaign that draws motivated people to one place (in this case, a website), where they can learn. The last crucial takeaway is noted by Group 2 - education should be available for everyone, and therefore should be displayed both in private and public places.

Second round: Role Playing method

During the second part of this co-creation session, it was researched how the focus group could be empowered. The format of this second part was a roleplaying game. Although the focus of the study was on finding out how the focus group could be empowered, lessons were also learned on how to engage and/or educate them.

For constructing the role-playing activity, the guidelines by Madsen & Nielsen (2009) were used as they allow for creating shared understanding and the generation of new ideas. This guideline consists of three components: the product, the procedure and the goal which are all adopted

Figure 19. Role playing cards

Figure 20. Impression of co-creation

in different ways. The product is the different roles that are developed, the procedure is the way the role-play is conducted, and the goal is what the roleplay needs to produce.
The first component for our roleplay (the product) is the different roles and a description of a fictional persona which can be characterised as a 'typical' persona for that stakeholder group. Different personas have been created for this round including a local employee, a business owner, someone from an overarching business park organisation, the municipality and a property owner. In Appendix D, the different persona can be found. For the second component used to set up our role-play (the procedure), the participants were split into two groups and were playing out a scenario in which they all had one of the aforementioned roles. The scenario was that a working professional from Sloterdijken named Kelly wanted to install a green roof. In one group, Kelly was just an employee, in the other Kelly was an entrepreneur with her own business which was done to diversify the perspectives. Appendix D gives an overview of the different roles and scenarios. The third component of the role-playing activity (the goal) was for Kelly to discuss with the different actors. Two things should emerge in the conversation: what does the stakeholder need from Kelly? And what does Kelly need from the stakeholder? For each stakeholder, around five minutes of conversation with all the participants and their different roles were given. With that, the groups had to make a roadmap of which stakeholder groups to approach first and which tools they needed from Kelly and present the roadmap to the other group in the end. The full roadmaps can be found in Appendix D, but the key takeaways were as follows.

Key takeaways for the end product

The two groups' roadmaps have strong similarities. The first thing they do is make contact with others - with the municipality or with other companies. The reasons vary, such as to gather information or to start a plan. They also agree that Kelly needs to have sufficient knowledge about climate adaptation before taking the next steps. Then they both turn to a network to find out if there are people with the same mindset. In this way, they increase their network, power and knowledge. These first two steps enable Kelly to take her plans to the next level - she can present them to her boss or to the municipality. After presenting these plans, Kelly hopes to get funding and a 'go' for her plans. The final step is to discuss the fully developed plan with the building owner, who will then decide whether the climate adaptation measure can be implemented in their building.

Developed skills within engagement experiment

Different skills have been developed during the co-creation, both on an academic and personal level

Academic We learned a lot from experiencing the synergies that take place when putting different stakeholder groups in the same room. We were aware and knowledgeable on the theory behind it, but actually seeing it happen in practice was a far more powerful learning experience. Our participants ended up requesting that we would connect them outside of this project as well because they wanted to work collectively on climate adaptation in the region which showed us what such sessions can accomplish.

Personal: The preparation for the co-creation came with the necessary stress. We were aware that our preparation time was short and somewhat lacking communication between group members on the different tasks causing the necessary strain on the preparation. In the end, we managed to successfully prefer and host the session and we learned that clear communication on the division of tasks is important, even more so when deadlines are approaching fast.

3

Product

Product development is an essential part of the living lab cycle, which consists of four main steps: implementation, evaluation, refinement, and dissemination. These steps do not necessarily occur in chronological order and may be iterative, with each step informing and influencing the others. In this chapter, we will guide you through the various steps we took to come to our final product. Note; these steps did thus not necessarily all occur in chronological order.

Throughout the design process, it was constantly kept in mind that the product but also the design process should be or contain..

- User-centred
- Co-creative element
- Iterative
- An innovative component
- Sustainable
- Scalable
- Measurable impact
- User adoption
- User engagement

3.1 Initial product design phase

After input was gathered during the design process phase, we moved on to product development. Product development is an essential part of the living lab cycle, which consists of four main steps: implementation, evaluation, refinement, and dissemination (Steen & Van Bueren, 2017b). These steps do not necessarily occur in chronological order and may be iterative, with each step informing and influencing the others. In this chapter, we will describe how we have shaped a prototype of our product and which basic requirements were taken into account based on our research and earlier submitted plan. Afterwards, we will explain how we have managed the Living Lab cycle steps to come to our end product.

Creating a prototype

As the period before starting the design of our final product was quite extensive due to large amounts of interviews and other types of data gathering, it gave us an opportunity to already substantiate and sketch some ideas for a final product. There were however basic requirements and limiting factors coming from our initial research and the objectives we have set for ourselves.

In our Living Lab Plan, we had set out four goals for our product. Two of the goals have become inherent to our product throughout the research itself. These are the goals that our product should engage stakeholders, which is one of the main elements of the Triple E Framework we have devised, and the other goal is to have a clear target group, which is something we have chosen earlier on in the research. The other two goals from our Living Lab plan were to have high replicability; the product should not only work in Sloterdijken, but in any other business park too. Also, a goal was to make a measurable impact. Knowing that we were to spend so much time on the project, the goal was to create a product that could live on after our Living Lab finished.

Keeping this goal of replicability and scalability with actual impact in mind, we decided to opt for a digital tool. A digital tool is easy to spread, which makes it highly replicable. Also, the advantage of being a digital tool is the ability to make changes to the content and update it according to the needs and experience of the users. In this way the outcomes can increase its efficiency, effectiveness, and satisfaction, which make it suitable not only in Sloterdijken but also in other business parks in the municipality of Amsterdam or other municipalities in the Netherlands. After consideration of different online tools (from expensive e-learning tools to free Qualtrics software that would not be online anymore after we would graduate), we decided to opt for a digital tool in the form of a webpage under the Wix Website licence of the AMS Institute to ensure that our product would be readily available in the coming years. .

In determining the content of the product we were highly focused on the initial findings of our research. As such, the product is connected to the idea and theory on stakeholder involvement and indirect influence, as discussed in chapter 1. The aim is to engage local stakeholders from our target group - such as an interested employee from a business and make them a kickstarter of a change process towards a more climate-adaptive business park as mentioned in the ToC. In our product steps, which will be elaborated on in

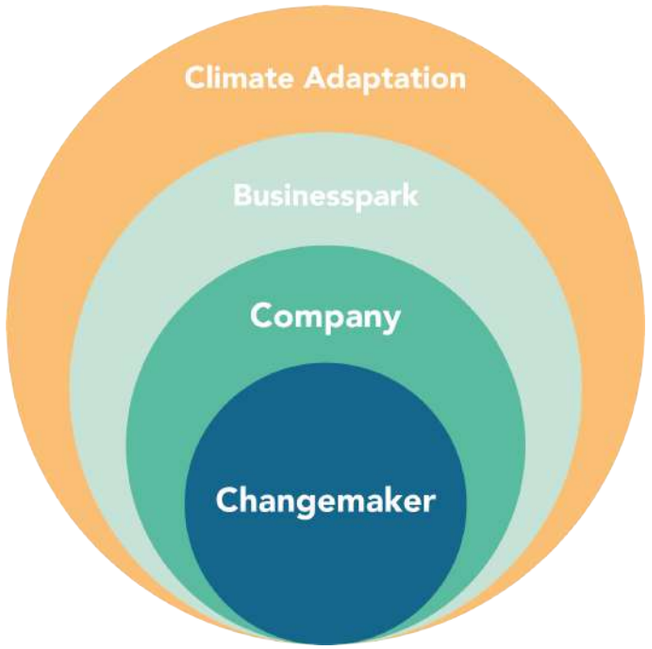

Figure 21: The different layers for change

the next part, they play the facilitating role in guiding this change and are educated, engaged and empowered to be the central actors, 'heroes' so to say of the process.

After being engaged, the next step for this changemaker is to tell the story to his/her colleagues within the company, as this is identified as an important step during the co-creation session. Not only is support from within the company necessary, but companies should also work together in the area, for example through overarching organisations. Through these different steps, the digital tool can foster change throughout these different layers (see figure 21).

The way this change is created is through five different steps that are presented in the digital tool. These are five easily followable steps towards kickstarting climate adaptation in any business park. The different steps and contents of the different steps are as follows:

1. KNOW THE PROBLEM

In the first step, the problem of climate change and business parks is further elaborated on. As became apparent through interviews with the local businesses and the survey sent to them as a part of the stakeholder mapping, most people working in the area are not aware of the potential risks posed to them. This first step is therefore focusing on reducing the problem of lacking knowledge as identified in the problem analysis of the research by first educating a change maker

2. BECOME PART OF THE SOLUTION

Now that the changemaker is educated on the problem, step two is focused on educating him/her on the solutions. Step two consists of four short knowledge clips on different climate adaptive solutions businesses could implement relatively easily on their own plot - green roofs, green parking space, vertical greenery and rain barrels. Providing simple, accessible and practical information about possible innovative measures was something we had learned during our co-creation. Also, throughout the knowledge clip, different inspiring photoshop imagery of measures is used as this has been found to be most effective during our engagement experiments. Next to that, a changemaker can learn in this step about the other stakeholders involved in such projects and how he/she can best work together with them. This was done because, throughout our problem analysis and co-creation, the importance of working together was always stressed and is considered as key importance within complex change initiatives. By doing so, a changemaker is educated, and engaged and is provided with implementable tools that empower them to make a change in their area.
next part, they play the facilitating role in guiding this change and are educated, engaged and empowered to be the central actors, 'heroes' so to say of the process.

3. SPREAD THE WORD

As making a business park climate adaptive is an effort that involves multiple stakeholders, the changemaker should be provided with the necessary tools to spread the word on the challenges and get his/her colleagues involved as well. From the role-playing part of the co-creation session, it has become clear that the changemaker needs to have simple and practical instruments to share knowledge on climate adaptation and convince colleagues and other stakeholders about the importance. Therefore, in this step, the changemaker is provided with different communication tools to do so. These are different conversation starters, a downloadable template that can be used as a workshop format, as well as a flyer template through which the debate can be sparked within the company and surroundings. By giving the changemaker these tools, he/she gets empowered to educate the rest of his/her surroundings within the company they work for.

4. CREATE YOUR NETWORK

Not only collaboration within the company is important, but also inter-company collaboration. A changemaker should be able to reach out to the other businesses in the area to get in contact, exchange information and decide how they possibly could work together. As found in the problem discovery, companies that work together have higher chances of successful implementation of projects. Also in the first round of the co-creation session, the possibility for the changemakers to unify was expressed as important. In our digital tool, a changemaker can therefore participate in a forum to get in touch with others and exchange knowledge.

5. BRING CHANGE TO YOUR AREA

In the last step, tools are provided to create a business case for the implementation of climate adaptation. Through a downloadable and interactive excel file, a changemaker can learn more about the different costs and benefits expressed in euros that are associated with implementing climate adaptive measures. By combining and reshaping existing information from online tools and by expert interviews, a specific financial model was created for the business park scenario. To learn more about the different sources, assumptions and instructions for the model, see appendix B. Although the inspirational approach has been shown to be slightly more effective in the engagement experiment, the importance of a better understanding of the business case has been stressed throughout the problem analysis phase by industry experts and in the co-creation phase, also as this is an important aspect for other stakeholders than our target group. Therefore, this step educates and empowers a changemaker. Next to the financial tool, more information is provided on possible financing structures offered by different municipalities because this was discovered to often be a challenge during the problem discovery phase.

Table 3 gives an overview of how the different steps related to our Triple E framework and where we got the input for the creation of the step.

Step	What does this step do or provide (3 E's)	Input for this step comes from which part of the research?
Step 1. Know the problem	**Educate** on the problem	**Problem discovery** - lack of knowledge (on the problem) and lack of urgency
Step 2. Become part of the solution	**Educate** on implementable solutions **Engage** through inspiring photoshop imagery **Empower** by providing implementable solutions and information on stakeholders	**Problem discovery** - lack of knowledge (on implementable solutions) **Engagement Experiment -** inspirational approach works best **Co-creation** - working together is key
Step 3. Spread the word	**Educate** fellow employees **Empower** the changemaker by providing necessary tools	**Co-creation -** contact with others and spreadable knowledge on the subject is important for all
Step 4. Create your network	**Empower** the changemaker to find others in his/her surroundings	**Problem discovery** - lack of responsibility **Co-creation -** a changemaker needs to be able to unify
Step 5. Bring change to your area	**Educate** the changemaker on the potential business case **Empower** the changemaker to acquire financial support from the national government	**Problem discovery** - lacking financial means **Co-creation -** providing more information on finance is always important

Table 3: Relation of prototype to Triple E framework and input sources

3.2 Implementation and evaluation

With a first prototype constructed, we followed the Living Lab steps of implementation and evaluation. According to the Living Lab methodology, the evaluation is conducted at two levels: the technical level, which refers to the interaction of users with the product, and the conceptual level, which involves evaluating the replicability and scalability of the product (Steen & van Bueren, 2017a).

The evaluation on a technical level was done during two different events. The first event was the CllimateCafé on the 6th of December, an online gathering of different experts from the field of climate adaptation (see figure 22). Different individuals were present ranging from SPATwater, the Green Business Club, Waternet, Arcadis, the Municipality of Amsterdam, Samen Klimaatbestendig and others, but also some external users that were not involved in the project before evaluated the process and the product. They had the opportunity to review and interact with the different parts of the digital tool and provided feedback on the content and design. The feedback gathered during this session was as follows:

- Regarding the financing options, it is not feasible to include municipal subsidy options as they are changing too much and you would never have an extensive list. Rather, focus on national-level financing possibilities.
- An integration with a business club is vital for the success of the tool. After we are done, the tool needs to be supported by one of the organisations involved in our research and this should therefore be discussed and integrated into the tool.
- In order to provide a complete package, also a blueprint of the co-creation session itself should be added.
- Language can be a barrier, as most people would prefer Dutch and the tool was currently fully English.
- Dissemination of the tool is important: how can you make sure people will know it and use it?
- In terms of the web page itself, it did not include enough imagery of business parks.

Another event at which we have presented and tested our tool as part of the technical level evaluation was the Green Business Club Sloterdijken Participants lunch on the 13th of December. From all the companies in their network, different representatives from the businesses were present. Being further in the process and having incorporated previous feedback points, the feedback was less extensive. Again, the problem of language was brought up as well as the question who would have ownership afterwards as these were considered valuable points. On a conceptual level evaluation focusing on replicability and refinement, the aforementioned comments on ownership and possibility to use the tool in the Green Business Club network were used as relevant input points for this type of evaluation.

Figure 22. Presenting at the ClimateCafé

3.3 Refinement

Another step in the Living Lab Circle is refinement, which means integrating the feedback from the previous stage to further develop our product. It is important to mention that these adjustments were suggested by various stakeholders in a co-creative way through testing and assessment, which is important for a living lab research. In the different steps, the following changes to our digital tool have been made:

- Throughout the whole webpage, the imagery has been tailored more towards business parks where possible
- A discussion was held with the Green Business Club and SPATwater on ownership and continuation of climate adaptation in the area. We have assisted in writing the Green Business Club policy goals for climate adaptation and have discussed the possibilities to grow with their country-wide network. In step 4, we therefore also incorporated a clearer contact form through which employees can get linked to their local business park. SPATwater indicated that they are interested in taking on the project further, as they already got a request from a different business park.
- The focus of financing possibilities on a municipal level has been left out of scope for step 5, but we focused rather on national-level financing options and incorporated those. This was also done because multiple stakeholders that municipal subsidies are subjective to change regularly.
- A translation is provided for the whole web page (excluding some of the downloadable documents and video content such as the knowledge clip).

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3.4 Dissemination

In the context of a living lab process, dissemination refers to the process of sharing the results, insights, and outcomes of the living lab project with a wider audience. This can involve presenting the findings at conferences, publishing articles in academic journals, or sharing the results through social media or other channels. The goal of dissemination in a living lab process is to share the knowledge and insights gained through the project with others in the field, as well as with the general public, in order to contribute to the development of new ideas, technologies, and solutions. Dissemination is an important step in the living lab process as it helps to ensure that the results of the project are widely available and can be used to inform future research and innovation efforts:

Figure 23: Testing the product at the GBC Participants lunch

1. Social media: the tool will be shared through our personal LinkedIn channels, through SPATwater, through the Green Business Club, through Klimaatadaptatie Nederland and likely through many other people that have been working together with us in the process.
2. Mailing list: in our process, we have attracted many interested employees of the business park that were willing to use this tool. For example as part of the awareness stunts, but also in the stakeholder mapping process. This has led to an extensive mailing list of over 100 people that will be emailed.
3. Through a launch event with our partners: different talks have been held with the Municipality to organise a launching event in ‘de

Buurtkamer', the local community centre in January. Also, the GBC suggested preparing an official launch event of the tool in which they could spread it to other local GBC.

Next to our own dissemination efforts, we hope the most substantial dissemination efforts will arrive from our discussion on ownership with SPATwater and them taking the tool further and the potential to spread the tool within the country-wide Green Business Club Network to ensure the actual impact that we envisioned in our Living Lab plan.

Throughout the report and the living lab process, new insights have been gathered and many decisions and assumptions have been made to come to the final product and this report. In this section, certain limitation and discussion points that require more elaboration are debated and critically assessed or justified. Additionally, recommendations for future research are presented.

4

Discussion & Conclusion

Target group

This project has gained new insights into how the stakeholder group of local employees can be involved in the process of making a business park climate adaptive, which was a stakeholder group that has not yet been researched before (Macke, 2022). This research excluded property owners as a stakeholder group, as they were difficult to reach out to despite several attempts. Nevertheless, as became clear from the conducted survey, property owners play a crucial role in climate adaptation in business parks as they are considered to be the most responsible for it. Future research should address this limitation by finding ways to effectively include property owners, maybe through as using personal connections or alternative ways of finding incentives for them to cooperate. In addition, residents were also excluded from our target group. Although they are becoming an increasingly important group due to large redevelopment plans (Municipality of Amsterdam, 2022), they do not have a vote in the implementation of climate adaption in business property which validates their exclusion.

Engagement Experiment

One topic that has been addressed in our project which was not yet researched in this context, is type of communication style that works best for this target group and setting. Although the engagement experiment generated interesting new insights, some challenges arose concerning reliability. Because of scope and time constraints, we were able to visit the area only three times which resulted in the test group being too small to be significant, which could potentially limit the generalizability of the engagement experiments. Furthermore, the posters were specifically designed for the use within Sloterdijken, which makes it not possible to use the exact same format in other business parks but it can serve as an example.

Stakeholder Mapping

Generally, the power/interest matrix is widely used to map the influence of a variety of stakeholders on a grid (Mathur et al., 2007), and not only the target group that we specified. Although this is an innovative approach that seemed relevant for the purpose of this living lab, it might hide important relations among other stakeholders that are important in change initiatives. Besides, the questions that were posed in the research and the transformation of the answers to power/interest values are based on acquired knowledge during the project, but not backed up by literature research or expert interviews. Nevertheless, due to time constraints and the importance to perform this analysis in early stage of our research, it is perceived relevant for further development of our project. Although replicability of this approach is difficult due to lacking academic support, it can serve as an example on identifying the importance of local stakeholders from our target group.

A pitfall related to reliability of stakeholder mapping was the relatively little response of 27 stakeholders (around 10% of the population), despite multiple efforts and repeated mailing. Besides, when processing the results, it was revealed that there were some stakeholders with much power, but low interest in the mapping, but paradoxically were very engaged in our process. De Verticale Tuinman (a local business) for example was highly involved in our process when he attended the co-creation session, but this was not reflected in the stakeholder map.

Co-Creation

During the co-creation, interesting new insights became apparent regarding on how to educate, engage and empower our target group, such as the steps changemakers have to go through before going to the managing board and the importance of having a platform to unite with other stakeholders and organise campaigns. The format that used during the co-creation is directly applicable to business parks, as the challenges perceived per stakeholders are generally the same everywhere (Hwang, Zhu & Tan). However, one feedback point that was provided was the fact that we did not sufficiently justify our choice for the target group and gave the participants a rather open environment to talk about stakeholders on business parks this resulted in a – later realised – timely discussion about the importance of property owners. Besides, most stakeholders were in favour of implementing climate adaptive solutions and were too likeminded. Nevertheless, it was really interesting to see how stakeholders were acting when they had to play in a different role.

Ethical considerations

To perform the research as best to our capabilities, privacy and consent were always taken into account throughout our interviews by asking for

permission to record, use their statements in the report and process the findings from it. Fortunately, we managed to get an actively engaged group of stakeholders it throughout the whole process and we perceived none to very limited ethical issues. The optimistic and enthusiastic collaboration and engagement of several stakeholders made this living lab project joyful and motivated us along our process.

Scalability and replicability

An important aspect of any Living Lab is the scalability of the product, which was also something we often experienced during our evaluation and refinement phase as feedback. Although many stakeholders - and for example attendants of the ClimateCafe - expressed interest in the potential for our product to be used in other business parks and beyond, there were also concerns about how this could be achieved in a sustainable manner. Although we have full trust in SPATwater and the Green Business Club to handle our product with care and to be using it in the future, this digital tool is dependent on someone paying - although it is just a fair amount - a monthly fee for a website licence. In future projects, it should be looked into if it is possible to make a digital tool that does not have a necessary maintenance cost or effort required. Regarding the content of the tool, we have adopted a 'general business park' scope rather than a focus on Sloterdijken itself. The tool however is based on Sloterdijken as a case study, which could lead to potential challenges when scaling it to other business parks. Although the four main challenges perceived in our problem analysis are found to be quite similar among business parks in our interviews with experts, it remains a product tailored specifically to Sloterdijken.

Conclusion

The first phase of the project involved thorough research on the context and analysis of the problem of implementing climate adaptation measures in the business parks of Sloterdijken in Amsterdam. Through several site visits, desk research, and interviews with a variety of stakeholders, a number of barriers to implementing these measures were identified, including a lack of responsibility and a lack of urgency. In order to address this complex issue, the team focused on a specific target group - people who use Sloterdijken in a professional capacity, which was not researched before. The aim of this living lab project was to answer the following research question:

How can we actively involve our target group within the topic of climate adaptation, to kickstart the movement towards a future-proof business park?

To do so, a new framework was developed named the Triple E framework, which was used to educate, engage, and empower our target group to become actively involved in climate adaptation efforts. Using co-creative design, including stakeholder mapping, engagement experiment, co-creation, in collaboration with the target group and other stakeholders a digital tool was developed. The digital tool consists of 5 different steps to help business parks become more climate-adaptive, by empowering local changemakers in the area while using a bottom-up approach. This tool aims to kickstart the movement towards a future-proof business park. Overall, the project has made significant progress in understanding and addressing the challenges of implementing climate adaptation measures in the business parks of Sloterdijken and has the potential to have a positive impact on the area.

5

Reflection

Of any academic process, reflection plays a key role. In the following part, the group processes and roles be reflected upon and how these have influenced how the final result and project completion has been reached.

Group Roles

Bram is an entrepreneurial individual with a background in sustainability science. He has recently been exploring his talents in documentary making and is known for being a critical and finetuned thinker. During the project, he approached each task with a strong sense of purpose and determination and is dedicated to positively impacting the world.

Julie has a background in Human Geography and Urban Planning, and has focussed on the method of Placemaking. Because of this background, she always looked at the whole picture of the issues. Together with Pien she was responsible for checking the project on academic structure. She was dedicated to the project, and kept going even when times were hard.

Gabriel has studied in Architecture in Mexico and a Master in Architecture, related to the study of cities and the phenomena that affect them by IAAC (The Institute for Advanced Architecture of Catalonia). This background has contributed to understanding the affectation of the climate in the area and to be able to collaborate in the graphic representation of solutions that can contribute to the adaptation of the physical space.

Pien had a critical eye on and was responsible for the coherency throughout the entire project. She is open to trying new challenges, as she designed most of the digital tool in a programme she never used before.

Hugo has a background in Economics and Business Economic as well as Urban Planning and design. Because of his creativity, Hugo is good at looking at problems from a different perspective and come up with new ways of approaching the challenges. This helped in the process when we were stuck in different phases.

Team Progress

The first weeks of the project were mainly about finding out what the actual problem was. We all knew what climate adaptation was, and could imagine that the need to implement it on business parks is very high. Therefore, we were left with the question: why is this not happening yet? To answer that question, we went straight into the field: we wanted to know who were in the area, how they viewed the issue and how they envisioned the future. On the one hand, getting in touch with these people proved more difficult than expected. On the other hand, we also had to deal with some expectation management; whereas we initially, after the case-presentation from the case owners, expected to map out locations of opportunities for climate adaptation and implement actual innovations, we had to take a step back
After the initial survey, the first interviews and some desk research, we came to the conclusion that business parks were far from reaching the climate adaptation phase; they did not yet feel enough urgency and responsibility was lacking. At this point, we made the decision to go in the direction we thought would yield the most interesting Living Lab, thus deviating from what our case owners initially expected and proposed. Fortunately, from the first moment onwards they were very supportive and interested, and happily supported our decision in this providing continuous help and feedback throughout the process.

Afterwards, we focused on what seemed to us the 'beginning' of climate adaptation - enthusing people who use Sloterdijk in a professional capacity. Unfortunately, reaching companies and their employees by phone and through mail was still not going too smoothly, so we had to find other ways to get in touch with them, but getting out of the comfort zone and performing several site visits to correspond with our target group. Although this seems slightly awkward in the beginning, our team really motivated each other to take the plunge to go and support each other. In addition, through our various case-owners, including the GBC, we were able to get in touch with several companies within the area, who not only served as direct contact but also provided tips, such as where best to find employees on their breaks. Having several case-owners did give us a bit of stress at times. Both SPATwater and Green Business Club Sloterdijken consisted of several people, each of whom we interacted with to discuss our process and progress. On the one hand, the large number of people provided a lot of input and valuable information, but on the other hand we sometimes spent a lot of time communicating. Besides communication with the stakeholders, we also maintained contact with most of the companies we had approached. We noticed that emails sometimes went unanswered and that we sometimes did not have a clear idea of who was in contact with whom, so we decided to appoint Bram as our communications officer. This was carried through into presentations later in the project; both by making them and presenting them most of the time at various occasions.

Now that we had specified a focus group, and a direction for our project, it was time to make a plan of action: what problem did we want to find a solution for? At this point in our project, the roles were not very clearly divided yet. We all sat around the table and contributed ideas. During these sessions, things already became clear; Hugo is a 'plant', as described in Belbin's team roles. He seemed to be very creative, by thinking out of the box and coming up with radical ideas that were more than often very valuable for our project. If the suggested ideas and solutions were going out of scope and too far away from the first research aim, Bram was there to focus on the research aim again and limit ourselves to what was doable.

The Triple E Framework came into being, and for this we needed stakeholder input. Gabriel and Hugo came up with the ideas for the engagement experiments and the interpretation of the co-creation session. Getting these activities, and their academic background, on paper proved more difficult than expected. This is where Pien and Julie came forward to manage the academic aspects, who provided the required information and clear structure, in addition to helping out in arranging last-minute tasks.

After the engagement experiment and the co-creation session, loads of work had to be done, and we had worked together for an extended period. We therefore thought it would be good to schedule a reflection session for ourselves. Although we already had individual coaching sessions with our academic coach, it also seemed important to give each other feedback in order to improve individually, and as a group. Julie proposed to do the session in a different setting, so we went to a cafe in the morning to have coffee together, to create a relaxed atmosphere. The session was very constructive, and all team members made sure we were maintaining a safe space. The main take away from this session was that we were often experiencing a lack of communication, which resulted in doing double work, not knowing what people should be doing or conducting work without it being checked by someone else. With this knowledge and experience in the back of our heads we made a new group chat, in which we only send short and concise updates about the project on what we are doing or where help was needed, to structure the communicative part and avoid chaotic correspondence. This has helped us a lot, up until the end of the project. In addition, personal feedback was provided from everyone to everyone, which is reflected further upon in the individual reflection.

From the feedback session we also incorporated some rules for the future of our project. First of all, every team member was supposed to be at AMS before 10.00 if we were working together. If you would be late or not able to come, you let your group know in advance. Secondly, we said to keep each other in the loop and involved in the project by sending updates and keeping one another informed. Lastly, we suggested asking for help when needed or if someone was unable to finish, no matter the circumstances.

In the last phase of the project we had gathered all the information that we needed to successfully finish our project - now the only thing we had against us was time. Where in the beginning we had worked together on almost all projects, or at least had talked about it with each other, it was now time to really start dividing tasks. Tim, our academic coach, had advised us to make an extremely detailed schedule up until the end of the semester. This turned out to be really good advice; over the period of four weeks we had to create our end-product, an infographic, a documentary, a final report and a personal reflection. In this last period the editing skills of Gabriel came into full bloom. Bram had taken over the directory of the documentary, Julie and Pien were chief final product and Hugo was chief end document.

All in all, we look back on this period as an extremely educational, exciting and challenging time. Having to work on a project for this amount of time with a group of five people is challenging at times. Nevertheless, we have worked well as a team by regularly meeting, initiating fun activities next to study activities and always motivating each other. We are very grateful for all the people who helped us and taught us new things. A Living Lab is a special way of working, and we are happy to have experienced it.

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Appendix

Appendix A

Questionnaire for stakeholder mapping
Business park Sloterdijk - Climate adaptation

On behalf of the Green Business Club Sloterdijken & SPATwater, we, 5 students of the MSc MADE (TUDelft and WUR), are conducting research into the possibilities of making the Sloterdijk business park in Amsterdam more sustainable. According to our analysis, your company is located (among others) in Amsterdam Sloterdijk.

We need your help. With this short survey we collect data to get an overview of all stakeholders in Sloterdijk and to gain insight into the opportunities and possibilities regarding further sustainable development of the business park. Your answers are for inventory purposes and are not binding.

Your vision counts and is important. Completing the questionnaire takes approximately 5 minutes.

Thank you for participating in this research,

Bram, Hugo, Pien, Julie & Gabriel
Master students MSc MADE

- Results are only used for this research, processed anonymously and not shared with third parties
- If you don't want to answer a question, you can skip it
- For questions/comments/feedback, please contact Bram Wolters via bram.wolters@wur.nl

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General information

What is the name of the company where you work?
A:_____

What is your position within the company?
A:_____

Which sector does your company belong to?

[ ] Healthcare & Welfare
[ ] Trade & Services
[ ] ICT
[ ] Justice, Security & Public Administration
[ ] Environment & Agricultural Sector
[ ] Media & Communication
[ ] Education, Culture & Science
[ ] Engineering, Production & Construction
[ ] Tourism, Recreation & Catering

[ ] Transport & Logistics
Other:
A:_____

How many full-time employees work in your company in Sloterdijk?
[ ] 0 - 1
[ ] 2 - 5
[ ] 5 - 20
[ ] 21 - 50
[ ] 51 - 100
[ ] 100+
[ ] I do not know

Information Business premises

For how many years has your company been located in Sloterdijk?
[ ] 0 to 1 year
[ ] 1 to 2 years
[ ] 3 to 5 years
[ ] 5 to 10 years
[ ] More than 10 years

Is your company a tenant, lessor or owner of the property?
[ ] Tenant
[ ]Owner
[ ]Other:
A:_____

Do you share the premises where your company is located with other companies?
[ ] Yes
[ ] No
Other:
A:_____

Analysis Companies Sloterdijk

Below you will find 8 statements that relate to your company in Sloterdijk. We would ask you to answer these on a scale of 1 to 5, as described below, on behalf of the company where you work.

1. Strongly Disagree | 2. Disagree | 3. Do not disagree/disagree | 4. Once | 5. Totally agree
Our company in Sloterdijk is part of a wider network together with other companies in Sloterdijk:
Totally disagree 1 - 5 Totally agree

Sustainability is included in the vision of the company where you work:
Totally disagree 1 - 5 Totally agree

The effects of climate change on your company in Sloterdijk are a topic of discussion between your colleagues:
Totally disagree 1 - 5 Totally agree

To date, your company has experienced negative consequences due to heavy rainfall, flooding, heat and/or drought in Sloterdijk:
Totally disagree 1 - 5 Totally agree

The consequences of climate change will pose a risk to your business premises in Sloterdijk and the immediate vicinity in the future:
Totally disagree 1 - 5 Totally agree

Within your company, a financial budget is available for sustainability and/or sustainable development of your business premises in Sloterdijk and the immediate vicinity:
Totally disagree 1 - 5 Totally agree

The municipality of Amsterdam provides sufficient information about the risks of climate change on your business premises in Sloterdijk:
Totally disagree 1 - 5 Totally agree

Who do you think is responsible for making your business premises more sustainable?
[ ] The municipality of Amsterdam
[ ] The owner of the property
[ ] The company where you work
Other:
A:_____

Closing

Green Business Club Sloterdijken
Green Business Club (GBC) Amsterdam Sloterdijken is an impact organization that focuses on concrete results by initiating and realizing sustainable projects in the field of Energy, Mobility, Circularity and Climate Adaptation for companies and business parks in Amsterdam Sloterdijken. Participants of GBC Amsterdam Sloterdijken turn ambitions into action. By working together, knowledge is increased and projects at area level become possible. Think and participate in the project groups together with your neighbours, get to know new people and make an impact with and for your organization.

Would you like to know more about the Green Business Club or would you like to become a participant?
[ ] Yes
[ ] No
Other:
A:_____

Would you like to be kept informed of the results of this research?
[ ] Yes
[ ] No
Other:
A:_____

May we approach you for an in-depth discussion on this theme?
[ ] Yes
[ ] No
Other:
A:

If you answered 'Yes' to (one of) the above questions, what is your email address?
Other questions/comments/feedback:
A:_____

Creating a power/interest matrix
The goal of a stakeholder map is to create a power/interest matrix. From the survey, questions 4-13 were focused on this part. In the following table, an overview is given of how the question relates to either power or interest.

Question	Answer Type	Power or Interest?	Remark
4. How many full-time employees are employed within your company in Sloterdijk?	Multiple choice	Power	Businesses with a larger number of employees typically have more financial resources and may have more influence in decision-making processes. They may also have a greater ability to negotiate with public actors, landlords, and other stakeholders. Therefore, a larger company results in more power.
5. For how many years has your company be located in Sloterdijk?	Multiple choice	Power	Businesses that have been present for a longer period of time are considered to have more power and influence compared to newer businesses, due to a number of factors, such as the company's history of economic contributions to the community, its reputation and brand recognition, or its relationships with local stakeholders.
6. Is your company a tenant, landlord or property owner?	Multiple choice	Power	If the company is the property owner or landlord of the office building, the company has more power to implement innovative climate adaptation strategies compared to being the tenant, due to the 'split-incentive' dilemma (Bult, 2020)
7. Do you share the building of your business in with other businesses?	Multiple choice	Power	When sharing the office building with other stakeholders, more cooperation is required to implement climate adaptive measures which could hinder the process. Therefore, when not sharing the building has a slight advantage in terms of power.
8. Our company in Sloterdijk is part of a wider network together with other companies in Sloterdijk	Likert Scale (1-5): 1 = totally disagree - 5 = totally agree	Power	If a company is part of a network in its local area, they have more power and influence compared to companies that are not part of such a network. Being part of a network can provide a company with access to resources and information that may not be available to companies operating independently. It can also give a company the opportunity to collaborate with other businesses or organizations and potentially leverage the collective power and influence of the network within climate adaptation.
9. Sustainability is included in the vision of the company you work for	Likert Scale (1-5):	Interest	Companies that prioritize sustainability often recognize the importance of taking action to become more resilient the negative impacts of climate change, which includes efforts to adapt to the impacts of climate change that are already being felt. Therefore, their relative interest in climate adaptation compared to other companies can be partly assessed through this question.
10. The effects of climate change on your business in Sloterdijk are a topic of conversation among your colleagues	Likert Scale (1-5): 1 = totally disagree - 5 = totally agree	Interest	When people are aware of and discuss the potential impacts of climate change on their work environment, it may increase their sense of responsibility and motivate them to take action to mitigate those impacts. By discussing and raising awareness about climate adaptation, the interest of implementing measures increases.
11. Your business has experienced negative impacts due to heavy rainfall, flooding, heat and/or drought in Sloterdijk to date	Likert Scale (1-5): 1 = totally disagree - 5 = totally agree	Interest	When people or organizations experience first-hand the negative impacts of climate change, it may increase their sense of responsibility and motivate them to take on a proactive approach to climate adaptation, to be more resilient in the face of a changing climate and potentially reduce their risk of financial losses due to extreme weather events or other climate-related impacts.
12. The effects of climate change pose a risk to your business premises in Sloterdijk and the immediate area in the future	Likert Scale (1-5): 1 = totally disagree - 5 = totally agree	Interest	If individuals or organizations believe that climate change poses a risk to their office building, they are likely to be more interested in adopting climate adaptation strategies to avoid these impacts. When people are aware of and concerned about the potential impacts of climate change on their work environment, it may increase their sense of responsibility and motivate them to be interested in taking action.
13. Within your company a financial budget is available for sustainability and/or sustainable development of your business premises in Sloterdijk and the immediate surroundings	Likert Scale (1-5): 1 = totally disagree - 5 = totally agree	Power	If a financial budget is available for sustainability and sustainable development in a company, it may have more power to adopt climate adaptive measures, regardless of the long-term investment required. Having access to financial resources can give a company the ability to invest in research, development, and implementation of climate adaptive strategies that may not be feasible for companies with limited budgets, giving them more power.

The second step was assigning a value to both power and interest questions not represented by the Likert scale, qualitative questions. The questions are transformed with values similar to the Likert scale, following the 1-5 scale. Question No.4 assigned to power referring to the years of existence of the company were designated the following values, 1=(0-1 years), 2=(1-2 years), 3=(3-5 years), 4=(5-10 years) and 5=(10+ years). Question No. 5 of power followed a logical order from 1-5. Power question No.6 was assigned the following values: 1=tenant, 3=owner, and 5=renter. Power question No.7 was assigned the following values: 1=shared and 3=not shared. As previously mentioned, the answers to the other questions would already have a value assigned based on the Likert scale, so they would not have to be reassigned. The third step to follow was to perform the final calculation of the values assigned to the answers; in this step, weight was added to each value, the squared number of each value, meaning (12=1, 22=4, 32=9, 42=16, and 52=25), this would help the final representation, creating more space between the different plotted points in the matrix, power/interest. The fourth step, once the final values based on the square number of the value were determined for the power/interest questions, was to create a CSV that would serve as a basis for determining the size and the four quadrants of the matrix in the X and Y axes. Y; then, the points in the matrix would be plotted according to their value. This will help us determine the trend within Sloterdijken regarding climate adaptation and create a plan to tackle this phenomenon during the development of the Living Lab.

Appendix B

Explanation of financial model used for the posters and in the final product

Assumptions and explanations of calculations

In this part, the different sources, assumptions and explanations of the different parts of the financial model will be given to better understand the numbers. The main sources of input for these calculations are the TEEB.stad tool, the Deltares Climate Resilient City Tool (CRCTool), calculations from Rebel Group and other scientific sources.

Costs of implementing climate adaptive measures

In the excel model, the different costs per square metre are presented.

Green roofs: the costs for the green roofs are retrieved from the website of the Dakdokters, a company specialised in transforming flat roofs into green roofs. The costs taken are for the basic green roof of a size of >250 m2.

Plants/extra grass and CA parking spaces: when it comes to the costs for installing plants and greenery and the costs of the water absorbing parking spots, these are retrieved from the Deltares Climate Resilient City Tool (CRCTool) (Publicwiki.Deltares, 2020). The costs for the water absorbing parking spots are the average of 'waterabsorberende/bergende verharding' and 'waterdoorlatende verharding' in the CRCTool and are cross-checked with one of the suppliers of such parking spots (Rain(a)way, 2022, personal communication). The costs of adding more greenery on ground level is chosen from the costs of 'ontharden: verharding eruit, groen erin' in the CRCTool.

Trees: The costs of trees are estimated, as the costs indicated by CRCTool were considered too low and not realistic at 11,4 euros per m2. Installing trees on a larger scale can be a costly procedure as it often requires extra equipment such as digging machines and the transport of trees and it being cheaper than planting simpler types of greenery therefore did not make sense. The estimation is based on adding 10 trees of 100 euros each and include wages for four workers, 8 hours for 40 euros per hour. Next to that, 1000 euros for machinery and transport have been estimated as well as 2000 euros of site preparation costs. These numbers are based on information from the webpage Hovenier.website (2022). From research, it is apparent that an average urban tree has a surface of 38,5 square meters (based on an average diameter of 3.5) (Pretzsch et al., 2015). The total costs are for the property or business owner.

Financial benefits of implemented measures

The benefits are given over a period of 30 years, as this is the average lifespan of greenery (Buck Consultants International, 2016). In the coming 30 years, the (monetary) effects of greenery will be experienced every year, but the costs are incurred now. Therefore, the benefits are discounted to get a present value of those benefits which can be compared to the value of the investment for the implementation costs which are incurred now. In line with the TEEB.stad tool, we use a discounting factor of 3% which is standard for costs for nature of a social cost-benefit analysis (Buck Consultants International, 2016). This leads to a discounting factor of 20,6 for a period of 30 years and the yearly benefits that are derived from this measure will therefore be multiplied with this factor to get the present value of these benefits over the coming 30 years. The value of all benefits are therefore given over a 30 year timeframe apart from the cases where it is stated otherwise.
In the TEEB.stad tool, climate adaptive parking spaces are not an option. Therefore, the same numbers as for grass have been taken but divided by 2 since climate adaptive parking spaces are roughly half made out of bricks and for the other half out of grass.

Benefits health: the health benefits are derived from the TEEB.stad tool (RIVM, 2022a). The first component for which the benefits are determined is the health of

people in the area and more specifically the reduced healthcare costs associated with the improvement in air quality. Some other components of the healthcare calculations of the tool are left out of scope for different reasons. The generic reduction in healthcare costs and the prevented loss in employee fallout by the tool is left out of scope because the way the tool calculates them focuses specifically on the environment surrounding the homes, which is different from their workplace as researched in this research and therefore the calculations cannot be applied. Also, the reduced healthcare costs as a result of reduced noise because of the increased vegetation is left out, because there are many production companies in the area which presents a source of noise itself and therefore it is not possible to draw a clear line on whether or not it influences the people working there.

The reduced healthcare costs as a result of improved air quality are calculated taking the aforementioned environmental factors into account and the estimated population density. The population density has been a moderate estimation of 50 and will be set for these calculations, as people do not live in the area but only spend a part of their day there. The calculations take into account the deposition speed of the different air quality parameters on the vegetation as well as the resuspension fraction (parts of the air pollutants that lands on the vegetation, but is blown in the air again by wind). The group benefiting from this measure is the local workforce.

Decreased water purification costs for waterboard: a component which falls under the benefits of climate adaptation within the TEEB.stad tool is the avoided water purification costs (RIVM, 2022a). By preventing water from ending up into a mixed sewage system which is often the case in older neighbourhoods such as business parks, clean water infiltrates directly into the ground again or is reabsorbed by plants which reduces the amount of water needed to be purified and therefore the costs. The tool looks at placing grass, green roofs and trees. The buffering capacity of grass is 0,87 m3/m2/year of a green roof is 0,45 m3/m2/year and of a tree 0,67 m3/m2/year. These are benefits for Waternet and therefore also partially the government.

Another climate adaptive benefit is the captured carbon dioxide by trees over their lifetime. As input for these calculations in the tool, it is assumed that 15 trees are installed with a diameter of 16-30 cm at chest height, as these are the most common urban trees (Pretzsch et al., 2015). These are benefits for society at large.

There is energy saving coming from a green roof. This depends on the year the building was built. Only for buildings that were built until 1992, green roofs have a direct effect on isolation effects. Buildings built before 1975 are benefiting most from green roofs, between 1976-1991, the isolation effectiveness is only 50% of other types of isolation (RIVM, 2022a). These are benefits for the business owner, as it reduces his/her energy bill.

Benefits property value: from the TEEB.tool the increased property value of adding a line of greenery on the property is 5% of the current value of the property (RIVM, 2022a). The TEEB.stad tool focuses on the value of houses to live in, and so it is questionable whether or not this should be incorporated and if the value is equal for business property. There are other parts of adding greenery which would increase the property value, but they focus on greenery on a neighbourhood level of focus on adding water ponds, which is not likely to affect the case of a single business plot. These benefits are immediate. These benefits are for the property owner.

Benefits saved costs of water damage: as input for these calculations, information was derived from supporting information and calculation guidelines from Rebel Group (personal communication, 2022) and guidelines provided by STOWA as part of a pilot project in Amsterdam West (STOWA, 2019).

First, the average damage per company in a business park per year is calculated to then calculate a cost per square meters based on the dimensions of the

business plot. The following input has been used for these calculations. From the STOWA report and guidelines from Rebel Group, there is an average direct damage in the built environment of 250 euros/m2 assuming 30 cm of water in the building after a rainfall of 70 mm per hour. In business parks, there are often many areas where the water levels are 30 cm or more after such rainfall (Klimaateffectatlas, 2022). From the guidelines of the Rebel Group, around 35% of the businesses in a business park are affected by such water damage if such a rainshower happens, and chances of it happening are 1% every year (Rebel Group, personal communication, 2022). From this, you can calculate the direct damage to businesses. In terms of indirect damage, businesses are on average 3 days not able to operate which results in costs of around 80 euros/m2/day with again 35% of the businesses being affected.

These numbers are based on green roofs. To extrapolate these numbers to different green measures such as for example trees, a multiplication factor is needed. The multiplication factor for trees is derived from the extra water buffering capacity of trees as seen in the previous part benefits climate adaptation (as 0,67/0,45 = 1.5). For green parking spots, the same buffering capacity as green roofs is used, so a multiplication factor of 1. These benefits are (partially) for property owners because damage to their properties is reduced, business owners because damage to their goods inside the facility are reduced and insurance companies in case they would have reduced claims.

Benefits of costs saved from preventing loss of labour productivity: increased temperatures can lead to a loss in labour productivity which results in lower output of workers and thus revenues. The input for these calculations are derived from different sources. The first source is a research in which different scientific articles on the effect of the interior environment of office spaces on the people working there are explained (Boerstra & Leijten, 2003). The second source is a research of the European Union on heat stress in the work environment (Mekjavic et al., 2018) and the third source is the KNMI'14 climate scenarios (KNMI, 2014).

For calculating the loss in labour productivity, it is assumed that the average revenue generated per worker per month is around 6500 euros (Boerstra & Leijten, 2003). In the excel model, you can fill in the average amount of employees in your company. The revenue per employee can also be adapted by unhiding rows 31-61 and play around with the numbers. From this, the average revenue per year can be calculated and also the average revenue per m2 per year.

For every degree of temperature above 25, labour productivity drops by 2% (Mekjavic et al., 2018). Given the climate scenarios of the KNMI (2014), there will be 13 days in which the temperature is more than 30 degrees Celsius in the next 30 years as compared to 3 days currently. Therefore, the average number of days in which the temperature is above 30 degrees Celsius is 8 per year in the coming 30 years. With these numbers, the model calculates the loss in revenue as a result of days on which the temperature is above 30 degrees. The total loss is given over 30 years using the discount factor of 20,6. The benefits of these prevented losses are for the business owner.

Appendix C

Engagement experiment survey

Theoretical basis for the survey

For this part of the Living Lab, the Theory of Planned Behaviour (TPB) is used as an academic framework which forms the basis for the survey as it is also a commonly used theory in climate change behavior (Tikir & Lehmann, 2011). The TPB states that **attitudes** towards climate change, **subjective norms** and **perceived behavioural control** all influence the intention to adapt to climate change and therewith are determinants in whether pro-environmental behaviour occurs (Zhang et al., 2020). Attitude refers to how an individual perceives the behaviour, either negatively or positively. Subjective norms refers to whether or not an individual feels like his/her surroundings would approve of such behaviour and perceived behavioural control refers to how difficult an individual feels executing the behaviour is (LaMorte, 2022). When looking at research in which the TPB has been research in the context of changing behaviour to adapt to climate change, it was found that perceived behavioural control has an insignificant effect on climate adaptive behaviour and that it seems relevant to (aim to) influence attitudes and subjective norms, as they influence behavioural intention, and as behavioural intention influences pro-environmental behaviour (Masud et al., 2016).

For constructing the survey, guidelines by Ajzen (2006) have been used, which provides 8 steps for such surveys. In the first step, the wanted behaviour is defined which is that our target group is involved in participating in climate adaptation projects. In the second step, the target group is defined as everyone that uses Sloterdijken in a professional capacity. In the third step, items for reflective (direct) measures (so attitudes, subjective norms, and/or perceived behavioural control) are chosen and based on the findings that are explained above and not being able to make the survey too long, the choice has been made to focus on attitudes paired with the corresponding belief regarding that attitude.

The next step of constructing the survey is to administer a pilot survey in which the basic attitudes surrounding this topic would be gathered on which the final survey questions would be based. Due to time constraints, it was not possible to adopt this step of the process but the earlier executed interviews were used as a basis for the main attitudes towards climate adaptation, as is also done in research by Masud et al. (2008).

From the interviews, the most prevalent attitudes were the ones related to:

- Urgency: effects of climatic changes in Sloterdijken do not pose an urgent risk to my business or the business I am working for.
- Responsibility: dealing with the effects of climatic changes in Sloterdijken is not the responsibility of my business or the business I am working for.
- Knowledge: there is not enough information on the effects of climatic changes in Sloterdijken.
- Likeliness to participate: I do not see myself participating in climate adaptation projects.

The survey started off with questions regarding the attitudes and beliefs for these main attitudes, but after the first 5 respondents stopped the survey and thus the experiment halfway through because it took them so much time, the decision was made to focus solely on the likeliness to participate as this is the most all-encompassing attitude for our research. The next steps (5-8) were to prepare the questionnaire, of which the questions are presented below.

The survey set up and questions

The experiment was set up at the Spar in front of the Sloterdijk station during 12:00-13:00, as this is the main location where people working in the area, our target group, go to buy lunch. Respondents would first be given a basic definition of what climate adaptivity is and would then be asked to scan the QR code of the survey and fill in the first two questions regarding their likeliness to contribute towards a climate-adaptive Sloterdijken and whether or not that is a good or bad

thing. Afterwards, they would be directed to either one of the two posters, and they would get around one minute to look at it. When they would have further questions, the researcher engaged in a short conversation explaining any further questions. It was switched between researched among the posters so we did not have to deal with bias by researchers explaining better or more enthusiastically than others. After this, the respondent would fill in the exact same two questions to see if there had been any changes in responses and thus measure the effect of the poster.

The survey questions were as follows:

"It is … that I contribute to making Sloterdijken climate adaptive"
Unlikely 1-7 Likely

"Contributing to making Sloterdijken climate adaptive is … "
Bad 1-7 Good

Please pause the survey. You will now be shown a physical poster. Indicate to the person present that you are at this question.

Which poster did you just see?
[ ] Rational poster
[ ] Inspirational poster

"It is … that I contribute to making Sloterdijken climate adaptive"
Unlikely 1-7 Likely

"Contributing to making Sloterdijken climate adaptive is … "
Bad 1 - 7 Good

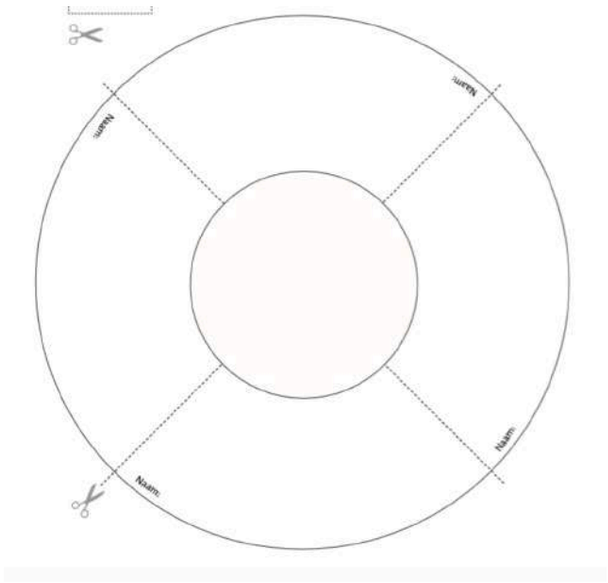
Do you have any further questions or comments about our research?
[ ]

Thank you so much for participating! In case you want to be kept up to date on our end product please leave your e-mail address and we will contact you at the end of December.
[ ]

Appendix D

Co-creation

Cherry on Top Method ring



Summary of Cherry on Top Method round

EDUCATE - group 1 presents cherry on top

On the one side, we focused on how we could get Kelly knowledgeable (bottom up):

- You need to show her concrete steps she can do and show to her company which they could implement. This could be 'tegelwippen' but also starting a bit of a club with other colleagues.
- We think a challenge of different companies and their Kelly's can be nice, so it can be something active
- A rooftop walk so they can get a different view on things
- Target them with Google Ads or large posters in the area

We (the group) also think that we not only need to reach Kelly but also her superiors (top down):

- They need to facilitate time and money for Kelly's to do something
- The Kelly's should reach their superiors themselves but also a Green Business Club can help in this. The Green Business Club should organize these sort of things
- Show that it can be good commercial for the company itself

EDUCATE - group 2 presents cherry on top

Looked more into how to reach them:

- Use the station to get awareness as people move through there
- Bigger is better. The only problem is that scanning a QR code might be too much as you are on the move, so let it come back at places where people chill out a bit more like the toilet or the Spar. The more you see it the better
- You need to really go to the offices themselves to get a larger crowd
- Give people a vote in what they want. The municipality has a similar system in which you can 'spend' a budget yourself on what you would want. Ivo said that since this year, buurtbudgetten and bewonersinitiatieven are implemented here in Sloterdijken. there are 5-6 ideas on which the inhabitants can vote. The budget is in a ratio to the amount of people living there so the budget is quite small but maybe you can initiate a similar thing for businesses if you can get the budget.

Role Playing

The different roles were as follows

Group 1		**Group 2**	
Role	**Explanation**	**Role**	**Explanation**
Person who uses Sloterdijken in a professional capacity: Kelly	I am an employee of a big firm (that of the business owner) I really want to contribute to placing climate adaptive measures I do not have any power I am not an expert on the topic	Person who uses Sloterdijken in a professional capacity: Kelly	I have my own company, which is a start-up with not a lot of budget I really want to contribute to placing climate adaptive measures I do not have any power I am not an expert on the topic
Business owner: Sam	I am the CEO of a company with 300 employees I am a renter in an office building with other companies where I pay for my own water/gas/electricity I want to contribute to the climate but you don't have the time I have some budget to contribute to climate adaptations, but I can't pay for complete projects	Owner of the business next door: Felix	The plot my company is on is directly next to the plot where Kelly's business is located I have a strong entrepreneurial mindset and like to act upon new opportunities I don't know Kelly very well, but we sometimes chit chat when we arrive at the same time
President of the business park association: Alex	I have a lot of connections: both municipality as businesses etc. I do not have any budget I can lobby, but I do not have any direct power I, and all of the people I represent, would like to see a climate adaptive Sloterdijken	President of the business park association: Rick	I have a lot of connections: both municipalities as businesses etc. I do not have any budget I can lobby, but I do not have any direct power I, and all of the people I represent, would like to see a climate adaptive Sloterdijken
Municipality: Hans	I want to contribute to making the city climate adaptive I do not own any buildings I can make changes to public space, but I don't have that many resources	Municipality: Frits	I want to contribute to making the city climate adaptive I do not own any buildings I can make changes to public space, but I don't have that many resources
Building owner / investor: Elise	I have a lot of real estate I rent out your building to several companies who pay for their own water/gas/electricity I want and can contribute to the climate, but I don't want to 'lose' money by investing in measures I am not profiting from.	Building owner / investor: Rita	I have a lot of real estate I rent out my building to several companies who pay for their own water/gas/electricity I want and can contribute to the climate, but I don't want to 'lose' money by investing in measures I am not profiting from.

Roadmap of role playing
Group I (Kelly is an employee)

1. First she goes to the municipality to gather knowledge on best practices and to get inspired.
2. She then goes to the president of the business park association to find other 'Kelly's' so she can group together and start forming a plan together.
3. Then she can go to her boss, which should enable her to work on her with a bit of a money and time budget, so hours she can put in. The boss should be noted about Kelly starting this project a bit earlier in the process though, but Kelly should take it on in her free time in the beginning and create a bit more solid plan and partners before really going to her boss.
4. The boss can then go and talk with the building owner. The costs and benefits should be really clear and also it should be shown that other people are interested as well.

Group II (Kelly is the owner of a start-up)

1. Kelly should first find other businesses close to her that want to help her, so within her network (neighbouring company for example). What are small first steps they can take together? Taking out tiles on the property or installing a green roof
2. together.
3. Then she should go to Alex, who is the president of the business club. Alex should check if there are other people like Kelly.
4. You then need a very clear plan before going to the municipality or the property owner. At the municipality, you can gather info but there also be a good plan before the municipality can provide funding or whatsoever.
5. Last, you should go to the property owner. You only want to approach them when you have a clear group of people willing to work with you and if you have a clear business case, so what are the costs? What are the benefits? You really have to show what is in it for them. The business owner will probably have a lot of new policy coming her way any time soon (see previous paragraph). So, you need to 'fix the problem' for Rita already with a plan.