HOW TO DESIGN A PARTICIPATORY CITIZEN WORKSHOP WITH THE GOAL TO DETERMINE ENGAGEMENT STRATEGIES EXEMPLIFIED ON THE TOPIC OF AIR POLLUTION

Therry Goldgrabe
Master Interaction Design
University of Applied Sciences Magdeburg-Stendal

Master Thesis

Title:
How To Design A Participatory Citizen Workshop
With The Goal To Determine Engagement Strategies
Exemplified On The Topic Of Air Pollution

Author:
Theresa Goldgrabe
Student No. 20142113

University:
University of Applied Sciences Magdeburg-Stendal
Master of Arts
Interaction Design

Date:
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Supervisors:
Prof. Dominik Schumacher
M.A. Victoria Batz

ABSTRACT

The approach of participatory design has been utilised in design processes for decades. As its values are inherently ecological and socially benefiting, it has gained considerable popularity in contemporary formats. However, the variety and broadness of published resources pose particular challenges for designers wishing to implement it successfully. The key objective of this project is to analyse and summarise commonly occurring obstacles and advantages of participatory design and develop viable strategies of applying it in a multitude of different projects.
A detailed analysis of contemporary participatory design formats was conducted and a case study developed. The case study, a series of workshops on the subject of urban air pollution, engaged local citizens to evaluate effective engagement strategies. In collaboration with the research project “cleanBREATHE”, the current disposition of local citizens towards the subject was investigated and methods to raise awareness applied.
The outcomes of the participatory design workshop series led to a reflection of the design approach, its core values, and application methods for designers on a variety of projects.

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1 PREFACE

This thesis, encompassing six chapters, will guide the reader through the approach of participatory design and the application in a workshop format.
Within this chapter an overview of the applied methods and the research questions will be summarised.
The second chapter expands the context of this thesis in further detail. This includes an insight into the collaborating research project cleanBREATHE as well as the subject of air pollution to elaborate its relevancy in contemporary science and design.
Within the third chapter, the approach of participatory design will be analysed in depth and its key characteristics deduced through its historical roots. Subsequently, this transitions into a state of the art analysis of participatory design projects in chapter four and an overview of current resources and literature will be summarised. The fifth, most extensive chapter will guide through the case study that was conducted as well as its evaluation. Lastly, the sixth chapter summarises the entire project by illustrating the workshop design that were developed as well as future visions and an overall conclusion of the thesis.

METHODOLOGY

1.1

This project was conducted over a time span of eight months at the University of Applied Sciences Magdeburg-Stendal. The objective was developed over several months in collaboration with the team of the research project cleanBREATHE.
The approach of participatory design is the main focus because of the relevancy in the contemporary design environment.
Since its conception, the conduction of a case study was set to be the primary focus. The format of a workshop was chosen early on as it proved to be the most beneficial for the objective, the reasoning behind this will become clear throughout the thesis.
From the beginning, experts were included into the process to allow for a more informed process. These experts included the *LÜSA* employees, which monitor air quality sensing technology in Magdeburg, other research teams as well as psychologists. To add to this, a state of the art analysis, summarised in chapter four, was conducted.
The method of mind-mapping was used as a tool to visualise the research questions and workshop process. To determine the target group, the method of developing personas was employed in an early part of the design phase.
After the preparatory phase, the focus was set on the conduction of three participatory design workshops. They will be illuminated in detail in the fifth chapter. In addition to the workshops, questionnaires were used for a deeper insight into the participants demographics, prior experiences and other elements.

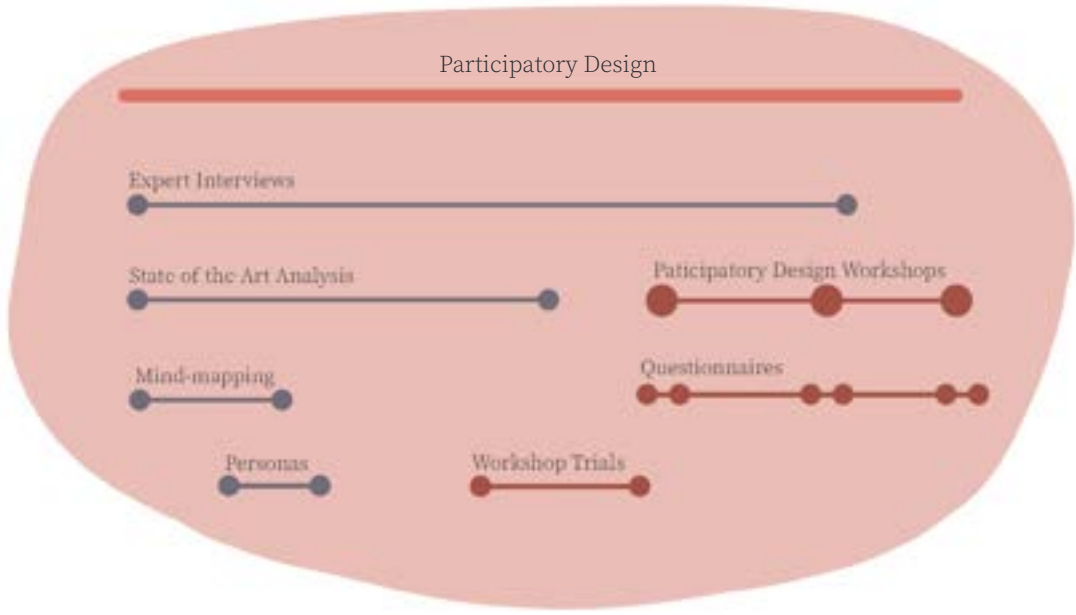


Figure 1: Methods applied throughout the thesis

RESEARCH QUESTIONS 1.2

Throughout the primary research, questions for the upcoming phases were summarised and categorised. This enabled a structured approach of analysing the contemporary participatory design approach as well as the literature published.

Workshop Content

How to define a topic?
What is too broad/ to narrow?
How to interest participants in the topic?
Which specifics do environmental subjecs pose?
How much input on the topic is useful and necessary?

Methods

Which methods are effective?
Which methods are frequently applied?
Which materials are necessary?
How can a method be applied to a given subject?
How does the method influence the participants perception of the subject?
Is a contest useful?

Logistics

Time:
Is childcare needed?
When should a workshop take place?
How long can should a workshop be?
How long and frequent should breaks be?

Incentives:
Should food be offered?
Which drinks should be offered?
Should there be music? Which?
Should there be a giveaway at the end?

Location:
How to choose a location?
What does a location need?
How does the location influence the atmosphere?

Research

How is Participatory design applied?
What are contemporary approaches?
What are frequent shortcomings?
Which approaches have proven successful?
Where are reseach gaps?
Where can informations be found?
In which form is research presented?

Documentation

How can a workshop be doumented?
How can the results be shared with the participants?
How can the outcomes be shared successfully with other target group persons?
How can outcomes be shared with other designers?
Which information is necessary in the documentation?
How to ensure privacy of participants in the documentation?

Collaborations

Which collaborations are helpful?
How to set up collaborations?
What incentives to collaborators need?
How to involve local policymakers?

Participants

How to determine the Target groups?
How to find participants?
How to ensure attendance?
Which incentives are necessary to motivate participants?
How many participants?
Should children be included? Why/ why not?
How to invite participants?

Evaluation

How is success defined?
How is the workshop concluded
Which evaluation methods are effective?

2 CONTEXT

To outline the scope in which this thesis is situated, the upcoming chapter will give an introduction into the research project cleanBREATHE, its stakeholders and project goals.
While the main objective of this thesis can be seen as a stand alone project, the research project creates a framework which aids the overarching goal of including citizens into design projects. By providing stakeholder support as well as thematic content within the development of the participatory design workshop, a symbiotic relationship was achieved.
Additionally, the chapter will outline the subject of air pollution, globally, within Germany, and in the city of Magdeburg specifically. An emphasis is set on outlining health implications as well as the current political landscape of air pollution to underline the importance of including local citizens into the decision making process.

2.1 CLEANBREATHE

2.1.1 OVERVIEW

CleanBREATHE, short for *Blended REsearch on Air pollution using TecHnical and Educational solutions*, is a multi year research project taking place in the cities of Magdeburg, located in Germany and a partner university Skopje in North Macedonia. It is conducted by the *spirit* research group, lead by Prof. Michael Herzog.

The approach is to address urban air pollution in three interconnected objectives (Herzog, 2020):

G1) Create citizen awareness and sustainable behavioral adjustment in two countries as a model for all of Europe, through a Critical Design Science Approach (Livari & Kuutti, 2017)

G2) Design and plan sensor networks, new mobile sensing approaches and AI prediction algorithms

G3) Develop new business models aiming for environment-conscious behavior.

Overall, the goals of the research project align well with the goal of this the, in particular G2, creating public awareness. As explained in a later chapter, the approaches of participatory design and citizen science overlap considerably and therefore allow for a seamless co-operation.

2.1.2 PARTNERS

There are several key partners within the cleanBREATHE project, with the main contributors being the research groups at the University of Applied Sciences Magdeburg-Stendal and at the Ss. Cyril and Methodius University in Skopje.
Another key collaborator is the development team of the AirCare mobile application. The application is visualising government air sensing data as well as privately sourced volunteer data. This offers a viable option to include data from the sensor kits developed in the objective G1 of the research project (Batz, 2021). It is currently already in use, particularly in North Macedonia where air pollution is a more pronounced public concern.

The air monitoring systems of Saxony-Anhalt (*Luftüberwachungssystem Sachsen-Anhalt*), short the LÜSA, is a key partner offering expert input on the overall topic of air pollution as well as sensor technology. Within this thesis the LÜSA was involved by offering expert input within the participatory design process and the case study.
Additionally to these partners of the cleanBREATHE project, there are numerous outside experts on topics such as environmental psychology and business management aboard. Involving design students at the University of Applied Sciences Magdeburg-Stendal into the process of the public awareness campaign is also a key component of the planned process.

Figure 2: Collaborators in the cleanBREATHE research project (after Batz, 2021)

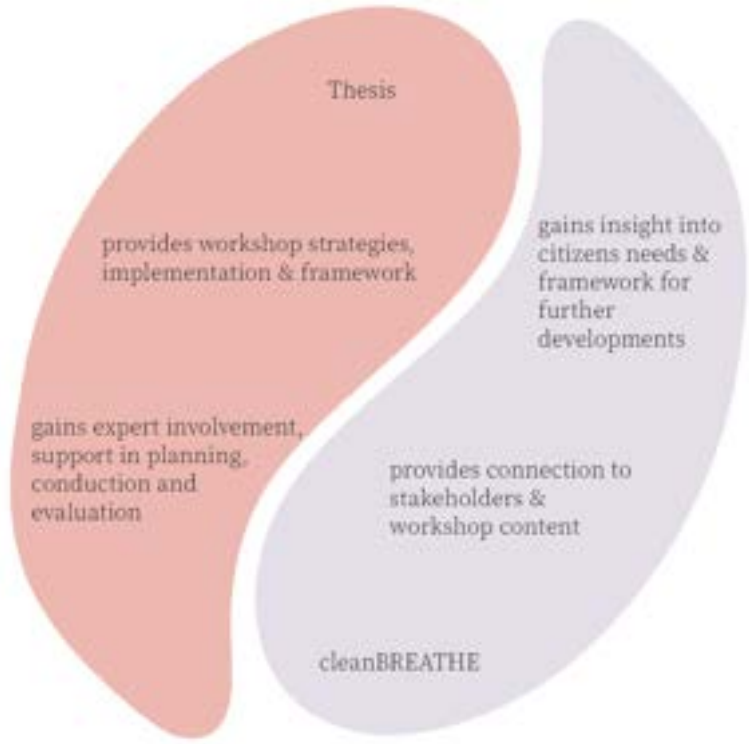
CITIZEN INVOLVEMENT 2.1.3

As raising public awareness on several levels towards air pollution is imperative to the objective, the cleanBREATHE research project is set to incorporate it in multiple ways. One key consideration of the cleanBREATHE research project is to involve local citizens in the cities of Magdeburg and Skopje throughout the three year process.
The sensor kit, as well as the public awareness campaign, are being developed focussing local citizens needs towards them. By aiding the conduction of a citizen workshop early in the development, the research team is enabled to develop an approachable, user adapted sensor kit and interface.
Involving the local community early on is also crucial to ensure the success of the following public awareness campaign and to develop strategies of communication that empathise the importance of air quality and air pollution.

Through the research projects objective several considerations for evaluation within the participatory design workshops can be derived. A primary objective is to assess the current state of knowledge on urban air pollution within the local communities. This will determine the base starting point of both the public awareness campaign as well as the digital application and sensor kits.Additionally, it is relevant to determine from which sources and in which format citizens currently receive informations on air quality, which will aid in the process of developing effective communication strategies.
Overall, the aim of the cleanBREATHE research projects collaboration is to get an overview of citizens needs and communication strategies of urban air quality to discover gaps and opportunities of improving awareness.

2.1.4 COLLABORATION

While the primary intention of this thesis is to develop a strategy in conducting participatory design processes in communities, the cleanBREATHE research project and their involvement within the subject of air quality aid in supplying the content for the case study. Within cleanBREATHE the conclusion of the thesis is anticipated to aid in the design of the public awareness installation as well as the mobile application. Offering an existing network of stakeholders and experts in turn enables a wider reach of this thesis.
In conclusion benefits are derived for both projects through the co-operation.



AIR POLLUTION

2.2

Every year up to seven million people are dying a premature death due to air pollution (WHO, 2020). While there have been relatively steady improvements of air quality within the European Union over the last decades, most of the population, especially in low income counties and dense urban areas, are still severely affected by unhealthy levels of air pollution. In fact, 99 percent of humans breathe air that is contaminated with an unsafe level of pollutants.
Additionally, increasingly extreme temperatures and weather conditions due to global warming have severe negative consequences on local and global air quality (WHO, 2022). As air pollution is mostly undetectable by humans, the dangers are often not considered.

2.2.1 HEALTH IMPLICATIONS

Air pollution contributes to a multitude of health problems. As a matter of fact, air pollution is widely recognised as the biggest environmental threat to human health worldwide (WHO, 2021). While children, the elderly and at-risk populations are especially affected, the extensive effects of air pollution are hazardous to all humans, animals and plants alike.

Several sources have shown that even the exposure to a relatively low concentration of ambient air pollution can lead to long term damages. Health hazards include cardiovascular diseases, increased cancer risks, premature death as well as several other consequences, with new influences on health implications being uncovered regularly (Murray et al., 2003).
Additionally, recent studies have shown links between air pollution and an increased risk of mortality from Covid-19 and other air borne diseases (Pozzer et al., 2020). This is most likely caused by the overall damages to the cardiovascular system during exposure to air pollutants, especially fine particulate.

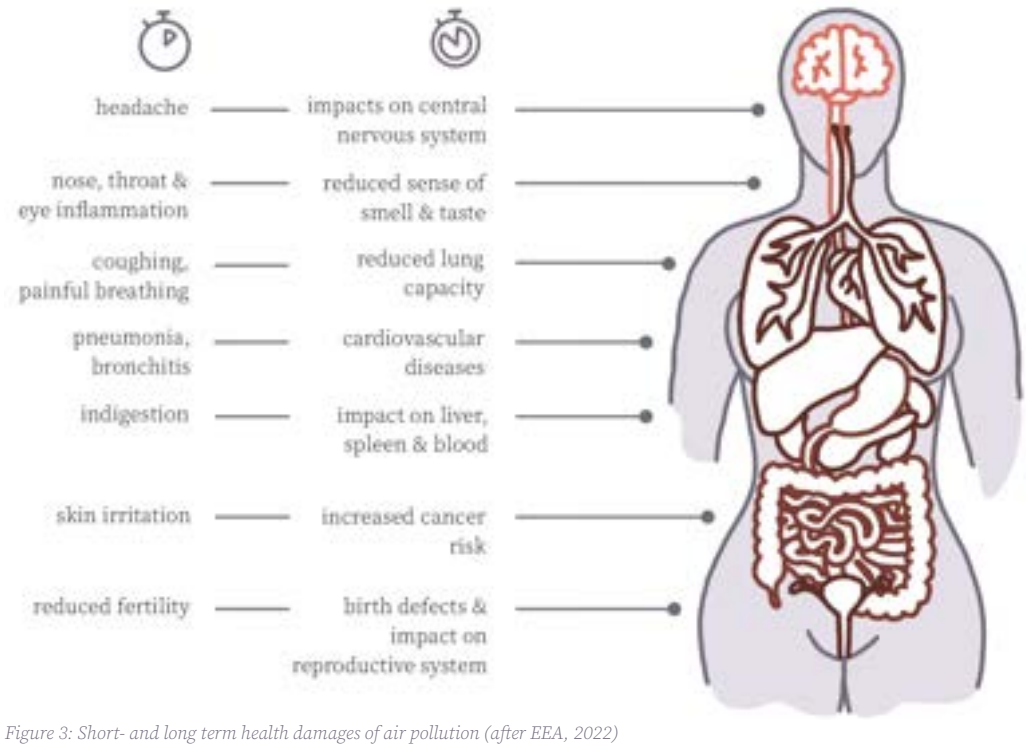


Figure 3: Short- and long term health damages of air pollution (after EEA, 2022)

As with many health implications, minorities and low income communities are especially at risk. This can be contributed to several main factors. Firstly, lower income regions tend to use less efficient heating and cooking methods as well as energy sources, namely combustion engines in the form of generators, open fires or wood burning stoves. Additionally, low income communities may have considerably fewer options when choosing living or work environments and often have no choice in being subjected to hazardous conditions. Lastly, the lower access to medical care leave vulnerable low income communities without necessary medical intervention (Romanovska, 2019).

The impact of air pollution on the ecosystem has been in researched for decades as well. While research has principally focussed on the impact on human health, it can be derived that other mammals face the same or similar health implications on their cardiovascular systems. The contamination of fish and animals lower in the food chain lead to a bioaccumulation, as predators continue to ingest toxins. In turn this tarnishes food for human ingestion (Barker et al., 1961). While air pollution damages forests and other plant matter at different degrees depending on the species, their destruction results in the reduction of natural filtering capabilities. This is particularly worrisome as a downward spiral may occur as a result.

In conclusion, virtually every living being in the 21st century is affected by air pollution to some degree, and with the further progression of global warming the situation is expected to escalate to a point where it is non-reversible..

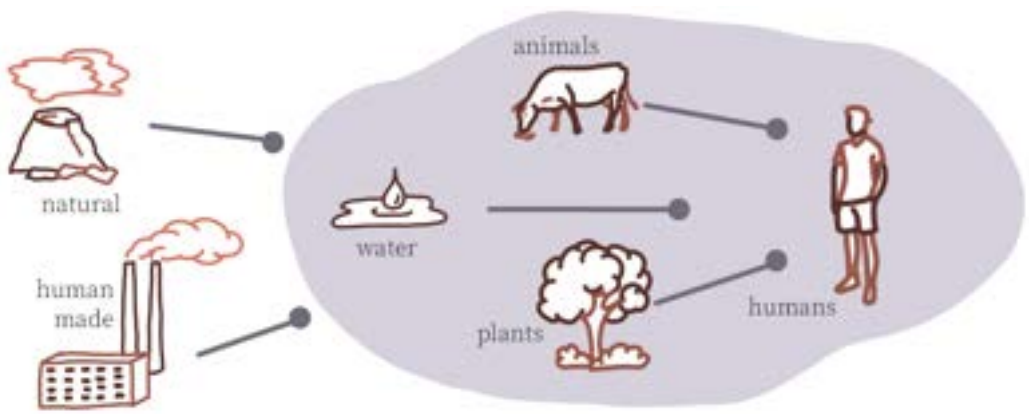


Figure 4: Air pollution sources and their effects on the ecosystem (after EPA, 2022)

2.2.2 CAUSES OF AIR POLLUTION

The causes of air pollution vary widely in different countries, geographical regions and are dependant on urban densities. Generally they can be categorised into natural and human-made air pollution.

Natural air pollution may include dust and sandstorms, pollutants distributed into the air by volcanic eruptions, biological decay or naturally occurring wildfires (Green, 2022). The increasing amount of wildfires due to global warming however, shift wildfires into being a human caused source of air pollution as well (Pascal et al., 2013). Natural air pollution is very specific to a geographic region as well as seasonal climate conditions and is relatively regular and predictable. While predictions and warnings can be made, there are few possibilities of reducing the sources and resulting air pollution.

Human-made air pollution on the other hand is more diverse and depends mostly on human behaviour and technology. Industrial sites and waste incineration have traditionally been one of the biggest contributors to human caused air pollution. Nowadays, around three billion people worldwide are depending on pollutant fuels as a source of electricity (WHO, 2020). As first world counties have made massive strides reducing these emissions, air quality in close proximity to large sites has improved steadily over the last decades (Pascal et al., 2013). Lower income countries are still most heavily affected, as the innovation and reconstruction of industrial processes is an expensive endeavour and takes a considerable amount of time (Romanovska, 2019).

Due to atmospheric phenomena and the physical properties of pollutants, air pollution from a single source can travel considerable distances and may cause issues far from the actual source (Zimmermann, 2016).

Another major contributor to air pollution is farming, particularly livestock, due to the use of ammonia and nitrogen based fertilisers which in combination with sunlight produces potent greenhouse gasses (Aneja, Schlesinger & Erisman, 2009).

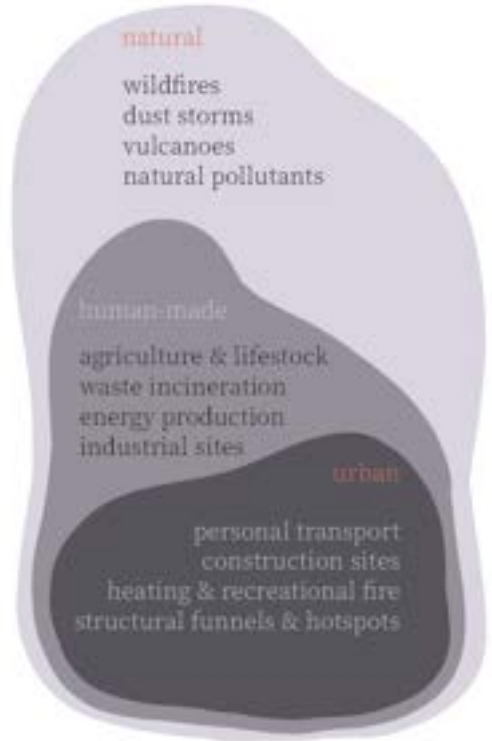


Figure 5: Summary of air pollution sources (after WHO, 2000)

Urban areas are particularly at risk of high concentrations of air pollution as they face a variety of industrial and personal contributions. Personal transport through vehicles and other personal combustion engines are one of the largest sources of fine particulate matter in urban areas. Additionally, the burning of wood, coal or other materials for cooking or recreational purposes create localised air pollution and may be heavily toxic depending on the materials. Urban construction sites are an additional hazardous source of fine particulate matter in urban settings (Zimmermann, 2016).
Oftentimes, the layout of a dense urban environments create funnels with little air flow that reduce the dissipation of air pollution and therefore create so called “hotspots”. Often, these hotspots are around city centers with large motorways and crossings and therefore affect a multitude of people traversing these areas.
Another problem, specifically of dense urban areas, is the huge variation in air quality, sometimes differing extensively within only a few hundred meters, which makes the evaluation of health risks difficult to track and communicate reliably (Bayer & Roloff, 2021).
Summarised, the causes of air pollution are tremendously diverse, spanning from natural phenomena to chemical reactions and human-made sources of pollution. Urban areas face further challenges due to the amount of pollutants and sources in a comparatively small region as well as the risk of a large population being affected.

WHO GUIDELINES 2.2.3

The World Health Organisation, *WHO*, can be considered one of the biggest contributors to research concerning air pollution. They offer an extensive databank of resources as well as being a major influence on policymakers worldwide. The WHO connects a large array of independent researchers and institutions and takes action to reduce air pollution and its impact globally.
The first edition of the *WHO air quality guidelines* was published in 1987, focussing on air quality in Europe (WHO,1987). A panel of air quality experts summarised studies into a guideline for 28 different air pollutants, focussing on both indoor and outdoor air quality. The guide was oriented around the minimum concentration of which each pollutant is proven to cause physical harm to humans.
Most recently an update of the *WHO global air quality guidelines* has been published in 2020, setting maximum air pollution goals for five main components of air pollution: particulate matter, ozone, nitrogen dioxide,, sulfur dioxide and carbon monoxide (WHO, 2021). These are the pollutants that have been been proven to cause the highest impact on human health during either short- or longterm exposure as well as being most prevalently found around the globe.

Particulate Matter, short PM, refers to different components like sulphate, nitrates, ammonia, sodium chloride, black carbon, mineral dust or water and is measured by size and separated into two categories: Particles smaller or equal to 2.5 ym (*PM2.5*) and particles smaller than 10 ym (*PM10*) (WHO, 2005). They can be found virtually everywhere and are caused by both natural and human causes. As one of the biggest polluters, particulate matter is also considered a major impact on global warming and regional climate disruption (Zereini & Wiseman, 2011).
Ozone (*O3*) is one of the biggest components of smog and is commonly caused by photochemical reactions. It is produced most predominantly by industrial sites and vehicles. A sunny, dry climate leads to an increase in O3 due to optimal conditions for a photochemical reaction (Bresnahan, Dickie & Gerking, 1997).
A precursor to Ozone is the chemical compound nitrogen dioxide (*NO2*). It results as a byproduct of combustion processes (WHO, 2021). Similarly, sulfur dioxide (*SO2*) is another byproduct of combustion. Lastly, carbon monoxide (*CO*), a well known substance, is by itself a highly dangerous gas. It is produced by the combustion of carbon rich materials and high exposures can lead to death within minutes (Chen et al., 2007).
The resulting pollutant thresholds summarised within the 2020 global air quality guidelines have been formulated and reevaluated from the last version published in 2005. Due to new studies of dangerous concentrations of air pollution many threshold values and short term exposure values have been lowered dramatically. Additionally to the guidelines itself, the WHO offers suggestions of implementation for governments, local advocates and citizens themselves.

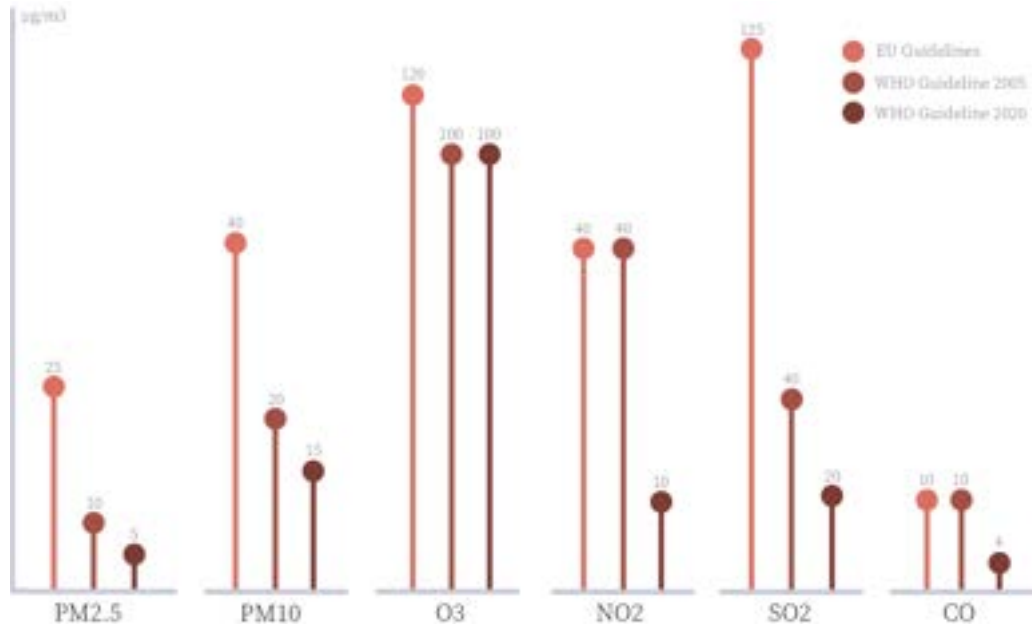


Figure 6: Air pollution guidelines set by the EU, the WHO in 2005 and the WHO update in 2020 (after EEU, 2016)

AIR POLLUTION IN THE CITY OF MAGDEBURG 2.2.4

The city of Magdeburg is located in the German state of Saxony-Anhalt. With around 235.000 inhabitants on an area of over 200 km2, it is the second largest city of the state as well as the state capital (Landeshauptstadt Magdeburg, 2022). While there are some high rise buildings within the city, the city is built relatively uncompressed and is known for its large and plenty parks and green areas. The river Elbe flows through the city center, reducing the urban density further.
Environmental concerns are primarily addressed by the Landesamt für Umweltschutz (*Ministry for environmental protection).* Air pollution and air sensing systems are supervised by the Luftüberwachungsystem Sachsen-Anhalt, short the LÜSA and adhere to the EU guidelines of air quality control. Throughout the state, there are 24 air quality sensing stations, five within the bounds of the city Magdeburg. They are specifically placed to measure different urban areas including traffic rich areas, inner city areas, suburban areas and rural areas (Zimmermann, 2016).

Massive industrial reconstruction has taken place since the reunification of Germany in 1989, reducing industrial air pollution dramatically (Bayer & Roloff, 2021). As of 2022, Magdeburg has relatively good air quality throughout the year, however specific events, meteorological or otherwise, are known to cause irregular spikes in air pollution. Especially in high traffic areas, air pollution can rise significantly over the 2020 WHO guidelines, especially during the warmer, drier weather in the summer.

Figure 7: Air sensing stations in the state of Saxony-Anhalt (after Zimmermann, 2016)

IMPLEMENTATIONS AND PUBLIC INTEREST 2.2.5

There have been several methods of implementation of the WHO air quality guidelines throughout the EU, although the current air pollution guideline are still above the recommended thresholds by up to 400 percent.
Generally it can be said that since 2010, improvements in air quality have been recorded in most of the 27 EU countries, although there have been negative tendencies as well. Germany has shown a sizeable reduction of CO2 emissions, while several other countries including Croatia and Portugal have even seen an increase in CO2 emissions (EEA, 2021).

Air pollution is still one of the biggest environmental issues humanity is dealing with in the twenty-first century. While scientists have studied causes and solutions for decades, policy-makers as well as public citizens have shown nominal interest towards the subject in Germany.

Figure 8 (right): The mobile application European Air Quality Index
Figure 9 (left): The mobile application Luftqualität Sachsen-Anhalt

One major challenge for public awareness is the fact that air quality data and information can be inaccessible for non-experts due to its complexity. There have been examples, such as the mobile application and cleanBREATHE partner *AirCare* that depict air quality in the form of the *Air Quality Index* or *AQI* as an effort to make data more approachable to private citizens. This application also allows for data collection from on-governmental sources such as local or private sensing technology (Batz, 2021).

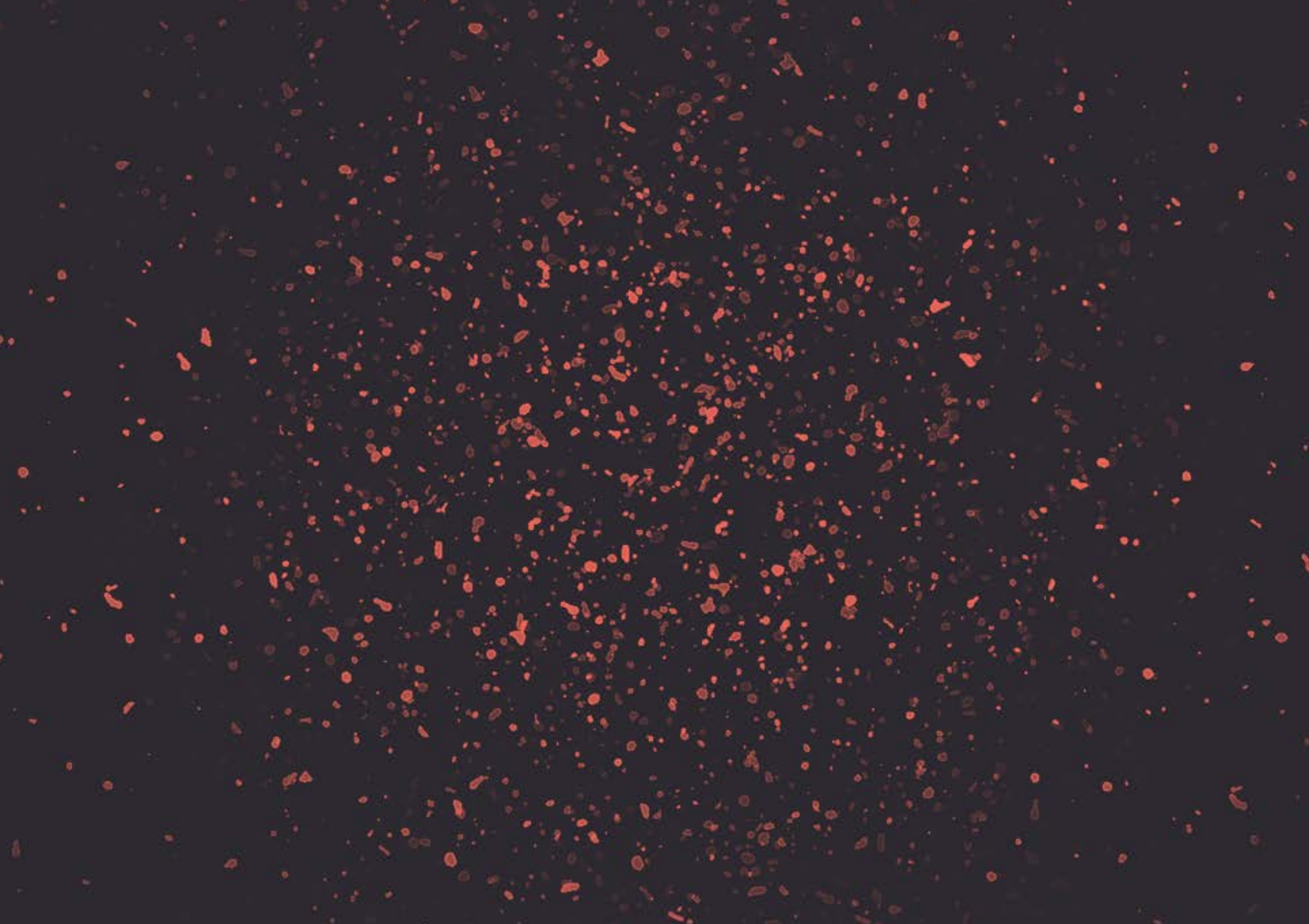
Regarding the city of Magdeburg, there have been several direct and indirect measures to improve air quality and public awareness towards the topic.
One of the strategies to reduce air pollution has been the reduction in traffic by lowering speed limits as well as a restriction on high emission cars within the city. During the 1990s the city set up a large scale air quality monitor in a central part of the city, which was demolished less than ten years later due to a lack of funding, interest and outdated technology (Bayer & Roloff, 2021). There have been recent approaches to engage with the citizens on the subject of air pollution by publishing a local mobile application *Luftqualität Sachsen-Anhalt* (Bayer & Roloff, 2021). However, the application has not shown a rise in interest. This can be attributed to the redundancy of the application, as the EU implements the same data in the more advanced *European Air Quality Index* mobile application.

2.3 CONCLUSION

This chapter summarises why air pollution should be addressed aggressively and fast, especially regarding the tremendous hazards air pollution poses on human health, even at relatively low concentrations. Air pollution is currently at an health impacting level all over world, thus it is surprising to see how low public awareness is. It may be true that Germany and particularly the city of Magdeburg are currently privileged to have relatively good air quality, however that should not allude to citizens not needing to be aware and change their behaviour to make cities more inhabitable longterm. A large portion of urban air pollution is produced by personal choices, particularly the use personal transport. Thus a rise of awareness and longterm behavioural change can have a sizeable impact.

Furthermore, local and state politics are influenced by citizens choices and priorities, which is why public pressure towards better decision making can lead to longterm improvements on the local urban air quality.

The research project cleanBREATHE and the author see this collaborative project as a chance to address the topic and raise public awareness.



3 PARTICIPATORY DESIGN

After outlining the subject of air pollution in the overall context of the thesis in the last chapter, the following chapter will offer an in depth insight into the design approach that is being utilised.
Firstly, participatory design will be explained through its main characteristics and its historical roots, reviewing its origins in social design movements of the 1970s. Furthermore, the growing interest in participatory design in current times will be analysed. Contemporary approaches of participatory design will be shown through the approaches of Elizabeth Sanders and Pelle Ehn. To situate participatory design in the current design landscape, an overview of multiple social design methodologies will be given. As participatory design is highly flexible, some of the more common formats will be evaluated and lastly, some of the disadvantages and advantages of utilising participatory approaches will be summarised.

3.1 DISTINGUISHING CHARACTERISTICS OF PARTICIPATORY DESIGN

Simonsen & Robertson define participatory design as "a process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective ‚reflection-in-action'. The participants typically undertake the two principal roles of users and designers where the designers strive to learn the realities of the users' situation while the users strive to articulate their desired aims and learn appropriate technological means to obtain them. (2013, p.2)"

Participatory design can be summarised as a design approach that relays inherently on the cooperation with the target group of the project. The viewpoint is that the participants have all of the necessary and valuable insights into the needs and desires of the target group, while the designer offers the tools and skills to enable the process (Björgvinsson, Ehn & Hillgren, 2012). Consequently, this approach is inherently social and relays of an understanding between all collaborating parties.
Ideally, the same participants are involved throughout the entirety of a project. This is one key difference between participatory design and other commonly applied design approaches such as design thinking, in which users are intermittently brought in throughout a project as an evaluation tool (Lewrick, Link, Leifer & Schmidt, 2020). As a benefit of working with a defined target group on a design solution for their particular need, outcomes are often highly individualised to fulfill their needs specifically.

To succeed in this objective, participatory design focuses on flexibility throughout the project and in the end result (Simonsen & Robertson, 2013).
Historically, participatory design engages with target groups that have been marginalised or have special needs, as they especially benefit from customised design solutions (Björgvinsson et al 2012). While participatory design originated from the need to adapt new technologies to the user, it has become more widespread into other design fields and beyond. Variations of the approach are also being utilised in social sciences and overlap with many attributes of the citizen science approach.

Participatory design is most commonly applied in non-commercial projects, by grassroots organisations and for research purposes. There is nothing inherently conflicting in utilising it for commercial projects, however its attributes make it generally less favourable for profit.

Lastly, participatory design has since its conception impacted local politics and environmental activism, as the collaborative approach encourages involvement of communities in decision making processes (Frascara, 2002). Designers or researchers often act as mediators between local policymakers and communities whose needs would otherwise not be recognised.
While political involvement is not inherently necessary for a project to be classified as participatory design, there is an emphasis on creating a framework for the project to continue growing independently even after the official conclusion (Björgvinsson et al., 2012).

3.2 ROOTS OF PARTICIPATORY DESIGN

Participatory design has a long history and can be traced back to the 70s Scandinavian co-design, in which political movements of union workers demanded their consideration in the design of technologies they use. The rapid advancement and integration of computer technologies into the work environments necessitated the involvement of the users to make the new technologies approachable (Simonsen & Robertson, 2013). This democratic process of development was, if not unheard of, uncommon during that time and enabled a change in the mindset of how design can collaborate with the user.

The hugely influential work *Design for the Real World*, published in 1971 by the Swedish designer Viktor Papanek reflects the changing mindset during that time. It is one of the most influential examples of early human centered design and is often used to showcase the link between politics and design. One focus in his approach is the cooperation of experts from different fields within the design process, as well as with the users of the product. He often included aspects from nature into his work and pressured for the consideration of the environment in design and in manufacturing processes (Papanek, 1971).

"Design must become an innovative, highly creative, cross-disciplinary tool responsive to the true needs of men. It must be more research oriented, and we must stop defiling the earth itself with poorly designed objects and structures. (Papanek, 1971, p. 8)"

Papaneks ideals were relatively unpopular at the time of publishing, particularly in the USA. It contradicted the current trend, in which mass production and maximum efficiency were seen as a desirable path towards the future. Ideas such as individualism, ecology and interdisciplinary cooperation were not profitable (Clarke, 2013).

Over the last decades the ideas of the social design movements of the 70s have gradually risen to popularity. Social design has developed into different subcategories such as human centered design and user-centered design that will be elaborated in a latter section.
While nowadays collaboration, environmental concern and inclusive design have become increasingly popular, it took several decades to get to this point.

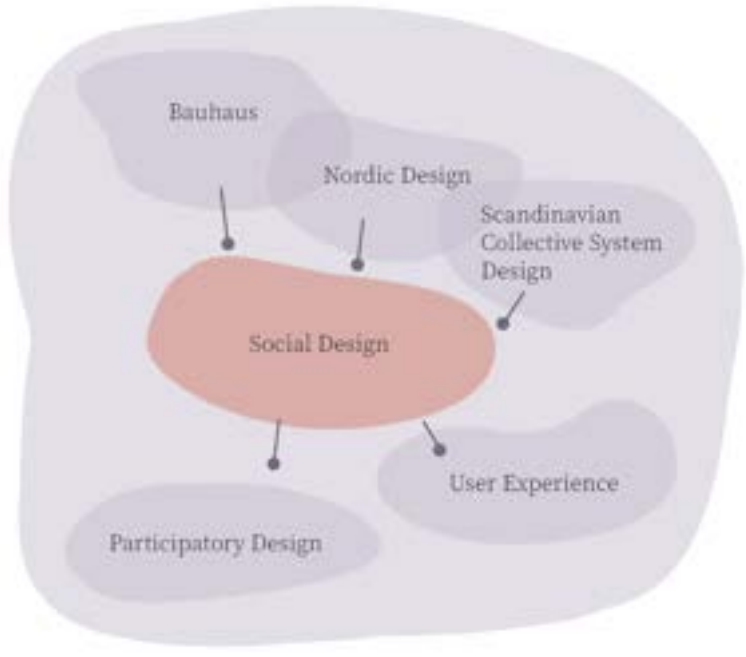


Figure 10: Summary of the influences on social design and participatoy design (after Simonsen & Robertson, 2013)

3.3 CONTEMPORARY PARTICIPATORY DESIGN

As explained in the last part, participatory design has its roots in social design reaching back to the 70s, gaining particular popularity within the last decades. This is due to several reasons which can be categorised in two groups: technological advancement and social change (Clarke, 2013).
Primarily, the popularity of participatory design is caused by the need of citizen involvement. Civil unrest, environmental issues and diversification in society have made social design increasingly necessary and desirable.

Outside of the design of products and technologies, participatory design has become increasingly popular in urban and city planning. Dense urban centers require more adapted solutions that fulfill the needs of its inhabitants (Cortés & Hassan, 2019). Furthermore, as the climate crisis and its consequences have reached first world counties, participatory design has become a tool to influence local politics and make citizens feel recognised.

Secondly, technologies enable more custom solutions in design. The accessibility of a broad variety of products forces brands to appeal to smaller groups of users, creating more customised solutions. To stay marketable and profitable, products have to be as appealing as possible to a specific target groups, whose desires have become more diverse accordingly. Additionally, the explosion of rapidly changing information technologies necessitate a design approach that includes the users into the process (Sanders, 2002). The fields of user experience and user interface design have developed to address this (Hassenzahl, 2013). There is a huge range of possibilities to involve users within the digital design process, such as evaluation and testing through digital services. However, it can be argued that while this is commonly done through user-centered design, it is rarely a participatory design process in which users are fully involved or their needs addressed.
Post design or *user-created design*, meaning design frameworks that allow the users to create their own products, have become more widespread (Buchmüller, 2013). Particularly modern media has developed into digital platforms that curate user generated content.
With an abundance of material goods more easily accessible than ever before, experiences are becoming more valuable than physical goods. This desire to experience rather than consume can be more readily fulfilled by participatory design.

MODERN PERSPECTIVES 3.3.1

Two modern perspectives on participatory design come from Elizabeth Sanders as well as from Pelle Ehn (Buchmüller, 2013).

Sanders argues that with the shrinking need for product designers, *experience design* is developing into the contemporary design approach. To be successes in its implementation, the users needs and desires need to be taken into deep consideration and should lead the design process (Sanders, 2002). It redefines the role of a designer as an enabler that has to collaborate with researchers and developers as opposed to being the lead creator themselves.

"Discovering what people think and know provides us with their perceptions of experience. Understanding how people feel gives us the ability to empathize with them. This way of knowing provides tacit knowledge, i.e., knowledge that can't readily be expressed in words (Polanyi, 1983). Seeing and appreciating what people dream shows us how their future could change for the better." (Sanders 2002: 3)

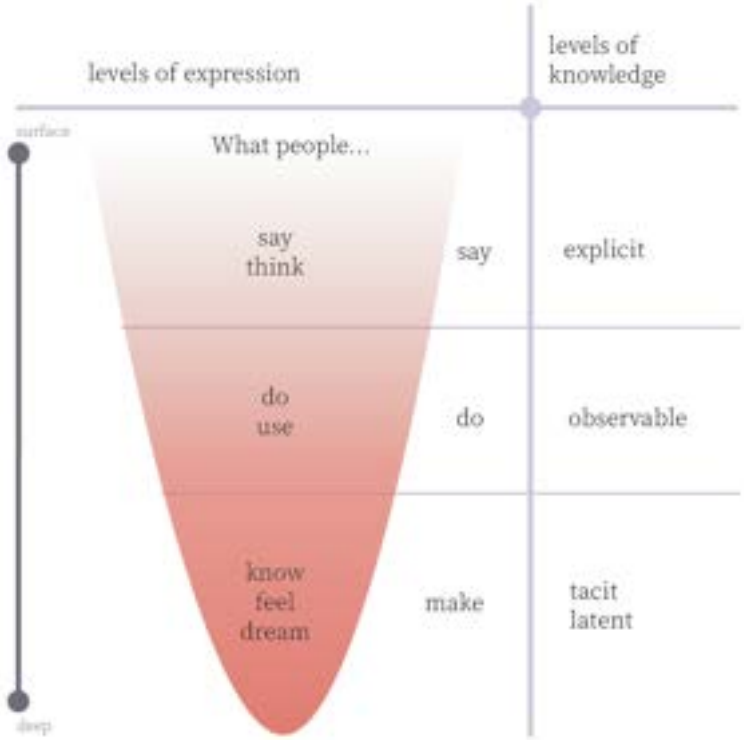


Figure 11: The three depth levels of participatory design (after Sanders, 2002)

Pelle Ehn, professor and researcher at the *School of Arts and Communication at Malmö University*, has a similar view to Sanders and sees design as more than the creation of objects, technology or goods (Björgvinsson et al., 2012). In contrast to Sanders however, he pursues a more critical approach. He points out that the Bauhaus movement catered for the elite and therefore cannot be considered successful social design. Similarly, the Scandinavian workers movement of the 70s was only successful as it created commercial benefit for the stakeholders and didn't succeed due to the benefit it created for the workers (Buchmüller, 2013).

He emphasises the true goals of participatory design as longterm user involvement, active participation and designing for real life scenarios and considers success the improvement of political democratic practices as well as the improvement of living conditions of minorities (Buchmüller, 2013).

"Social innovations can be products or services just like any innovation, but they can also be a principle, an idea, a piece of legislation, a social movement, an intervention, or some combination of them. The key aspect is its capacity to simultaneously meet social needs and create new social relations.(Björgvinsson, Ehn & Hillgren, 2012, p.43)"

3.4 RELATED DESIGN METHODOLOGIES

Throughout the decades, participatory design developed from social design alongside several similar, yet distingrustiable design approaches. In the following part the terms *user-centered design*, *human centered design*, *design thinking*, and several others will be further elaborated to understand the current design environment and the distinguishing features of participatory design.

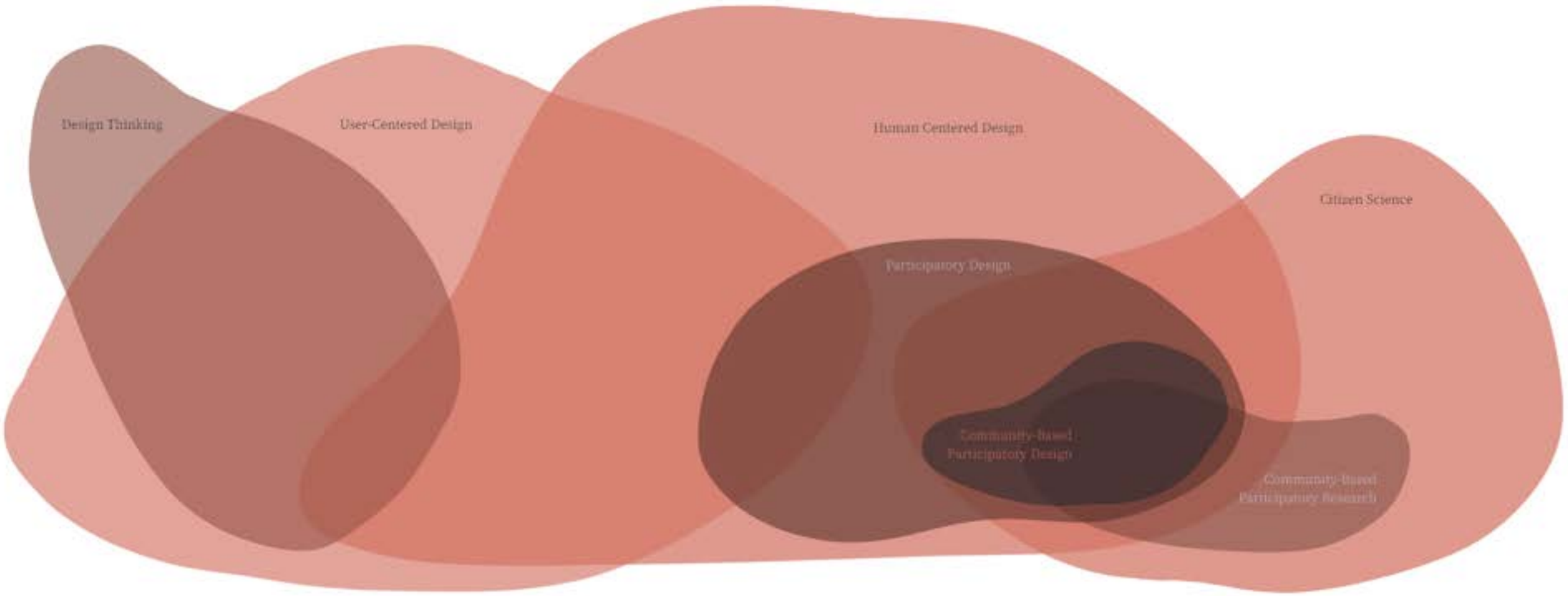


Figure 12: Participatory design in the context of other social design approaches

USER-CENTERED DESIGN 3.4.1

Abras, Maloney-Krichmar & Preece define user-centered design as "a broad term to describe design processes in which end-users influence how a design takes shape. It is both a broad philosophy and variety of methods. There is a spectrum of ways in which users are involved in UCD but the important concept is that users are involved one way or another (2004, p.1)."

User-centered design can be seen as an umbrella term of any design that incorporates the user into the design process. It was first coined by Donald Norman in the 1980s and has quickly risen to popularity thereafter.

In his book *The Psychology Of Everyday Things*, Norman elaborates on his view of user-centered design approaches and offers a list of four basic attributes that good design has to contain, all of which place the user in the center (Norman, 1988). In summary, he suggests that the role of the designer is to create a product which facilitates flawless interaction and simple understanding of its functions for the user (Abras et al., 2004).

Apart from involving the user in the design of the process, Norman also takes the situation and environment in which the interaction takes place into consideration (Norman & Draper, 1986). Summarised, in user-centered design the users become a central part of the development process.

HUMAN CENTERED DESIGN 3.4.2

Due to its similarity to user-centered design, the term human centered design can seem misleading. However, while they share some common traits, human centered design focusses on humans altogether instead of reducing them to a user for a particular product. Human centered design is more commonly used for social projects as compared to business developments (Holeman & Kane 2020). The design process incorporates the target group similarly to user-centered design, however in contrast, it takes all involved parties into consideration, which may include local governments, stakeholders as well as the target group. While the focus of user-centered design is finding a creative solution for a predetermined design problem, the human centered design approach places a larger emphasis on the problem definition and analysis (Kurosu, 2011). The project may exist without a predefined end result but as an ongoing process of defining a problem, testing possible solutions and reevaluation.

3.4.3 DESIGN THINKING

Design Thinking is a design approach that can be considered related to the field of user-centered design, however they differ in some important factors. While user-centered design focusses on involving the user of a product in the design process, design thinking calls for a development team that includes interdisciplinary experts instead of the target group themselves (Lewrick et al., 2020). Most of the design process takes place inside the team, using tools that encourage creative problem solving to develop custom solutions. There is an emphasis on conducting field studies and building empathy for the users through methods such as interviews, but the users are not part of the creative process themselves (Winograd & Woods, 1997). User testing and involvement is conducted intermittently at different stages of the design process as opposed to continuously throughout the entire development (Lewrick et al., 2020).

However, many methods that are used to creatively engage within an interdisciplinary team in design thinking can also be utilised in a user- or human centered design approach.

3.4.4 CITIZEN SCIENCE

Similarly to social design, participatory science approaches have become popular alongside.

Citizen Science, as the name suggests, is not a design approach but a science approach with a similar philosophy. Its conception can be traced back to as early as the 1900s (Cohn, 2008). The approach involves citizens in various science processes, particularly in field testing and data acquisition. The goal is to encourage interest in science and the respective subject, creating awareness as well as facilitating

large scale data gathering methods. The citizens themselves become scientists similarly to users becoming designers through user-centered design. A key difference is that citizen scientists generally acquire knowledge or receive an education on the subject throughout the collaboration, while participants in human and user-centered design approaches already possess all the skills necessary to collaborate in the design process (Finke, 2014). The approach of citizen science is commonly found in education and social sciences. However, there has been critique about the validity of data gathered by citizen scientists.

COMMUNITY BASED PARTICIPATORY RESEARCH 3.4.5

Another approach within the field of citizen science is community-based participatory research. It includes all the characteristics of citizen science but has a particular focus on the involvement of the local community and educating throughout the research process (Commodore, Wilson, Muhammad, Svendsen & Pearce, 2017). Projects often concern the local environment of the community and are adapted to their needs.

COMMUNITY BASED PARTICIPATORY DESIGN 3.4.6

Lastly, the field of community-based participatory design is a specific subcategory of participatory design that closely resembles community-based participatory research. Many participatory design projects will fall into this subcategory, as community involvement is a frequent attribute. Community-based participatory design is closely related to community-based participatory research, the difference being that the focus is on the creative solving of design problems rather than science based research approaches (Harrington, Erete & Piper, 2019).

Summary

The variety and nuances between the social design and science approaches become evident through the analysis of the commonly used terms. While all have specific distinctions, the needs of humans are a major focal point throughout all approaches.

Considering the placement of participatory design within this social design environment, it can vary depending on the the subject and approach of a project. Generally, it is categorised as a user-centered design approach, although it can be argued that many participatory design projects can be classified as human centered approaches due to their positive impact on humans and/or their environment. Only design thinking has the distinct difference of placing the user involvement in a lower priority while still promoting emphasising on the users needs and desires.

PARTICIPATORY DESIGN IN ENVIRONMENTAL ACTIVISM

3.5

Working collaboratively within local communities has always been a focal point of environmental activism. Involving citizens through participatory projects is a successful method to activate and lead to behavioural changes as well as engaging with local politics (Harré, 2018a).

In contemporary research, environmental psychology has become a distinct research topic within behavioural psychology. Psychologists Niki Harré summarised this in her book *Psychology for a better world* in 2018. The subtitle *Working with people to save the planet* highlights the focus on participatory approaches. Within the book she summarises how to communicate environmental information effectively by accessing psychological phenomena as well as giving real life examples on how activating participants through collaboration can be achieved (Harré, 2018a).

"There are three key levels of action. The personal level, which concerns your lifestyle; the group level, which includes both the sustainability-focused and other groups you are part of; and the civic or political level, which concerns the larger systems that influence us all.(Harré, 2018a, p.140)"

Harré categorises environmental activism into these three levels of action, of which the second and third particularly correlate with the strategies of participatory design.

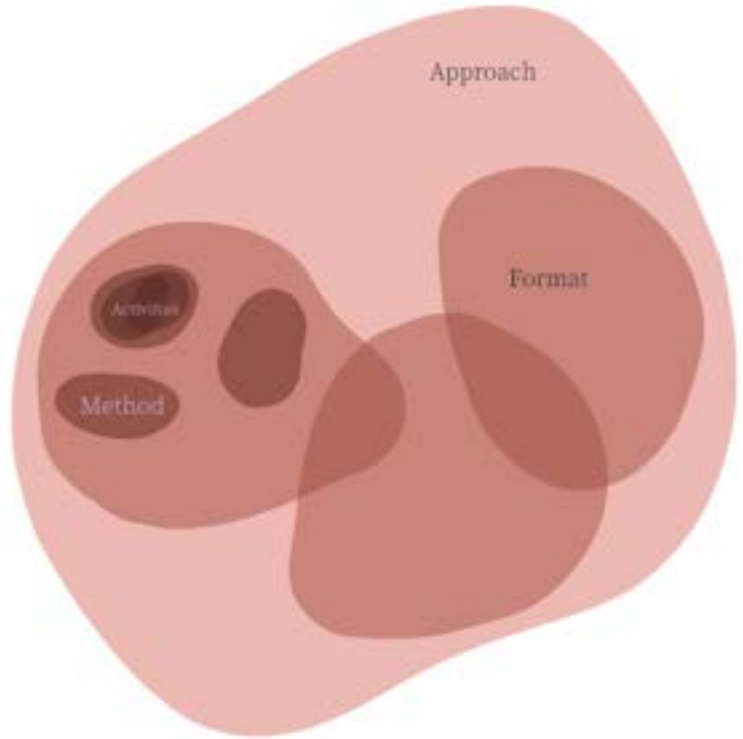
Other key elements include using positive emotions rather than negativity, encouraging behavioural changes through creativity, as well es educating through comprehensible real life scenarios (Harré, 2018a). Many elements mirror methods of participatory design.

To emphasise on the collaborative aspects, Harré (2018b) published an addition *Keeping what we Value in Play*, a manual which offers instructions of involving participants through nine detailed exercises. These are designed to be run in participatory events such as workshops and courses and can be classified as participatory design methods.

It is evident that the values of participatory design and environmental activism overlap tremendously. This mirrors the origins of participatory design, as seen in Papaneks work, who included ecology and politics into his design approach and made it a central subject in many of his publications.

COMMON PARTICIPATORY DESIGN FORMATS

3.6



Participatory design can be approached through a multitude of different formats and variations of each. A format can be defined as the situation in which users and designers collaborate continuously. They should not be confused with methods, which are short term events within the format. Most common formats are courses, workshops or more elaborate longterm establishments such as living labs which will be summarised in the following.

Figure 13: The terms Approach, Format, Method, and Activities in correlation

LIVING LABS 3.6.1

"A Living Lab is an open innovation environment in real-life settings in which user-driven innovation is the co-creation process for new services, products, and societal infrastructures. Living Labs encompass societal and technological dimensions simultaneously in a business-citizens-government-academia partnership. (Bergvall-Kåreborn & Ståhlbröst, 2009, p. 2)"

The term Living Lab is an umbrella term describing an environment in which innovation is approached through cooperation of several parties. The main benefit for stakeholders is a continuous flow of ideas that can be accessed directly without establishing new infrastructures for singular research programs (Bergvall-Kåreborn& Ståhlbröst 2009). Most of the time living labs have the goal of growing organically and have a regular interchange of participants throughout the phases.
One example, the Malmö Living Labs, is a series of projects that have grown over several years and enables several smaller grassroots organisations to collaborate successfully with local stakeholders (Björgvinsson et al., 2012).

COURSES 3.6.2

Similarly to living labs, courses cover a wide spectrum of different participatory design approaches. In general, courses are recurring events in which the participants interact to fulfill a certain objective (Cambridge University Press, n.d). Participatory design courses often take place at educational centers such as schools, universities or community colleges but can also be conducted in facilities such as senior citizen centers, businesses or privately without a partnering institution. In the context of participatory design such courses commonly provide a benefit to both the designer by working on achieving a design goal as well as for the participants by offering insight into the subject.

Courses are generally rigidly structured and are conducted over a predetermined time frame (Byers et al., 2013). The participants, designers and other stakeholders collaborate in the same group throughout the project, although there may be additional collaborators joining intermittently throughout the courses.
The main advantage of courses is the comparatively low effort in the establishment and the continuous involvement of the same participants. Through a partnership with a local institution participants can be sourced reliably and steadily. However, possible partnerships

3.6.3 WORKSHOPS

"We define the design workshop as a spatially situated and temporally bounded coming together of participant groups and researchers to envision new design futures, which employ particular materials, tools, and goals (Harrington, Erete & Piper, 2019, p. 216:2)."

Workshops are by far the most common format of participatory design. A workshop in participatory design can be a singular event or a series of multiple workshops with the same or different participants (Simonsen & Robertson, 2013). In comparison to courses, workshops are usually conducted in less regular time frames and in lower numbers per project.
Another key difference between workshops and courses is that workshops are usually more interactive and put less emphasis on traditional educational formats such as lectures or exams. The setting is often in an open, creative environment and can integrate a wider target group. Due to their flexility workshops can be organised relatively quickly and at low costs which makes them a popular choice for researchers, designers and private facilitators.

3.6.4 DIGITAL FORMATS

Digital formats of participatory design are comparatively rare, as there are significantly more challenges when collaborating digitally. Through digital methods, user involvement is usually of a short duration and more simplistic, utilising methods such as questionnaires, feedback options, or even unconsciously through tests conducted by developers (Sturm & Tscholl, 2019). This can not be considered true participatory design as it lacks in collaboration.

However, digital variations of courses, workshops or other interactive formats are possible. They offer several advantages, particularly considering that participatory design often includes marginalised target groups that may otherwise face challenges gaining access to participatory design projects. Additionally, this allows for participants from several different geographic locations to collaborate, which gains importance when working with a very narrow, scattered target group or external stakeholders. It also allows for different approaches in activating hesitant participants.

On the other hand, not every participant has the technical equipment to participate digitally, which should be taken into consideration. There is also a tremendous benefit from interacting in person, as it improves communication, group dynamic, and allows for more hand on exercises. It should be very carefully evaluated at the beginning of a project whether a digital format can be beneficial, particularly because participatory design projects often includes direct interaction between the involved parties.

OTHER AND MIXED FORMATS 3.6.5

As participatory design encourages flexibility in its implementation, many formats cannot be categorised easily or use elements of multiple different formats.
In some cases, even an interview can be interactive and extensive and as such can be considered as a format in itself, particularly if it takes place in a series or with other participative elements. In other cases an interview is one exercise within a larger format such as a workshop. Same can apply to quizzes, such as the interactive quiz utilised separately and in combination with a workshop series by a UK based research project that took place in 2020 shows (Mahajan et al, 2020). The quiz was distributed both online and physically accessible to the public at specific locations prior to a workshop series. In this scenario it can be considered both a format and a method, as participants were able to use the quiz without attending the workshops.

Summary
These are a limited choice of many different formats of participatory design approaches. Many projects include some elements of these formats or combine various formats together to match their needs. Overall it can be said that workshops are the most common format due to their flexibility and relatively low entrance barrier. However, courses often offer similar benefits. Even though living labs are a particularly successful and beneficial format, they require much more funding, time and human resources to establish.

ADVANTAGES AND DISADVANTAGES OF PARTICIPATORY DESIGN

3.7

As with any design approach, participatory design poses its own unique challenges and advantages.
When executing a participatory design project, the communication and relationship between the researchers and participants is of utmost importance. Mistrust or misunderstanding can severely reduce the effectiveness of the collaboration. Especially in the early phases of a project, major consideration should be put on the communication and establishment of a positive relationship, especially when working with participants that may have a natural distrust in authority due to their prior experiences (Harrington et al., 2019).

Documenting a project for design and research purposes is elementary and can come with additional challenges within participatory design projects. This is especially the case if the participants are continuing processes at their own pace or in their personal environment. This may deter researchers to use a participatory design approach, which limits references other researchers and designers may relate to.
In research or design projects are commonly funded by institutional funds or through third party funding. Both require a project to adhere to particular conditions set by stakeholders. Making the target group a key collaborator within a research project can be risky, as the outcomes are less predictable. It may also require more intensive funding as well as a longer time frame. This makes participatory design a risky investment for both cooperations and research institutes alike.

On the flip-side, participatory design delivers many advantages if applied correctly and in suitable situations. As mentioned in the beginning of the chapter, one key advantage of participatory design is that the resulting outcomes are customised exactly to the target groups needs (Simonsen & Robertson, 2013). Such individual solutions can hardly be archived without participant involvement. A successful project may also deliver outcomes that are applicable to other subjects with minor adaptations, therefore providing additional benefit the longer it is running. Similarly, once a collaboration between a target group and stakeholders is established, it can run almost independently and achieve longterm results outside of the initial research goal (Björgvinsson et al., 2012)

Most importantly, a successful participatory design project can have a tremendous positive impact on the participants well being. Not only are the outcomes of a project directly benefiting the target group, participating in a project can be beneficial in itself. Many participants describe the projects as an encouraging and overwhelmingly positive experience. In some instances, even the facilitators have built such a bond with the participants that they continue a relationship outside of the research project (Harrington et al., 2019).

Lastly, a successful participatory design project can have lasting positive impact on the social environment it was conducted in. Projects can influence local politics and snowball into larger changes.

3.8 CONCLUSION

As seen in this chapter, participatory design does not exist in a vacuum, it is a design approach with numerous overlaps of other social design and citizen science methodologies. All have the user or human in the central point of the research and design process in common. There are many situations in which the methodologies overlap and a design process utilises attributes from several approaches.

Participatory design is extraordinary flexible in its execution, which leads to a widespread variety in approaches, formats and methods. However, there are some elements that need to be represented to define a project as participatory design. There has to be longterm involvement of the target group throughout the process, and within the collaboration the participants need to be given control over the design process. The designer is a facilitator that enables the process and guides throughout the process (Simonsen & Robertson, 2013).

Political involvement is deeply engrained into the roots of participatory design. As it stems from political movements throughout the 20th century, it can be argued that true participatory design requires a political aspect to be considered true participatory design (Buchmüller, 2013). However, this opinion is contested.
Furthermore, participatory design has an inherent connection to ecology, environmental and socially benefiting behaviour. This should be a goal of any participatory design project and it is debatable whether success can be achieved without striving for it.

4 STATE OF THE ART

To understand the contemporary participatory design environment, this chapter will guide through a review of multiple projects that include participatory design aspects. Primarily, the reference projects that have been taken into consideration include workshops or courses and have been conducted in the last ten years. Additionally, there has been an analysis of available guidelines that include information on participatory workshops to understand how the subject is currently presented in contemporary media and research.
Most importantly, the key findings and challenges of the reference workshops were analysed to recognise recurring issues in participatory design approaches. This will allow the case study within this thesis to evade avoidable complications and develop potential solutions.

REFERENCE PROJECTS 4.1

EMPOWERING MARGINALISED COMMUNTIES THROUGH PARTICIPATORY DESIGN 4.1.1

A detailed strategy of two case studies was published by the female research team Christina Harrington, Sheena Erete and Anne Marie Piper in the United States of America in 2019. The research group conducted a series of workshops on two different topics by utilising participatory design approaches.

"Although PD was intentioned as a way to counter power in workplace infrastructure and create balance between the user and the designer, we argue that certain methods, such as the design workshop, or approaches to design thinking (e.g., "blue sky" ideation) have an ethos that can be exclusionary to communities that have historically faced systemic discrimination (Harrington, Erete & Piper, 2019, p. 216:2)"

The main focus was to evaluate participatory design approaches within communities that have traditionally faced oppression and address possible challenges that participatory design pose for these groups (Harrington et al., 2019).

First Workshop

Within the first workshop, the goals were formulated as to *"elicit a better understanding of (1) health and potential tools to support health maintenance, and (2) the use of design workshops as a catalyst for community health discussions (Harrington et al., 2019, p. 216:9)."*.
The series of five publicly funded workshops were held weekly and lasted roughly two hours each. Thirteen participants were recruited through a local partnering senior citizen center. The methods used within the workshop included collaging, photo voice activities, "How might we..." statements, brainstorming as well as paper prototyping.

Additionally, the researchers led and encouraged open discussions about the participants personal struggles within the medical care environment (Harrington et al., 2019).
A particular emphasis was making the participants feel involved by adding critical reflection sessions after each workshop as well as through extensive debriefing after the workshops. Furthermore, a one page review was formulated and shared with the participants. Due to the strong bond researchers and participants built and the success of the workshop, the lead researcher continued working at the senior center and engage with the residents to evaluate the possibility of future projects (Harrington et al., 2019).

Second Workshop

The second workshop included participants from black and latinX communities and engaged on the topic of how technologies can better support underserved communities to address local issues. (Harrington et al., 2019). Two workshops of roughly three hours were held with two separate participant groups. 14 participants were recruited in the first workshop and 41 participants in the second, as well as local stakeholders (Harrington et al., 2019).
In addition to the participants, a lead facilitator, a group facilitator and a notetaker were involved throughout the workshops. The agenda included three main sections: an icebreaker activity, an asset mapping activity and a brainstorming activity.
Similar to the first workshop, outcomes were shared with the participants in the aftermath through a flyer as well as via a presentation. Results from the workshops were also shared with local policymakers and a collaboration between the community and local government was encouraged (Harrington et al., 2019).

4.1.2 MULTILAYERED CITIZENS SCIENCE APPROACH ON AIR POLLUTION

Another case study that will be highlighted due to its process and topical relevancy is an approach of citizen science focussing on the public understanding of urban air pollution in the British city of Guildford (Mahajan et al., 2020). While the project did not follow a participatory design approach, the methodology applied is comparable and the research team conducted the workshops similar in their key features.

"[…]we adopt an integrated citizen approach which ensures meaningful community interaction and participation. The citizens are no longer just treated as the participants but more like collaborators and are involved in all the steps; from problem formulation and experimentation to results dissemination. (Mahajan et al., 2020, p.3)"

As a first evaluation, the research team developed an interactive air pollution quiz which is available online as well as being presented at several physical locations (Mahajan et al., 2020). The participants of the quiz assessed their own exposure to air pollution through 15 questions and simultaneously received educative feedback about the causes and effects of air pollution in urban environments (Mahajan et al., 2020).

Additionally, with the aid of ten low cost air sensors, 25 citizens were instructed to measure air quality in their personal surroundings and share their findings with the researchers and other participants during two interactive workshops. The participants were sourced through the researchers university as well as word-of-mouth within the researchers social environment.

Both workshop sessions were intentionally conducted relatively unstructured and followed a storytelling process to promote the interaction between participants and facilitators. Brainstorming methods were utilised as well as expert input, which was given by a team of scientists with expertise on pollution, social sciences, data and citizen science (Mahajan et al., 2020).

Figure 14: Workshop level development of the reference (after Mahajan et al.2020)

4.1.3 COURSE-BASED OUTREACH IN STEM EDUCATION

Lastly, a case study in which a series of courses for high school students conducted at the Boston College in the USA will be analysed. The objective was to develop an interdisciplinary outreach program encouraging high school students in pursuing a STEM degree (Byers, Weerapana, Catterjee, 2017). While the research team itself did not define the project as a participatory design approach, the process and execution match the approach closely.

The participants, predominantly female, attended eight course sessions over the span of a month offered during summer months (July and August) and took place twice a week. This schedule was intentionally chosen to ensure that participants could attend in a time frame that would be favourable for them during the summer break. To follow up and further engage the participants, a follow up course was developed with a more complex and experimental approach.

Conducting the courses in small groups of 3-4 participants was deliberately chosen as to ensure complete engagement. Additionally, logistics such as space and material constraints restricted the group sizes (Byers et al., 2017). Undergraduate students were employed as facilitators, this strategy allowed for a closer collaboration near peer-to-peer learning approach between participants and facilitators. An additional benefit was that undergraduate students could gain experience in the laboratories and through teaching.

To mitigate the risk of the facilitators not being knowledgeable enough, a series of educational sessions was conducted by the lead facilitator (Byers et al., 2017).

This case study offers a positive illustration of a system in which the facilitators can be secondary parties apart from the lead researcher. Such a structure allows for larger scale projects and further growth.

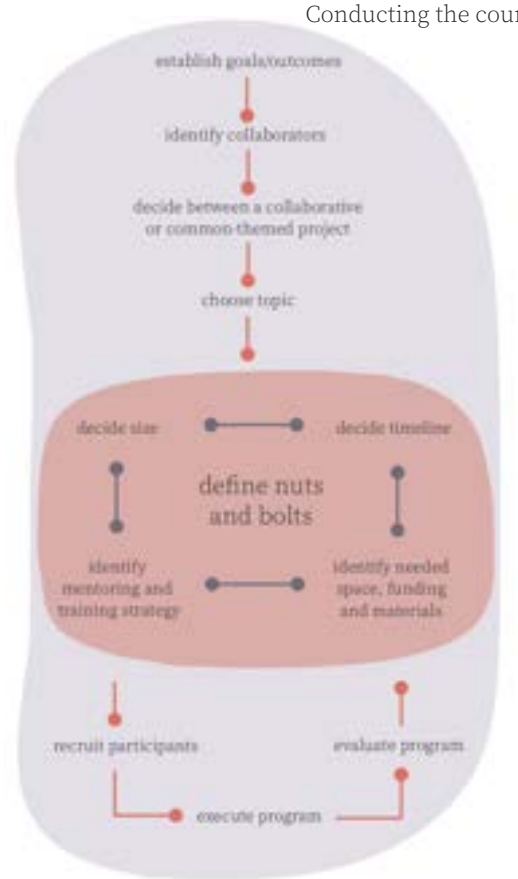


Figure 15: The workflow of the reference (after Byers et al., 2017)

GUIDELINES

4.2

In the following, an analysis was conducted on guidelines on participatory design workshops. Collins dictionary defines a guideline as *something that can be used to help you plan your actions or to form an opinion about something* (HarperCollins Publishers, n.d.).
Evidently, this is a very broad definition, which needed additional refinement within the research. Keywords included *participatory*, *workshop* and/or *design*, and were predominantly researched digitally, thus including papers, journals and webpages from 2012 or later. A research via science platforms was conducted and there was an additional non-scientific web search, as to review what is currently available to non-researchers. This resulted in a wide variety of results of fluctuating quality. In the following, four digitally available publications will be reviewed to exemplify the extend of what is currently presented under the term *guideline*.

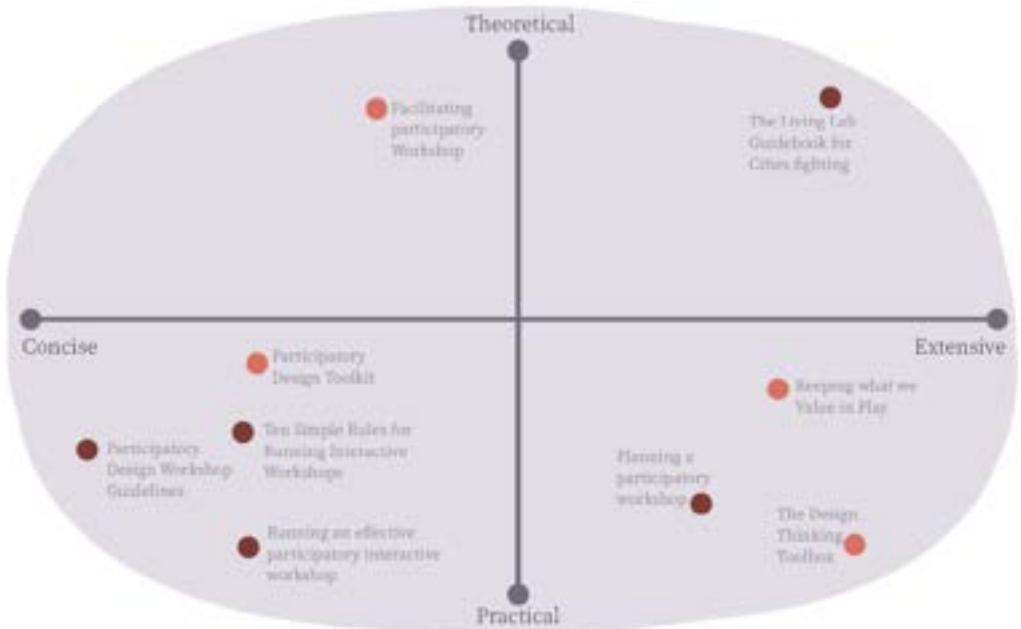


Figure 16: Evaluation matix of paticipatory design guidelines

4.2.1 KEEPING WHAT WE VALUE IN PLAY

As mentioned in the previous chapter, Niki Harré (2018b) published two interconnected works in 2018 that focus on behavioural psychology and its relevancy in environmental activism. The publication *Keeping what we Value in Play* includes nine exercises that can be included into interactive, collaborative events. The intention is to enable readers of the more theoretical *Psychology for a better World* to put what was conveyed into use.
The publication entailing 60 pages is openly available online and includes all necessary workshop materials. Evidently, effort was put into an intuitive and attractive layout and design which helps guide the reader throughout the manual. All exercises are elaborated in detail and allow for some variation in duration and group size. They are composed to build on to each other as well as being usable in sections (Harré, 2018b).

However, while the exercises are constructed to encourage collaboration, critical thinking or empathy, they can not be adapted towards different subjects. Therefore the manual can only be used as a reference or inspiration and does not allow to be utilised as a functional guideline for the development of an interactive workshop.

4.2.2 THE DESIGN THINKING TOOLBOX

The Design Thinking Toolbox, written by three design thinking experts Michael Lewrick, Patrick Link and Larry Leifer (2020) and aided by the Institute for Innovation and Technology Management at Lucerne University of Applied Sciences and Arts – Technology & Architecture is a compendium of a multitude of different exercises to be used within design thinking. Clearly, the design thinking approach differs considerably from participatory design, however many exercises can be adapted and utilised in this approach as well. It contains around 50 different exercises that are categorised into six phases: *understand*, *observe*, *define point of view*, *ideate*, *prototype*, *test* and *reflect*. The toolbox features a multitude of illustrations, photo-

Figure 17: Cover of „Keeping what we Value in Play" (Harré, 2018b)

graphs and texts within the 300 pages to aid as an elaboration of the exercises. Adaptation of the exercises is encouraged within the guideline. However, no exercise materials are included in the publication.
A short section on how to conduct a design thinking workshop is included and generally applicable to participatory design (Lewrick et al., 2020). While the toolbox is a helpful resource of different exercises, it does not guide the reader in applying them within a workshop or similar format. Additionally, the amount of different methods can be overwhelming, especially to a non-expert.

4.2.3 PARTICIPATORY DESIGN TOOLKIT

The *Participatory Design Toolkit* has been created with the specific a focus on affordable housing needs. It was published in 2013 by Theresa Hwrang for the *Enterprise Rose Architectural Fellowship* which is a USA based fellowship with the goal of providing affordable housing. The Toolkit itself entails 31 pages including an introduction, an overview of a workshop preparation and process, facilitation tips as well as eight suggested design tools. The toolkit features high quality images, graphics and a coherent layout.
While some of the exercises are adaptable to different projects, many are inflexible or only applicable when concerning the topic of affordable housing. There are six exemplary workshop agendas included (Hwrang, 2013). While the overall guideline has a reasonable information density and overall quality, it lacks adaptability as well as flexibility in real life scenarios, particularly in the recommended agendas.

Figure 18: Cover of „The Design Thinking Toolbox“ (Lewrick et al., 2020)

4.2.4 FACILITATING PARTICIPATORY WORKSHOPS

Facilitating Participatory Workshops is a 20 page participatory guide by *Seeds For Change,* a British non-profit organisation offering support for groups fighting injustice, promoting community involvement and ecological awareness (Seeds for Change, 2012).
The guide includes insight into the subjects of workshops and participatory design, as well as practical advice for conducting workshops. Its main distinction to the other guidelines is that it is not based on a case study or one subject, but contains universal workshop design. The guideline does not offer specific agendas or methods but rather theoretical references and organisational advice (Seeds for Change, 2012). It encourages flexible and realistic workshop planning even for inexperienced facilitators.

Although this guide may be particularly helpful to inexperienced facilitators as an introduction to workshop organisation, it doesn't offer the framework that aids in the actual conduction of a participatory design workshop.

Summary

When analysing currently available guidelines on participatory design workshops, it is noticeable that there is an immense variety. The broad definition of the term results in a similarly broad spectrum of quality, information profundity, extensiveness as well as visual communication effort.Very few guidelines instruct the reader in developing a workshop regardless of the particular subject while still offering enough framework to guide the reader in the process. Many guidelines are more akin to a published case study concerning a specific subject rather than a guideline.
An additional issue is the lack of flexibility in many guidelines, especially throughout the actual workshop and considering real life variations that are to be expected when working with collaborative approaches.

Figure 19: Cover of „Facilitating Participatory Design“ (Seeds for Change, 2012)

COMMON METHODS AND EXERCISES 4.3

While there are a multitude of exercises and variations, several are utilised more commonly in the conduction of a participatory design. A few notable ones are being summarised in the following section.

ICEBREAKER ACTIVITIES 4.3.1

An icebreaker activity, rather than being a specific exercise, can be seen as a method to engage the participants at the beginning of a workshop (Hwrang, 2013). All variations typically aid in achieving the same goals and have similar attributes.

The intention of an icebreaker activity is generally to be the first exercise of any given workshop. It will include elements in which the participants are encouraged to talk to each other, state their names and in some instances further information about themselves (Lewrick et al., 2020). Icebreaker activities do not necessarily reflect the subject of the workshop. Typically this exercise will be comparatively short to allow ample time for the goal oriented methods afterwards.
Additionally, icebreaker activities will have few or no materials to allow for a simple and concise workshop kickoff without overwhelming the participants.

There may be movement involved to improve concentration afterwards. A large variation can be seen in whether an icebreaker activity is highly structured or relatively free, however it should generally mirror the methods following, to set the right expectation for the participants.

BRAINSTORMING AND MIND-MAPPING 4.3.2

Most participatory design workshops will include some variation of brainstorming or mind-mapping activities, in which participants are encouraged to think freely about a subject or question. The participants input can be either verbally or written down by themselves or facilitators. General rules in brainstorming and mind-mapping are to avoid criticising the individual input and ensure that every opinion is treated with the same value (Gallen, 2018).
During mind-mapping, the input is written down on separate sheets of paper and assembled, traditionally on a wall or large cardboard sheet. Connections between different ideas will be made by placing the statements closer together or further apart and tape or string may be used to make additional connections. Materials can be as simple as sticky notes and a pen or as elaborate as using multiple coloured paper sheets for different ideas, different pens, string in multiple colours, etc.

Utilising brainstorming and mind-mapping exercises is particularly beneficial in the earlier parts of a workshop, as it introduces the subject and can encourage further discussion. Keeping the mind-mapping results visible throughout the workshop can be helpful as they may be used to review conclusions of the workshop (Gallen, 2018).
The advantage of these exercises is the particularly low entrance barrier due to the fact that most people have had some touching points with them before. There is usually no technical equipment necessary, which simplifies set up and reduces material cost. Additionally, it is very flexible in duration, group size and will work for almost any subject.
If a participant group is too large however, the methods can be challenging for hesitant participants as they may not feel comfortable to talk freely, while other participants may be more assertive.

PHOTOVOICE 4.3.3

The method photovoice works particularly well in participatory design processes as it allows the participants to document in their own environment.
Participants will either use their own devices or be equipped with them by the facilitators. The exercise requires the participants to document something related to the workshop subject for a predetermined duration, usually until the next workshop. The documentation visualises frustration points towards the subject matter in the participants personal environments, such as the workplace, home or neighbourhood (The Howard League for Penal Reform, 2016). Often the outcomes will be printed or digitally assembled with the input of all participants and discussed during the next workshop session. This exercise enables the facilitator to get an insight into participants point of view in a way that may not be possible throughout a workshop (Harrington et al., 2019).

If implementing the method it needs to be considered that it is only feasible for participants with a certain level of technical understanding and physical capabilities. Variations may include the option to document by making notes instead of photographs. The project needs to have access to sufficient equipment for the participants which can be costly. It is best used when there is a series of workshops with the same participants, as both an introduction and a resolution at two different occasions is necessary.

QUESTIONNAIRES AND QUIZZES 4.3.4

Questionnaires can be used in several different ways during a participatory design process: as an exercise within a workshop or to assess the workshop itself.
As an evaluation method questionnaires are very common and are efficient in evaluating anonymously and to get feedback from participants (Döring & Bortz, 2016). It can be conducted before, during, after, or multiple times throughout the workshop. Considering their popularity, most participants are familiar with the process.

As an exercise throughout a participatory design phase questionnaires are less frequently used but nonetheless a viable method, particularly when the subject of the workshop is sensitive and participants may be hesitant to discuss it openly. A subcategory of questionnaires is the quiz, which can be interactive and include a collaborative and/or competitive aspects. If applied, it should be considered that competitive elements have their advantages and disadvantages and can be both motivating or discouraging to participants.

Generally, they should be kept relatively simple and lighthearted to avoid frustrations. A quiz may also offer an opportunity to include indirect education on the subject as seen in the interactive quiz reviewed earlier (Mahajan et al., 2020).

4.3.5 (PAPER) PROTOTYPING

Prototyping is a creative method in which participants get to solve problems by making physical mockups. These can be made out of various materials, even waste materials. Paper is a popular choice due to its low cost, versatility, and lower chance of being intimidating to the participants (Osman, Baharin, Ismail, & Kamaruzaman, 2009).
Generally, prototyping is more successful in later stages of a participatory design workshop, after participants have already acquainted themselves with the subject. Building prototypes can be highly satisfying to the participants as it is a physical visualisation of the process, and the outcomes can be particularly helpful towards the goal of the workshop.

The prototypes can be as elaborate or as simplistic as necessary, however the facilitator should keep the instructions as straightforward as possible as the method can be overwhelming to participants with no prior experience. The method generally requires a considerable amount of time and a variety of materials (Osman et al., 2009).
Prototyping most useful if the end goal of the project is developing a product, however it can also be adapted to digital interfaces or architectural and environmental subjects.
This method is best suited for creative participants with adequate physical capabilities and may not be a viable choice if the participants are physically limited. It also necessitates close guidance by facilitators and ample time.

OTHER METHODS 4.3.6

There are countless methods that can be used in participatory design workshops, many of them specific to the subject which is addressed within the project.
One method that has not been mentioned above due to its lack of participation is having educational input through lectures. While this does not involve the participants interactively, it may be necessary within projects if the subject is particularly complex.An importance should also be laid on the conclusion of a participatory design workshop. To ensure the participants leave with a positive and empowered feeling, they should be informed about the further developments of the project. It is advisable to have some sort of resolution, either directly after the workshop or in following weeks (Harrington et al., 2019). A workshop may also conclude with an open ended exercise which continues in the participants own environment afterwards. This should not be too complex of time consuming and fit in well into the workshops subject and the participants lifestyle.

Summary

Overall it can be said that the methods utilised in participatory design are variable and need to be adapted towards each project, participant group and situation. Some exercises require more time overall, while others need a specific space, group size or skill. All of this needs to be considered, which makes a one-size-fits-all solution impossible. However, the basic process of including an icebreaker, open discussions and a creative solution phase works in most situations.

Exercise	Goal	Logistics	Applied in...
Brainstorming	Problem Definition, Ideation	Low entry Level Best in Groups (4-6 Persons) Flexible Duration (5-30 m.in) Materials: Paper, Pens, Wall,...	Harrington et al., 2019 Hwrang et al., 2012 Lewrick et al., 2020
Mindmapping	Problem Definition, Ideation	Low entry Level Best in Groups (4-6 Persons) Flexible Duration (10-30 min.) Materials: Paper, Pens, Wall,...	Lewrick et al., 2020 Jisk, 2012 Harrington et al., 2019
2x2 Matrix	Ideation, Evaluation	Best group smaller than 8 min. 45 min. if discussion is included after, Paper and Pens	Lewrick et al., 2020
Dot voting	Evaluation, Decision Making	no group limit, short (5-20 min.), one/several colours stickers, prior brainstorming or mindmapping necessary	Lewrick et al., 2020
6-3-5 Method	Ideation	optimum 6 people, 20-30 min., Materials: paper, pens, creative method, mentally exhausting	Lewrick et al., 2020
"How might we..."	Ideation	groups of 3-5 persons, short (5-15 min.), Materials: post-its, pens	Lewrick et al., 2020 Harrington et al., 2019
Every Voice Matters	Introduction, Create Good Group Dynamic & Atmosphere	unlimited group size (5-10 best), short (5-15 min.), best in the beginning of a meeting, pen and paper optional	Hwrang et al., 2012 ITEC, 2014
Photovoice	Problem Definition	group limited by equipment, very long (hours to days), in personal environment, Material: cameras	Harrington et al., 2019 The Howard League for Penal Reform, 2016
Always, Sometimes, Never	Evaluation, Problem Definition	unlimited group size (under 30 best), short (20 min.), documenter necessary, Materials: paper, pen, stickers	Hwrang et al., 2012
Interviews	Problem Definition, Introduction, Build Relationship	usually 2 persons, duration flexible but longer is better (40-120 min), Materials: Pen, Paper	Harrington et al., 2019
Quiz	Education, Evaluation, Introduction	single participants or in teams, flexible duration (10-120 min.), can be competitive and/or educational, mentally draining	Lewrick et al., 2020 Harrington et al., 2019 Hwrang et al., 2012 Mahajan et al., 2020
Paper Prototyping	Ideation, Experimentation	group size limited by materials (5-20 persons), long duration (40-200 min.), Materials: various, e.g. paper or craft materials	Lewrick et al., 2020 Harrington et al., 2019 Hwrang et al., 2012 Osman et al., 2009
Identity and Diversity	Introduction, Improve Group Dynamic	flexible group size (5-20), duration flexible (10-45 min.) Materials: post-its and pens optional	Harré, 2018b

Figure 20: An overview of notable methods for participatory design workshops

KEY CHALLENGES AND POSSIBLE SOLUTIONS

4.4

By analysing the references above and other notable literature, some more prevalent challenges in the conduction of a participatory design workshop become evident. Even though the approach of participatory design and the therefore occurring challenges are individual to each project, some recurring obstacles can be overcome by evaluating possible shortcomings and addressing them within the planning process. A selection of common problems will be summarised in this section.

DETERMINING THE CORRECT TARGET GROUP 4.4.1

Before instigating the process of setting up a participatory design workshop, the target group has to be evaluated carefully. If this is not done properly, the workshop may not be successful or the results may not be beneficial to the projects objectives.
If a target group is too large, it will be challenging to include all types of participants in the process. As a typical workshop will include a relatively low number of participants, it is unlikely to have a heterogenous group with all demographics present. Additionally, it makes the logistics far more challenging, as, for example it is difficult to find a timeframe for a workshop that will suit all participants. Lastly, a large heterogenous group makes establishing a positive group dynamic more difficult as some participants may have inhibitions working with people considerably different from themselves and language or skill discrepancies become more pronounced.
One the other side, if a target group is too narrow, a challenge to find enough participants may arise. Furthermore, participants that are too similar may not be able to engage in beneficial discussions or sharing of experiences as all participants are of very similar opinions. This could reduce the variation of the workshop results to a point in which it can not achieve the desired outcome.

To address this challenge project leaders should make an in depth analysis of their research goal and target groups, with an additional effort in finding participants outside their own personal demographic to reduce the risk of confirmation bias.

4.4.2 ACTIVATING PARTICIPANTS

One of the most complex challenges in participatory design projects is to seek out and activate enough participants to conduct a successful workshop. There are countless situations in which participants may not have sufficient time or motivation to be part of a participatory design workshop, particularly in demographics that are typically engaged in full time work and/or child care. For this reason it is imperative to set the workshop up in a way that makes it convenient to the target group. This may include choosing a specific time or location for the workshop as well as offering incentives such as child minding or other benefits. However, organising this can take up more time and resources than the workshop itself.
Many research projects therefore work with partnering institutions, such as senior citizen centers, schools, non profit organisations or even sports clubs. This is particularly beneficial if the partner is exclusive to the target group. Setting up such a cooperation may be challenging at the conception of a project, however will benefit greatly the longer the duration.This may not be an option for independent of unfunded designers or grassroots organisations, or in situations where a relatively fast setup is necessary. In that case other methods may be necessary to activate the target group.
A method that has proven successful is personalised invitations via e-mail or physical mail (Becker & Jayaweera, 2021). This makes participants feel particularly valued and is more likely to raise an interest in attending. Additionally, this technique allows the project leaders to have more control choosing the specific participants.
When inviting participants it can also be beneficial to highlight the fact that the offer is free of charge, as that may encourage interest (Byers et al, 2017). Furthermore, participants can be offered financial incentives to attend. If incorporating a payment, the researcher should consider whether this impact the intristic motivation to participate and lead to a less cooperative participant group.

Another common approach is word-of-mouth throughout the target community and involving community leaders (Harrington et al., 2019, Mahajan et al., 2020). This works especially well in tight knit, local communities. Utilising social media within a community, such as Facebook groups or Instagram channels, can add additional awareness.

Either way, it is always possible and likely that not all participant that have accepted an invitation will attend the workshops or that participants bring family members or friends. It is the responsibility of the facilitator and design team to ensure that the workshop is flexible enough to be executed with a larger or smaller participant group than originally expected and have materials prepared accordingly.

4.4.3 TRANSLATING THEORY INTO REALITY

While planning and conducting participatory design workshops, it can be frustrating if unexpected obstacles occur. However the facilitator needs to be prepared for such situation.
Particularly when working with technical equipment, a malfunction is always possible and should be prepared for. Generally, equipment should be tested intensively prior to the workshop, if possible at the specific workshop location. By having backup or physical copies of workshop materials the risk of severe disruptions can be mitigated.

Time management is another element that can lead to issues in the conduction of a workshop, thus constructing the right agenda is crucial. Having workshops that are too lengthy may lead to frustration of the participants and lack of concentration in the final exercises. However, if the workshop is too short, time may not be sufficient to accomplish the workshops goal or participants may feel rushed and exhausted. A duration of two to three hours has often shown to be successful (Hwrang, 2013, Byers et al. 2017). For longer workshops adequate breaks and refreshments should be offered accordingly. Within a shorter workshop the materials and goals should be adjusted and less extensive.
Overall, the facilitator should plan ample amount of time for each exercise and have clearly defined breaks throughout the workshop (Lewrick et al., 2020).

Especially when working with a larger participant group, being understaffed can be challenging to the lead facilitator. There should be at least one co-facilitator for each group during group work as well as an assistant to act as a documenter (Becker & Jayaweera, 2021). All facilitators should be instructed carefully before the workshop and have access to the agenda and workshop materials. They should be acquainted with each other, the workshop subject and the exercises that will be conducted. If possible, co-facilitators should also have experience working in participatory design and with the target group.
While some potential problems can be circumvented by proper preparation and testing, it is unlikely to not experience some difficulties throughout the workshop. Taking them with stride and keeping organised is imperative. The facilitator should stay friendly and maintain a positive atmosphere throughout the workshop.

4.4.4 OTHER OBSTACLES

Additionally to these regularly experienced complications, there are other challenges that need to be taken into consideration throughout the planning of a participatory design workshop and are highly dependent on the participant group.
One obstacle can be to build trust with the participants, particularly if the participants belong to a marginalised group that has been subjected to injustice in the past or if the topic of the workshop includes sensitive topics such as medical history or sexuality (Harrington et al., 2019). In this case getting to know the participants before the workshop and acquainting oneself with the community can be helpful. It is imperative for the facilitator to be open minded and honest and not force participants to share experiences involuntary.

In some cases decisions of the materials seem minor but can be of significant importance for the participants. Colourful or simplistic materials may seem attractive to the design team but make the participants feel infantilised (Harrington et al., 2019). When addressing environmental topics during the workshop particular emphasis should be laid on choosing sustainable materials whenever possible, otherwise the participants may perceive the project as insincere (Harré, 2018a).

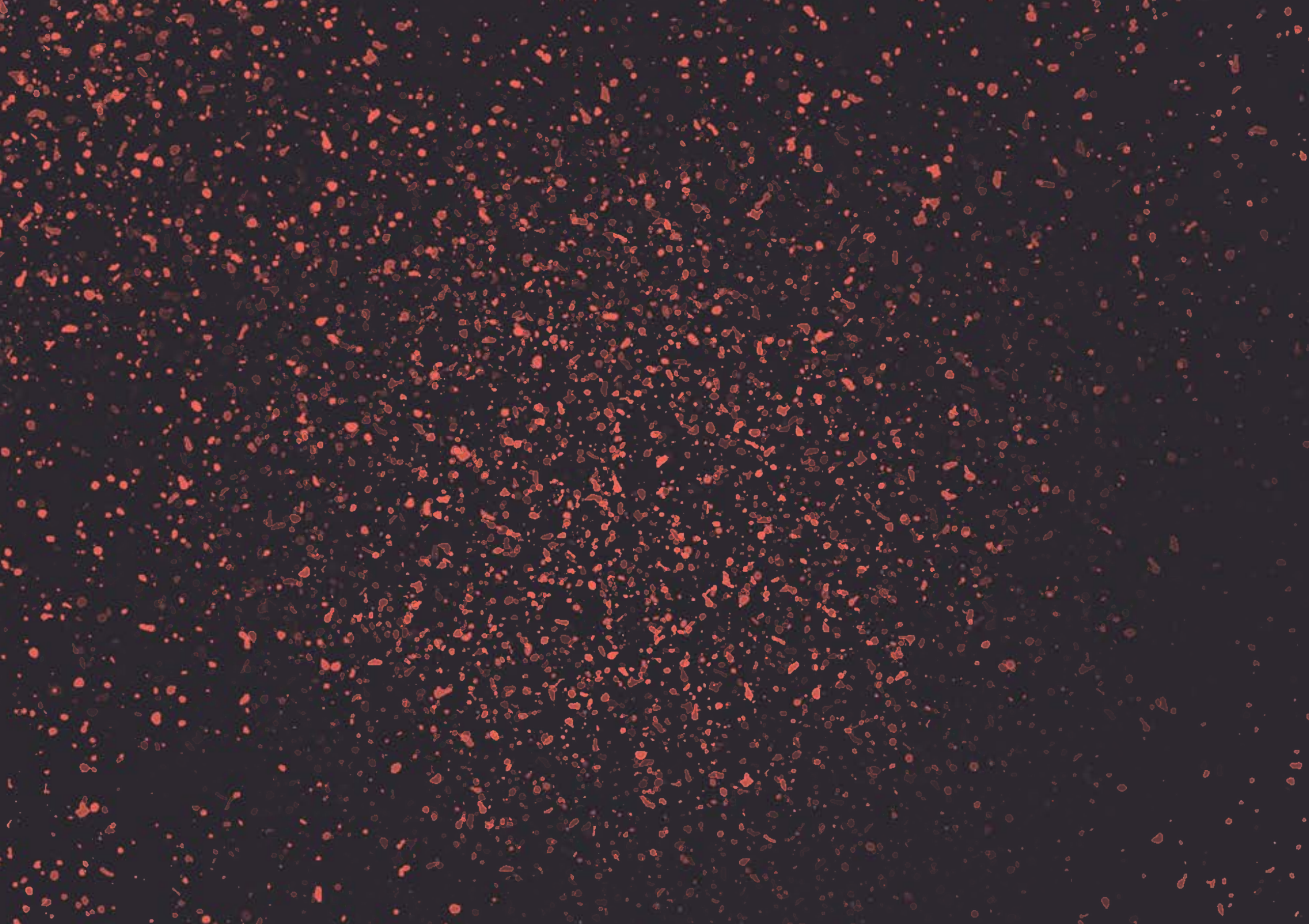
4.5 CONCLUSION

As seen within this chapter, the variation in participatory design projects is enormous. Literature in both science and public domains is extensive, which mirrors the growing interest in the approach in the last decades. Unfortunately, the quality in research and literature varies accordingly.

Nonetheless, a pattern of typical methodological approaches can be extracted from the analysis of reference projects and offers a rough idea on successful formats and exercises. Most prevalent is a workshop setup of about two to three hours that includes an opening method, an educative element, brainstorming or similar open exercises, as well as a solution oriented phase towards the conclusion. The outcomes of these workshops are generally shared with participants and local stakeholders and may lead to a continuation of the project within the community.

The obstacles are often prevalent within the preparation of the workshop itself and less drastic during the conduction. However, all phases have to be planned and organised in detail to ensure achieving the overarching goal of the workshop.

After an analysis of this, the case study conducted within this thesis will be focussing on the activation of participants, the preparation of the workshop materials as well as the potential of a longterm continuation of creating public awareness on the topic of air pollution in the city of Magdeburg.



5 CASE STUDY

After an in-depth evaluation of the overall context of the thesis and gaining an insight into the strategies applied in participatory design projects, the following chapter will guide through the executed case study. The focal point is the conceptualisation of the project and its core objective as well as rationalising the decisions made in the execution of the workshop series. The process is demonstrated within the development of the third party cooperations, target group analysis, participant acquisition as well as the necessary logistics. The most extensive section of the chapter will illuminate the three workshops conducted with an insight into the agendas, materials and participant feedback. Lastly, an evaluation of the workshop strategy finalises the chapter.

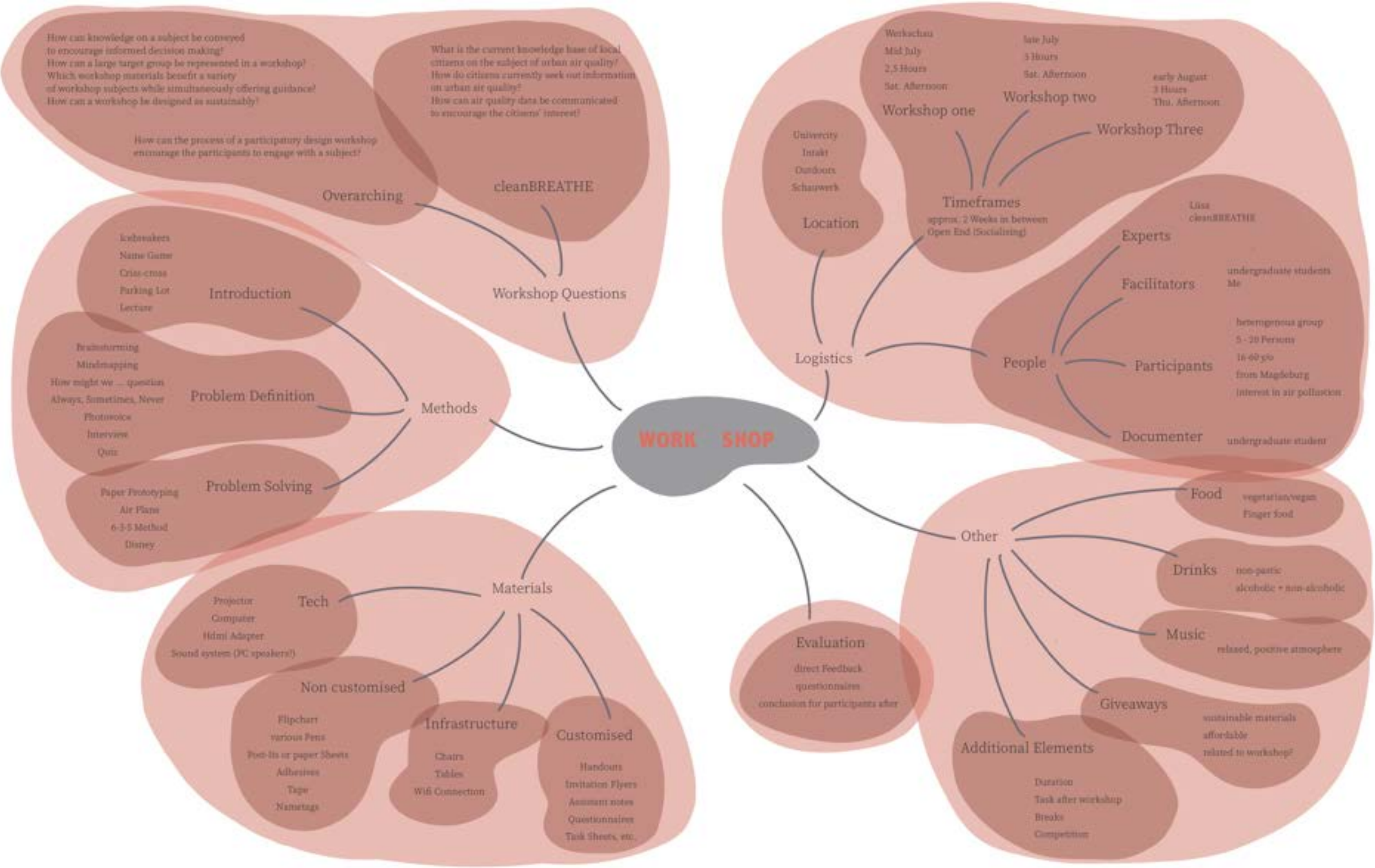


Figure 21: A mind-map including necessary considerations for the design of the case study

OBJECTIVES

5.1

For the strategical planning of the participatory design process key objectives were founded on several bases. Primarily, the key objective for the thesis was determined on grounds of the research conducted prior to the planning process and the disparities in contemporary participatory design research. Additional objectives were set by the research team of cleanBREATHE. Those objectives primarily influences on the content of the workshops.

THESIS 5.1.1

There are several questions that arose within the analysis of the participatory design approach. These led to the formulation of the main objective and were tested within the conduction of the case study. The overarching objective is:

1) How can the process of a participatory design workshop encourage the participants to engage with a subject?

While this question is relatively broad, it mainly focusses on engagement strategies via the development of effective workshop materials. Four subquestions were formulated to break down the main objective. These relate to common practices in participatory design and their shortcomings.

1a) How can knowledge on a subject be conveyed within a workshop while still remaining the core values of participatory design?

1b) In which way can a larger target group be represented within a participatory design workshop?

1c) Which workshop materials can be utilised to benefit a variety of different workshop subjects while simultaneously offering adequate guidance through the activities?

1d) How can a participatory design workshop be designed as sustainably as possible in regard of methods and materials?

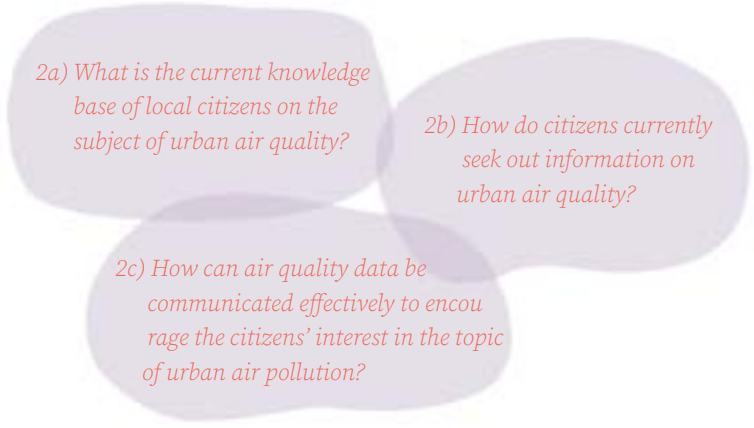
Question *1a* directly relates to the methods of engaging participants through education and has a large influence on the activities and methods used within the three workshops of the case study. The second *(1b)* and third *(1c)* questions arose through the research and analysis of reference projects as well as the guidelines.
The representation of the target group directly influence the participant recruitment strategies and often present challenges within participatory design workshops. Additionally, as collaboration with the target group and participants is one of the core values of participatory design, is should be considered in every participatory design project. The subquestion *1c* directly relates to the guidelines assessed in chapter four and their general shortcomings of either usefulness or flexibility for a variety of different subjects.
Lastly, question *1d* stems from the environmental aspects of participatory design and the specific subject of this case study.

CLEANBREATHE 5.1.2

The cooperation with the research project cleanBREATHE warrants a secondary objective, which will be answered should be sourced through the content of the participatory design workshops. The overarching question defined though the research goal G2 of cleanBREATHE can be summarised as:

2) How can a public awareness campaign encourage citizens interest and lead to behavioural changes on the subject of local urban air quality?

As this question is broad and multifaceted, the participatory design workshops one of several strategies utilised by the research team of cleanBREATHE as assessment tool. Therefore, three subquestions were formulated that focus on particular aspects of the objective and will be processed in the workshop series.



The first *(2a)* and second *(2b)* objectives were assessed through the content of the applied methodology within the workshop, with the addition of questionnaires being conducted before and after each workshop. The third question *(2c)* closely relates to the thesis objective *1a)*, as both focus on communication and education strategies and correlate well.

5.2 METHODOLOGICAL APPROACH

After analysing the most common approaches of participatory design in chapter four, a system of multiple workshops was chosen for this particular participatory design project. This format is particularly advantageous due to the relatively low time span available for the preparation as well as the lack of funding. Additionally, the vast amount of reference case studies allow for a more informed design process.
Three workshops were planned in a series to assess different strategies in workshop methods.This allowed for iterations of multiple activities as well as facilitating participants to partake in multiple or separate workshops. An open series of workshops is also favourable due to an increased flexibility while testing and comparing multiple different approaches.
To evaluate different methods of knowledge transfer *(thesis question 1a)*, all workshops have a different approach in the main exercises. The first workshop included a brainstorming activity with a subsequent unstructured phase of digital research in which participants were encouraged to research specific questions based on the topic of air pollution in groups. The second workshop was based on a brainstorming activity that emphasised a peer-to-peer education approach. Lastly, the third workshop included an interactive lecture conducted by air quality experts.The methods will be illuminated in more detail in the parts illustrating each of the workshops.
To keep the workshops comparable, the materials, overall workshop structure, location and group size were kept similar throughout the workshop series. All workshops were conducted within a timespan of approximately three hours. They included an icebreaker activity or introduction round, a self-assessment via questionnaires, brainstorming and group exercises as well as an open-ended workshop conclusion.

Workshop One	Workshop Two	Workshop Three	Overview
Questionnaire & Unstructured Introduction	Questionnaire, Introduction & Icebreaker	Questionnaire & Unstructured Introduction	Introductory Session
Brainstorming	Brainstorming & Peer-to-Peer Education	Lecture & Excursion	Method One
			Break
Research Phase	Unstructured Input	Structured Exchange	Method Two
Clustering & Dot Voting	Clustering & Dot Voting	Dot Voting	Reflection
Questionnaire & Unstructured Conversation	Questionnaire, Gift & Unstructured Conversation	Questionnaire, Gift & Unstructured Conversation	Open-Ended Closing

Figure 22: An overview of the three developed workshops in comparison

5.3 THIRD PARTY INVOLVEMENT

Many participatory design projects involve third party stakeholders apart from the designer and participants, which likewise applies to this project.

One of the key partners is the research project cleanBREATHE, which has a significant involvement in the thesis. Primarily, the project collaborated by supplying the subject of air pollution as content for the participatory design project and in return benefiting by receiving an evaluation of the citizens' current understanding of urban air quality. A research member supervised the thesis and collaborated in the development of the workshop content as well as giving input on the subject.

Through the authors institution, the University of Applied Sciences Magdeburg-Stendal, undergraduate students were engaged as co-facilitators, documenters and in the logistical preparation of the workshop. This was inspired by the aforementioned case study of a course based outreach program for high school students (Byers et al., 2017). The undergraduate co-facilitators were primarily tutors or otherwise involved in mentorship programs and had had prior touching points with teaching or workshop execution. Some of the involved undergraduate students also had participated in prior projects concerning the topic of air pollution.

The Luftüberwachungssystem Sachsen-Anhalt (LÜSA) has been an established partner of the cleanBREATE research project before the development of the participatory design project and agreed to partake in the workshops.

Apart from providing the author with a deep insight into the subject of air quality and data collection techniques in Magdeburg, one air quality expert held an interactive lecture during the third workshop.

Additional to the research team from cleanBREATHE, the undergraduate students, the experts from the LÜSA, and the lead facilitator, several minor collaborations aided in the process of developing the participatory design workshops. This included two local coworking spaces that served as workshop locations, a psychology graduate student that aided in the evaluation methodology, as well as two researchers that successfully conducted participatory design workshops in Magdeburg before and advised on the project.

Figure 23: Collaborative partners of the case study

TARGET GROUP 5.4

The target group was in part predetermined through the research project cleanBREATHE, which defined it as citizens in the German city of Magdeburg and the North Macedonian city Skopje. As the author of the thesis as well as the collaborators of the research project cleanBREATHE are located in Magdeburg, the choice was made to base the project in that location, with a potential continuation of the project in Skopje in the future.

Personas based on loosely conducted interviews were created as an assessment tool of the validity of the target group and it was determined that a target group limited only by the geographic location of Magdeburg would be too broad and needed further refinement.

Through extensive research the age group of the participants was restricted to between 16 and 50 years old, based on the benefit that a comparatively young target group can be expected to be more skilled in working with technology. It allowed for the inclusion of technological education and research methods within the workshops.

Children were excluded due to the difficulties in engaging both adults and children through the same methods. Additionally, having large age discrepancies may have hindered open exchanges within brainstorming activities or discussions.

The minimum age of 16 years was chosen as it allowed for the inclusion of younger participants that are currently in or have recently finished school and therefore are closely acquainted with a broad spectrum of education methods. They also offer a different perspective on the subject without the obstacles that working with children would have included.

The target group was also defined as people who have some interest in air quality or overall environmental subjects. While it would have been interesting to assess the necessary incentives to involve participants without these interests, a priority was set on ensuring a target group that would show active involvement throughout the workshop. The participants were specifically chosen to include people with and without prior knowledge concerning air pollution. This allowed to include peer-to-peer knowledge exchange within the workshops.

As the workshops were held in German, the target group was also limited by the language. The workshop materials and content were kept relatively simple to include international participants with limited German skills.

This led to a final definition of the target group as *local citizens of Magdeburg and surroundings (max. 50km) between the ages of 16 and 50 with at least basic German skills and interest in environmental subjects; with optional prior knowledge about air pollution.*

Figure 24: A condensed summary of the six developed personas and their key frustrations

5.4.1 PARTICIPANTS

After defining the target group, the actual participants were taken into consideration.
Group sizes of the workshops were determined to be between five and twelve participants. Limiting the group sizes to a relatively low number ensured the engagement of all participants throughout the workshops and allowed adequate group working sessions even in the limited time span of each workshop. Participants were specifically chosen to include people with and without prior knowledge concerning air pollution. This allowed peer-to-peer knowledge exchanges within the workshops.

Several methods were used to attract participants to partake in the three different workshops. Primarily, flyers and personal invitations were spread at local community hubs in the city of Magdeburg, such as coworking spaces, sports clubs, the university and college, as well as at exhibitions or similar environmentally-based workshops.
Additionally, stakeholders from several local cultural institutions, scientists and locally situated companies were invited to participate.
To reach local climate activists and similarly interested communities, Facebook and Instagram invitations were published in groups and Instagram stories of accounts such as *Magdeburg_klimabund*, *Fridays for Future Magdeburg*, and *mitmischen_md*.
All in all, a wide variety of different methods were used for invitation. In the end, word-of-mouth and digital campaigns proved to be the most successful method to activate interested citizens from the target group.

Figure 25 (top): Cover of the printed invitations for participants
Figure 26 (bottom): The digital workshopflyer for instragram posts and stories

5.5 LOGISTICS

5.5.1 LOCATION

As locations for the three workshops, initially two student-led coworking spaces in the city center of Magdeburg agreed to host. Due to the particular conveniences of one of them, all were conducted in the same coworking space *schauwerk.*. The space was chosen due to its logistical advantages of offering enough space, basic technical equipment as well as a convenient location close to public transport in the city center.
While conducting the workshops within the university would have been possible as well, the creative and open atmosphere of the coworking space was preferred. An added benefit was the extreme close proximity to one of the cities air sensing stations which could therefore be explored in one of the workshops.

Figure 27: Picture of the coworking space „schauwerk." (by Swantje Van de Ven)

TIMEFRAMES 5.5.2

Due to the chosen target group, the time and date of the workshops were considered carefully. The target group consisted primarily of people with full time employment, students in full time degrees and with other social responsibilities such as child care.
This necessitated workshop times outside of regular working hours, such as afternoons or weekends. After an unstructured survey, the target group was determined to be most willing to participate at workshops on Saturday afternoons. Thus, the first two workshops were organised to take place on two Saturday afternoons (*1pm-4pm*).
As the third workshop included the expert input from the LÜSA, a Thursday late afternoon (*3pm-6pm*) was more convenient.
The workshops were each roughly two weeks apart ;14 days between the first and second workshop and 12 days between the second and third workshop. This allowed for ample time to review each workshop and make potentially necessary adjustments, but wasn't long enough for the participants to loose interest and allowed for the possibility to participate in multiple workshops.

INCENTIVES AND MATERIALS 5.5.3

While no financial incentives were offered for the participation, other amenities were provided throughout the workshops.
Throughout each session, hot and cold drinks were offered for free, this included typical regional cold drinks in reusable glass bottles, fair-trade coffee and plant based milk. Snacks such as home baked goods, fruits, vegetables as well as candy in plastic-free packaging were provided during breaks and after the workshops. These were chosen intentionally to emphasise on the environmental aspect of the workshop as well as to demonstrate positive alternatives to more unsustainable products. For the same reason, all printed materials were printed on recycled, unbleached paper whenever possible. Workshop materials such as pens and glue were either reused from previous projects or donated to the coworking space afterwards.

As a reward and thank you, participants of the workshops received a gift at the end. In the workshops two and three this was a small 3D printed vase out of recyclable PLA material with regionally harvested flowers. The 3D print was designed and printed by the facilitator herself and therefore didn't require packaging or shipping. Attached was a note thanking the participants for their collaboration and adding contact information of the facilitator in case of questions or feedback. Workshop participants at all three workshops were also given pvc-free stickers that depicted a stylised lung in the same design style as the workshop materials.

Figure 28 (left): Picture of the developed vases as farewell gift for participants
Figure 29 (right): PVC-free stickers with a stylised lung as a gift for the participants

5.6 WORKSHOP ONE

The first workshop was conducted on a Saturday afternoon in Mid-July and was scheduled to last approximately two and a half hours. The lead facilitator was present, a research member of the clean-BREATHE project that acted as a workshop documenter as well as an undergraduate student as a co-facilitator in the group session. The atmosphere was kept informal, the casual for of address “Du” was used instead of the more formal “Sie” in all three workshops as well as first names or preferred nicknames.

Activitiy	Program	Materials	Goal
20 Min Introduction	introduction by lead facilitator, unstructured introduction by Participants, fill questionnaire	questionnaire, handout & nametags	introduce agenda & team, create positive atmosphere, set expectations
30 Min Brainstorming	groups of 3-4 persons, brainstorm 5-7 min each to four different questions, note key insights on the related color sheets, co-facilitator encourages	postcard sized paper -> 4 colours, pens	develop an insight into the participants current state of knowlegde on the topic, possible gaps & encourage interest
15 Min Break	drink,eat, open conversations	drinks, snacks	destress
30 Min Research Phase	Same groups as before research 7-10 min each to four similar questions, note key insights on the related colour sheets, co-facilitator assists	computers & smartphones, postcard sized paper -> 4 colours, pens	develop insight into the benefits & frustrations of digital information sources, encourage interest & educate on resources
10 Min 10 Min Clustering Dot Voting	clustering of the insights of the last rounds on a large cardboard wall, highlight significant insights with stickers	adhesives, cardboard wall, pens stickers	reflect workshop insights, gain insights into key interests
20 Min + Questionnaire & Unstructured Conversation	filling out second questionnaire, receive a thank you & gift, option to converse with design team and other participants	questionnaire, gift (stickers) snacks, drinks	get feedback on subject & workshop, create positivity towards the topic, encourage experience exchange

Figure 30: The agenda of the first workshop

METHODS 5.6.1

Three main activities were used in the first workshop of the series: a brainstorming phase in groups of three to four participants, a clustering phase in teams of two as well as a dot voting activity.

At the beginning, the facilitator introduced the team and offered a short insight into the workshop objectives, a handout was given to each participant and a first questionnaire filled out. An unstructured introduction round was conducted in which participants stated their name and two or three interesting facts about themselves, such as why they chose to participate at the workshop or their place of work.
After instruction by the lead facilitator, the participants were separated into two groups. Participants who knew each other chose to work in the same group which was accepted as it would improve the group dynamics and kept participants in a positive mood. Within the first brainstorming activity, participants were asked to brainstorm to the following four questions [paraphrased from German] and write down the key points.

Figure 31: Picture of the workshop setup (by Victoria Batz)

1. What do you know about air pollution in Magdeburg?
2. What are the causes of air pollution and what can be done to fight it?
3. How and where can information about air pollution be found?
4. Which questions do you have about air pollution?

Afterwards, a fifteen minute break with drinks and refreshments was conducted before starting the next round, in which the participants were asked to research about similarly phrased questions on their own devices. Additionally, the group facilitators aided in the research on their computers. The questions were phrased as [paraphrased from German]:

1. Which informations can you find about air pollution in Magdeburg?
2. What are the causes of air pollution and what can be done to fight it?
3. How and where can information about air pollution be found?
4. Try to answer the questions you wrote down in the last round!

The participants were asked to research each question for five to seven minutes and write down the key insights. To aid in the research, each participants had three to five hint cards in an envelope in their handout. These cards differed for each participant to encourage the exchange of information within each group.

Figure 32: A participant doing research on their own mobile device (by Victoria Batz)

Afterwards, participants were asked to each choose one of the four questions answered in their group and work together with the person from the other group with the same question. They then exchanged their key insights and clustered them on a large cardboard wall by combining similar topics together. Additionally, they were encouraged to add tape or headlines to organise the board. As a final activity, participants each got three colours of stickers to vote on the the insights they found most positive, most negative and most important.

This added a visualisation of the value of the specific insights. To conclude the workshop, the participants filled out a final questionnaire, were thanked and offered stickers as a gift. Most of the participants stayed for another fifteen to thirty minutes to discuss the subject or talk with each other freely.

Figure 33: Two participants clustering key insights on the large carboard wall (by Victoria Batz)

Figure 34: Participants using stickers to add value to different key insights (by Victoria Batz)

Figure 35: Workshop participants while dicussing written insights (by Victoria Batz)

5.6.2 PARTICIPANTS

Present were seven participants ranging in age from 19 to 37 years old. Six filled out the demographic survey. Four had academic degrees, including one participants with a PhD, another participant was an undergraduate student. The prior knowledge on air pollution ranged from very little to extensive. All of the participants lived in the city center or suburban areas within the city boundaries and none had children.

MATERIALS 5.6.3

The materials for the workshops were kept intentionally simple for several reasons. Primarily, the participants should not be overwhelmed and the materials should be flexible enough to be used in other workshop concepts. Additionally, the materials were chosen to create an informal atmosphere, particularly the self made name tags from painters tape. All materials were also chosen to be as recyclable or reusable as possible.

Participants received a handout with five pages at the beginning of the workshop. This included a greeting and farewell page, two overview pages that summarised the instructions of the activities, as well as a *cheat sheet* which included hints for the research sessions. The participants were encouraged to keep the handout for review after the workshop. Additionally, participants were given a questionnaire at the beginning of the workshop that included questions about demographics, previous experience with air pollution and workshops as well as their expectations and overall interest in environmental topics. After the workshop a second, shorter questionnaire included questions as to whether the expectations were fulfilled, feedback about the activities and overall conduction of the workshop.

Within the workshop activities, coloured sheets were used to write down the key points in the brainstorming and research phase. Each question had a unique colour in both rounds amounting to eight differently coloured stacks of sheets. They were clustered on a large (*approx. 150*100 cm*) cardboard sheet via removable adhesives.

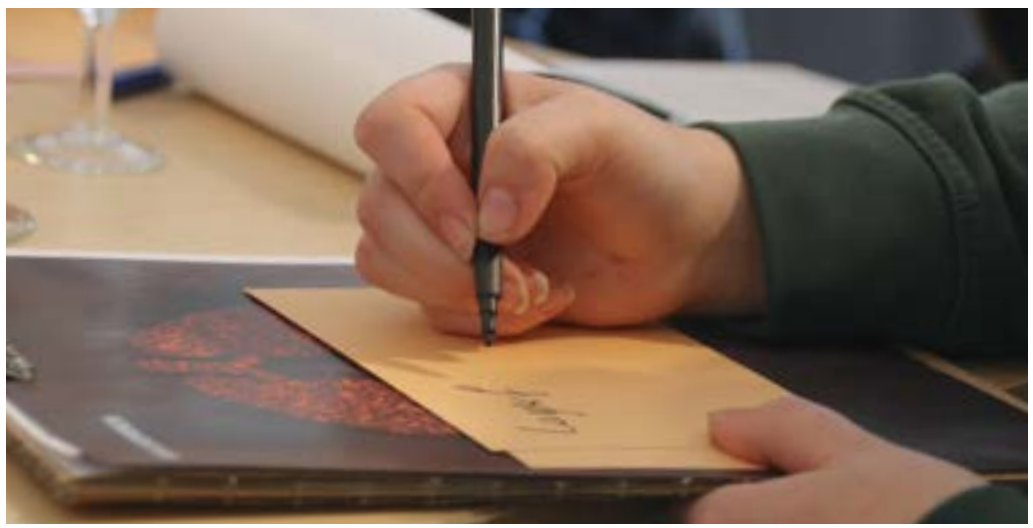


Figure 36: A participant writing down a key fact on a sheet of orange paper (by Victoria Batz)

5.6.4 FEEDBACK AND IMPROVEMENTS

> Researching online was really difficult and exhausting. The data was confusing and felt inaccessible to me, as if it was only meant to be understood by experts.

> The methods and materials were interesting, I could imagine doing something similar with my [high school] students.

> For me, the workshop lacked a conclusion in the end. I liked looking for information online, but there was no verification if what we found was right.

The research phase proved particularly exhausting for the participants, which limited the participation at the end of the workshop and reduced the input during the group discussion. This reaction had been anticipated, as a strategy for the participants was to only have enough time to access the most easily found information and data. One factor that aggravated this was the extent and amount of questions within the activities. They proved to be quite extensive and could be reduced to two or three, possibly more specific, questions in an adaptation of the method.

One key insight gained by the participants was that air quality information online was hard to understand as a non-expert, as they are conveyed primarily through data and figures. While participants gathered several illuminating insights throughout the research, many were contradicting or confusing. A specific issue was the abbreviation of technical terms (*such as AQI,meaning air quality index or PM, the abbreviation of particular matter*).

This caused a suggestion of future improvement by a participant, which was a lack of professional insight as a resolution of the research phase.

The materials were very well received and enjoyed by the participants, however the wide variety of colours of papers proved to be slightly confusing in between the brainstorming and research phase. Particularly the dot voting session and materials were enjoyed due to their straightforwardness and visual representations of the value of the researched information.

Overall, all participants stated that they had a positive experience and enjoyed the activities within the workshop. Most participants particularly enjoyed the format of the workshop and the atmosphere created. The group dynamic was excellent and many experiences were exchanged within the exercises. All participants wished to be kept informed about the further development and were interested in attending future workshops.

5.6 WORKSHOP TWO

Similar to the first workshop the second workshop took place on a Saturday afternoon, two weeks after the first. Within this workshop, a peer-to-peer education method was evaluated. The main facilitator and two undergraduate students were present to document and assist.

Activitiy	Program	Materials	Goal
30 Min Introduction, Icebreaker Activity	introduction by lead facilitator, name game: a fact about yourself based on the letters of your name	questionnaire, handout & nametags	introduce agenda & team, create positive atmosphere, set expectations
50 Min Brainstorming, Peer-to-Peer Education	groups of 3-5 persons, brainstorm 7-10 min each to three different questions, note key insights on the related color sheets, exchange information, research when necessary	1/2 postcard sized paper -> 3 colours, pens	develop an insight into the participants current state of knowlegde on the topic & encourage interest encourage peer to peer education
10 Min Break	drink, eat, open conversations	drinks, snacks	destress
20 Min Unstructured Input	lead facilitator gives input on subject, answeres questions and encourages further dialog between participants, research of open questions	computer, monitor, digital presentation	clarify unanswered questions, encourage further interest in subject
20 Min Clustering& Dot Voting	clustering of the insights of brainstorming on cardboard walls, highlight insights with stickers	adhesives, 3 cardboard walls, pens, coloured tape, stickers	reflect workshop insights, gain insights into key interests
20 Min Questionnaire & Unstructured Conversation	filling out second questionnaire, receive a thank you & gift, option to converse with design team and other participants	questionnaire, gift (stickers) snacks, drinks	get feedback on subject & workshop, create positivity towards the topic, encourage expecience exchange

Figure 37: The agenda of the second workshop

METHODS 5.7.1

A setup of three activities similar to the first workshop was roughly recreated. When the participants arrived, a questionnaire and the handout were distributed.
The workshop started with an introduction by the lead facilitator and commenced with a more structured icebreaker activity in which the participants came up with a fact or information for each letter of their name. This led to interesting facts and an overall good mood but necessitated more time than an unstructured introduction.As the group of five participants was smaller than during the first workshop, the activities were conducted in the entire group. During the main activity, participants were asked to brainstorm to three separate questions and write down the key insights [paraphrased from German].

1. What do you know about urban air pollution?
2. Where have you come across the topic of air pollution in Magdeburg before?
3. What and how would you like to learn about air pollution?

Figure 38: One participant writing down key insights on their handout (by Swantje Van de Ven)

Overall, the group was given more time to answer the questions than during the brainstorming exercise of the first workshop. Participants were encouraged to share and elaborate knowledge they had gathered prior to the workshop. This was particularly successful as the group consisted of participants from multiple countries and with large variation in prior knowledge on the subject of air pollution. Additionally, the lead facilitator delivered insights into the subject throughout the brainstorming activity when necessary. Participants were also encouraged to look up informations online if they were unsure or particularly interested about a fact. The key insights were written on sheets of paper, one colour for each question.

After a fifteen minute break with refreshments, the group was instructed to assemble the brainstormed informations on a cardboard for each question. The group cooperated independently from the facilitators and switched between the boards with little to no guidance from the facilitator. After they finished they summarised each board and their key findings verbally.
Similar to the first workshop, participants used three different coloured stickers during a dot voting activity to evaluate insights that should be improved in the future, were positive or particularly important.

Figure 39: Key insights written down on one of the three colors of paper (by Swantje Van de Ven)

In the final phase of the workshop the facilitator held a ten minute presentation on air pollution, focussing on the situation in Germany and Magdeburg specifically. The second questionnaire was distributed and participants received a gift before being released. Most stayed at the location for thirty minutes to an hour, in the time they exchanged further air quality knowledge and personal experiences as well as general small talk.

5.7.2 PARTICIPANTS

Five participants between 20 and 32 years old participated in the second workshop. More participants were expected but illness and other responsibilities hindered several from attending.
In this workshop, the participants were chosen more specifically to include participants with prior experiences and knowledge on air pollution, either through academic pursuit or personal interest. This followed the objective of this workshop to test out peer-to-peer learning strategies. It led to a more goal oriented discussion. Additionally, participants from more diverse backgrounds attended than during the first workshop, which was advantageous for the open discussion and experience exchange.

5.7.3 MATERIALS

The materials were similar to the first workshop to facilitate comparability. While the handout was designed similarly, it was more extensive to offer a better guide throughout the workshop as well as a deeper insight into the subject of urban air pollution.
It included a greeting and farewell page, an introductory page with the agenda, and informations about the location such as the internet password. Two pages guided through the activities and four pages offered insight into air pollution, further reading suggestions, instructions on improving the personal impact on air pollution and lastly the references of the informations given.
The brainstorming and clustering activities were simplified and only included three different coloured paper sheets of a smaller size

Figure 40 (left): A participants adding tape to organise the information on a cardboard canvas (by Swantje Van de Ven)
Figure 41 (right): The printed handout given to the participants (by Swantje Van de Ven)

than during the first workshop. Instead of clustering on one cardboard sheet, three were offered to allow the group to work more effectively simultaneously and not be constrained in space. An additional handout for the assistants was prepared to simplify the instruction. It consisted of two full pages including the agenda and suggestions in how to encourage and lead the participants. The questionnaires were adapted to the specifics of the workshop but largely kept the same as to allow for the comparability of the outcomes between the three workshops. A digital presentation was designed to improve guidance throughout the activities.

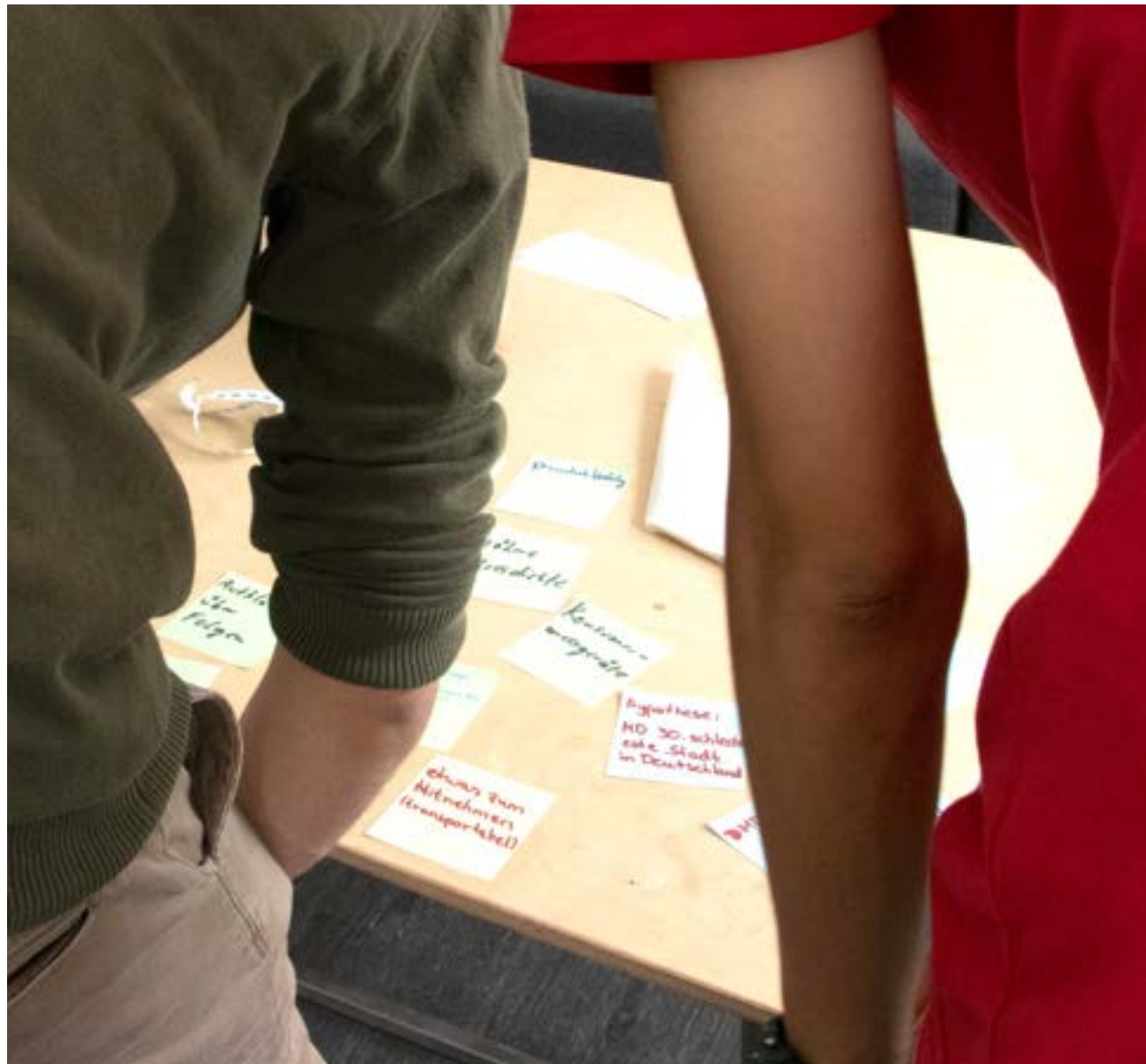
FEEDBACK AND IMPROVEMENTS 5.7.4

The particularly successful brainstorming activity led to an exchange that was so animated that participants regularly forgot to transcribe the insights gathered within the activity. They were reminded by the facilitator throughout the exercise and eventually the co-facilitator assisted by recording some insights so they wouldn't be disremembered. It resulted in a lower amount of key insights which in turn led to limited success in the clustering session afterwards.

Working with less variation in the material, particularly less colours of paper sheets, proved successful and led to better understanding for the participants. Additionally, fewer and slightly more specific questions were beneficial for the participants, as it allowed more time for each one. All questions could be reflected thoroughly due to the reduced extensiveness and added time which led to deeper insights.

Figure 42 (above): An overview of the workshop table with vases as well as snacks and other materials (by Swantje Van de Ven)
Figure 43 (right): Two participants reviewing the written key insights (by Swantje Van de Ven)

Technical difficulties occurred during the workshop that ended the digital presentation, however as all materials were prepared to be accessible physically this did not cause particular trouble. In addition, the input on the subject by the facilitator was well received and encouraged a free discussion afterwards. In conclusion however, an input at an earlier stage within the workshop would have been even more beneficial as the information could have aided the participants in the clustering or brainstorming.
Same as in the first workshop, the participants particularly enjoyed the group work and the personable atmosphere during the workshop.



5.7 WORKSHOP THREE

The third workshop was conducted on a Thursday late afternoon, which was chosen due to the involvement of the LÜSA and their respective schedule. Within the final workshop, the strategy of involving expert input as an indirect engagement strategy was analysed. One air quality expert, the main facilitator and a cleanBREATHE research member were present in addition to the participants.

Activitiy	Program	Materials	Goal
20 Min Introduction	introduction by lead facilitator, unstructured introduction by Participants, fill questionnaire	questionnaire, handout & nametags	introduce agenda & team, create positive atmosphere, set expectations
30 Min Lecture	an expert gives input on the subject, focus on local connection and personal impact	digital presentation by expert, computer, monitor	offer insight into subject, encourage further interest
30 Min Excursion	trip to the nearby air sensing station, participants encouraged to ask questions	none	offer insight into subject, encourage further interest
10 Min Break	drink,eat,open conversations	drinks, snacks	destress
20 Min Structured Exchange	groups of 2-3 persons, reflect the input and write down key insight on two questions. Attach them to a wall and share with everyone	postcard sized paper -> two colours pens, adhesive, prepared wall space	gain insight into participants interests & effective communication methods
10 Min Dot Voting	highlight insights with stickers	stickers	gain insights into key interests
20 Min + Questionnaire & Unstructured Conversation	filling out second questionnaire, receive a thank you & gift, option to converse with design team and other participants	questionnaire, gift, stickers, snacks, drinks	get feedback on subject & workshop, create positivity towards the topic, encourage experience exchange

Figure 44: The agenda of workshop three

METHODS 5.8.1

Due to the involvement of experts in this workshop, the methods varied slightly more than during the first and second workshops. The agenda was still dominated by three main parts: a lecture, an excursion and a reflection exercise, but offered less interaction due to the more traditional lecture in the beginning.
Similarly to the other workshops, the participants arrived separately, filled out the first questionnaire and got introduced to the location as well as receiving a handout. An unstructured opening was conducted in which the team members and the agenda of the workshop were introduced by the lead facilitator. Afterwards participants introduced themselves freely by stating their names and one to two facts about themselves.

As the main element of the workshop, the air quality expert conducted a one hour lecture on air pollution, with a focus on the political environment, sensing technology and causes of air pollution. There was also specific information on the situation in Magdeburg specifically as well as the personal impact. There was no direct participant involvement during this, however participants were encouraged to take notes and ask questions.

Figure 45: Lead faciltator,expert and participants sitting at the workshop table (by Victoria Batz)

Afterwards, an excursion to the close by air sensing station was made. The air quality expert revealed the technology of the station in detail and offered a further description of its functions. This was held relatively unstructured and the expert engaged with the participants and the individual interests directly.

After returning to the location, further questions were asked while participants took a break with refreshments. During the next activity participants were separated into three groups of two persons and summarised three to seven key points to instructions [paraphrased from German] on prepared paper sheets.

Talk about the insights from the lecture and subsequent trip to the air sensing station and document…
… at least four key insights you found particularly interesting.
… at least three things about which you would like to learn or seek information in the future.

Figure 46: Side view of the air sensing stations, participants peering through the door (by Victoria Batz)

The insights were clustered on a wall and each team gave a short summary of their results. Similarly to the first two workshops, participants used stickers to highlight the insights they considered the most valuable during a dot voting exercise. However, only one colour of stickers was used as the amount of noted key insights was significantly lower during this variation of a clustering activity than during the other workshops.
At the end of the workshop, participants were thanked, filled out the second questionnaire and received a gift, which was the same as in the last workshop. They had the opportunity to engage with the air quality expert as well as the facilitators afterwards.

Figure 47: Two participants discussing the workshop insights (by Victoria Batz)
Figure 48: Dot voting activity (by Victoria Batz)

5.8.2 PARTICIPANTS

Six participants between 20 and 41 years old were present during the workshop. All stated a particular interest in environmental subjects or specifically air quality for personal reasons. However, the prior knowledge on the subject of air pollution varied. One participant had a particular interest in air quality as it was a part of their job. Two participants had already participated in one of the prior workshops and had returned. Of the participants, only one lived outside the city bounds of Magdeburg in a more rural area. In contrast to the first two workshops, none of the participants knew each other before the workshop. This proved particularly beneficial for the group dynamic.

5.8.3 MATERIALS

The handout in the last workshop was less extensive than during the second workshop as insights into the subject were given in person were not necessary in writing. It included a welcome and farewell page, an introductory page, a page to note questions throughout the lecture and two pages with further informations on personal impact on air pollution as well as further reading recommendations.
The materials of coloured stacks of paper for the group sessions were similar to the last workshops. Every team received a pack of two different coloured paper stacks with the prompts printed directly onto them. The pack also included the instructions printed out, which ensured that the objective was clear and the groups needed less assistance throughout the exercise.

Figure 49: Close up of the workhop reflection materials (by Victoria Batz)

Instead of large cardboard sheets which were utilised for the clustering activity in the last workshops, the insights were gathered on a wall. This improved stability and offered more space for all teams to work simultaneously.
A digital presentation was prepared by the experts of the LÜSA to follow along during the lecture. While the facilitator had prepared a digital guide through the workshop, it was neither necessary nor beneficial as it would have distracted from the printed materials.

As the facilitating team was relatively small this time and didn't include undergraduate students, assistant notes were not necessary, instead the expert and cleanBREATHE research team member were given a copy of the participant handouts to allow for an overview throughout the workshop.
The questionnaires were adapted to the specifics of the workshop but otherwise kept consistent to the last two workshops. As a gift, the same vases were given as in the last workshop.

5.8.4 FEEDBACK AND IMPROVEMENTS

> It was nice to be able to look into the sensing station and seeing how air quality is measured. Mr Bauer [LÜSA expert] was very friendly and we were abe to ask so many questions.

> The atmosphere and people were great. I didn't have a lot of expectations before the workshop but it was a lot of fun and I never expected to lie so interested in air pollution.

As this was the first time the air quality experts of the LÜSA were involved in an interactive workshop or similar format, small adjustments can be made in future variations. While the lecture was well received by the participants, the content was quite technical and long-winded. It became obvious that the participants preferred the open conversation with the expert as well as the on-site information at the air sensing station.
The transition between the activities proved challenging, as the conversations were very active and participants had to be encouraged to focus on the exercises. This led to the workshop taking longer than than would have been necessary. However, the participants did not mind the extension and stayed for a considerable duration after the workshop to engage in conversation.
The materials worked very well and the prompts printed on the sheets helped keep the participants on track. All in all the strategy of this workshop went very well. The participants were very engaged with each other as well as the expert and the research team. It was clear that the participants that had attended a prior workshop had many informed questions and particularly enjoyed the being able to talk to the experts as a resolve of the prior sessions.

Figure 50 (left): Air quality expert Mr. Bayer and one participants discussing air quality data (by Victoria Batz)

5.9 CONCLUSION

Designing a participatory design project is a long and challenging process. Through the multiple iterations of workshop materials and strategies, insights were gained in the pursuit of answering the objectives and subquestions in the prior part of this chapter.

5.9.1 OUTCOMES BENEFITING CLEANBREATE

The research project cleanBREATHE includes three main objectives, which were stated in the second chapter of this thesis. However, the collaboration focussed mostly on the second goal which can be summarised as the question *"How can a public awareness campaign encourage citizens interest and lead to behavioural changes on the subject of local urban air quality?"*. Within the participatory design workshops more specific subquestions around the current knowledge base, the specific interests in the subjects and communication strategies were addressed.
Overall, the questions stated within the workshop activities allowed for an insight into the citizens' current mood around the subject of urban air pollution. While the hypothesis was that the knowledge base is relatively low, the workshops illustrated a different picture. Most participants had some prior knowledge at different extents, either developed through personal interest or academic pursuits. However, few participants knew how to translate this knowledge into behavioural cues that impact air pollution. Additionally, the health hazards of air pollution were rarely known or taken into consideration for personal life choices prior to the workshops.

For the subquestion 2b, how citizens currently seek out information, it became increasingly clear that only few participants knew about actual resources containing comprehensible air quality information. The acquired knowledge was often gained through school education or the participants did not know where they learned about the subject. Only few were familiar with mobile applications, websites or other sources that specifically contain air quality based information.
The last subquestion, 2c, stated how air quality data can be communicated. Generally, the outcome was that citizens would prefer an indirect source of information that didn't require them to access it consciously. One participants mentioned examples such as monitors that are equipped in the local public transportation or through digital media outlets. Another participant had previously shown interest in the air sensing stations placed throughout the city, but it lacked further information on site.
An in-depth evaluation of the statistical data, primarily through the questionnaires, will bring additional insight into the answers of the research projects in future stages. This has not been included into the thesis due to the extend of this evaluation and the comparably lower importance for the key objective.

5.9.2 OUTCOMES KEY OBJECTIVE

Considering the main objective and subsequent questions stated in the beginning of the chapter, the case study led to many illuminating outcomes.

Through the testing of three different strategies to convey knowledge, several conclusions can be drawn. The method of guided digital research is particularly useful to recognise the shortcomings of the current information environment and its effect on the participants. Peer-to-peer education, which was applied in the second workshop, proved to be successful in creating a positive and encouraging atmosphere while still delivering some insight into the subject for most participants. Lastly, the strategy of including expert input provided another perspective by being most educative to the participants, although it reduced the interactiveness in participatory activities significantly. All in all, the strategies applied all proved to offer their own unique value towards the objective and for the participants. All can be effectively utilised within a participatory design project, although the successful peer-to-peer education seems to be particularly undervalued in the current environment.

Developing materials that are applicable to different subjects within a participatory design workshop reduced the viable design options to some degree. Within the case study, the materials developed were primarily based around brainstorming activities as this method is applicable to most subjects due to its adaptability and simplicity. Utilising materials such as paper sheets of different colours and handouts proved particularly effective for several reasons. The materials are easy to obtain and prepare, and offer the most flexibility. They also guide the participants through the process without limiting their options. While the materials may seem rudimentary, small details matter tremendously, such as the choice of colours, adhesives and paper sizes, as this for example influences the amount of information the participants will write on each sheet. Most importantly, the choice of the questions within the brainstorming activities is crucial to ensure the success of the activity. The questions should be limited to two to four, depending on the time available, and relatively specific, while still being formulated broadly enough to encourage participants free thinking.

The objective of creating a workshop as sustainably as possible proved to be a comparatively easy undertaking by incorporating it throughout the planning process. Using natural and recyclable materials and offering regional products wherever possible can be applied to any subject and most formats. Keeping environmental factors in consideration throughout the planning process allows for the materials to be adapted to the objective of being sustainable. It should be considered that additional time may be necessary to research and acquire alternatives to otherwise unsustainable materials.

After all considerations, the final objective *"How can the process of a participatory design workshop encourage the participants to engage with a subject?"* simply cannot be answered conclusively. Several effective strategies were developed and tested within the workshop, through different the activities, methods and materials. However, the subject of the workshop and the unique goal of each workshop may necessi-

5.9.3 ASPECTS OF IMPROVEMENT

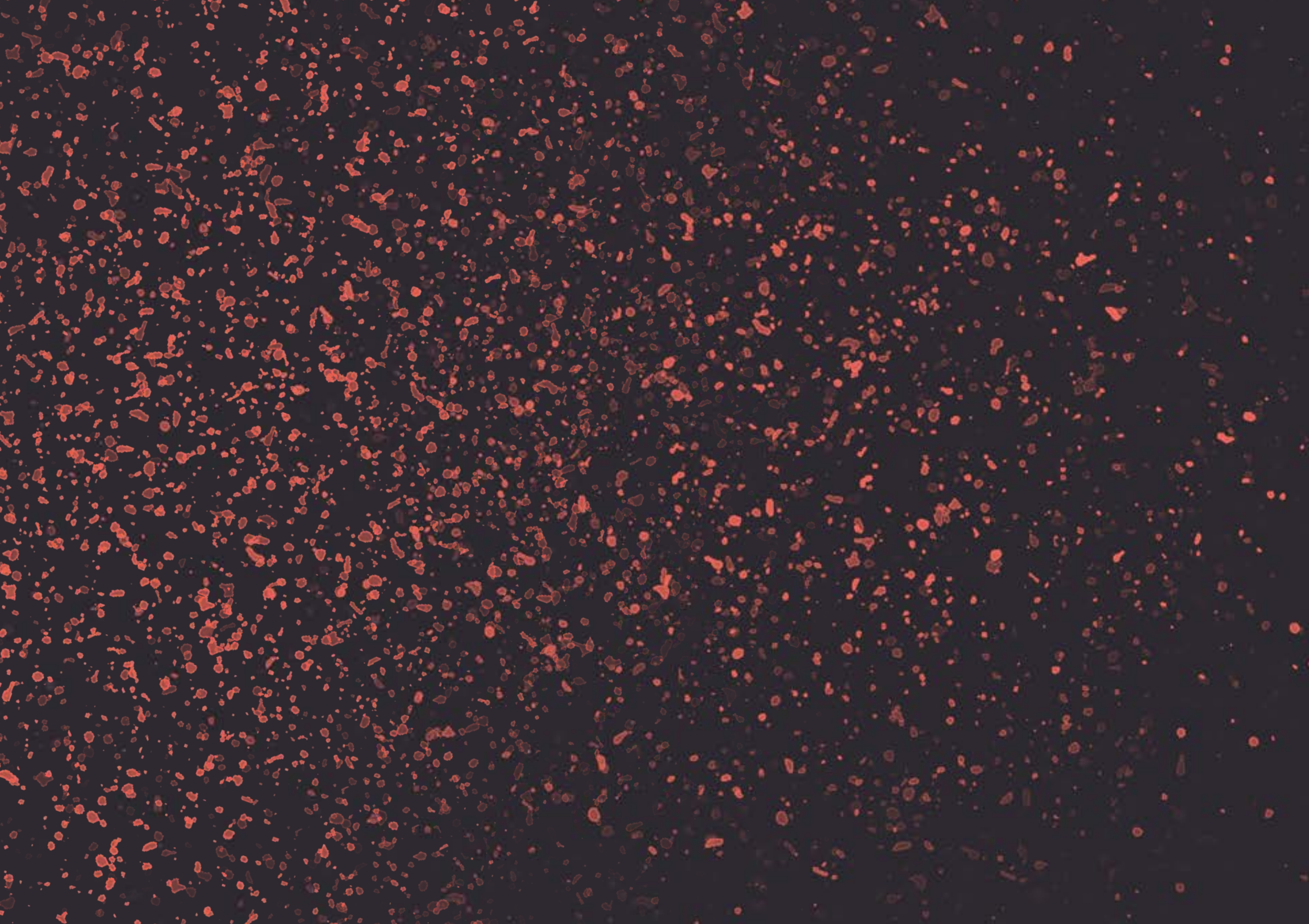
While there have been multiple iterations of workshop materials and strategies throughout the series, some aspects still necessitate improvement in future applications.

One key consideration for future participatory design projects is the simplification of acquiring participants. Throughout the workshop series, the number of participants was adequate, but could have been more extensive. The constant promotion through digital media and word-of-mouth proved to be particularly time and energy consuming. A collaboration with a partner, such as a local cooperation or organisation would have been ideal. While such an approach requires more effort in the setup, it simplifies the process throughout the project.
This leads to the second point, the timeframes and coherence in between the workshops. The strategy of three workshops with a three hour duration each worked well for this project, as different strategies could be tested. However, having a workshop series with the same participants throughout, or single but considerably longer workshops would allow for more elaborate and extensive activities. Due to inviting independent participants with no monetary incentives, the workshops needed to be particularly convenient in this case study.

While the materials were improved on in between each workshops, there certainly is room for further adjustment. Ideally the materials are as easily adaptable to any workshop subject and therefore usable by other designers in similar setups. This proved more challenging than expected and while the materials are certainly adaptable, more can be done to allow simpler access.
An even closer collaboration with local politics or institutions such as the LÜSA would have been favourable to the workshop series. This allows to outsource some of the preparation and has a larger impact on local policymakers through the project.

Even with all the opportunities of improvement, the workshop series was very well received by both stakeholders and participants and can therefore be considered a success. Particularly the research project cleanBREATHE and its further developments will benefit greatly from the results. The expert team from the LÜSA gained insight into possibilities of engaging citizens through interactive lectures. Most importantly, the participants had an overwhelmingly positive and educative experience which sensitised them towards the subject of urban air pollution.
Lastly, the author herself gained deep insight into the conduction of workshops and will continue to implement and teach the advantages and values of the participatory design approach.

Figure 51: Workshop materials and key insights laying on a table (by Victoria Batz)



6 EPILOGUE

Within the thesis, a deep insight into the approach of participatory design was developed and similar contemporary projects analysed. Additionally, the current information on the development of participatory design workshops was summarised and its shortcomings addressed in a case study. The workshop series developed within the case study was explored in detail including its successes and challenges.
In the last chapter of the thesis, the design choices will be clarified and summarised as a workshop identity (in lieu to a cooperate identity or CI). Though the project is concluded, the longterm impacts and future goals will be summarised and lastly, an important question will be evaluated: *Did the project accomplish true participatory design?*

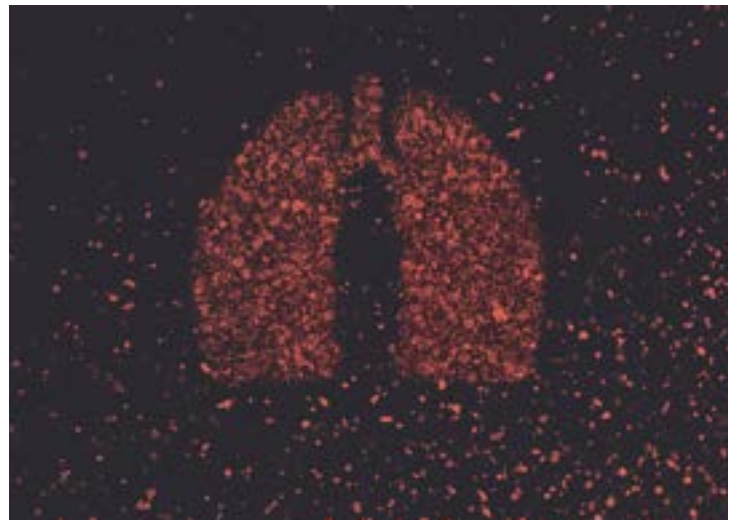
WORKSHOP IDENTITIY

6.1

A particular emphasis was placed on the development of a coherent and attractive design that unifies all elements of the project. While there were considerations in how to include some aspects of participatory design into the design process, it is a challenge to develop an identity based on such a broad and theoretical subject. Therefore, the colour scheme as well as illustrative choices were made to depict the subject of air pollution, albeit being abstract in its execution.

A colour scheme was developed from two contrasting main colours: a vivid orange and a dark grey with a blue hue. Both colours were used in lighter and darker variations to allow for a broad variety of uses.For the same reason, two contrasting fonts were used throughout the workshops and thesis. One was primarily used for headlines and/or particular emphasis and a serif font for text bodies, quotes and fine print. This created a high readability and allowed for multiple options of adaptation throughout all materials.

Figure 52: Colour scheme developed for the workshops and thesis
Figure 53: Fonts used throughout the thesis and workshops



The key element of covers and backgrounds was a pattern reminiscent of particulate matter. It was used extensively throughout the materials and thesis to create a connection between all elements.
A stylised version of an anatomical lung was illustrated with the same texture, which was a primary element within the workshops principally, as it emphasises the workshop content of air pollution and its impact on human health. It was used in materials such as stickers, the handouts or as a cover of presentations.
A personal choice by the author was made to produce illustrations in a line-art style throughout the thesis and workshop materials. It contrasts the particulate style well and adds artistic and visual contrast to many theoretical and text based elements.

Figure 54: Stylised lung as main motive of the workshop series
Figure 55: Exemplary line art illustration as utilised in the thesis and workshop materials

FUTURE VISIONS

6.2

While the thesis is concluded, the research project cleanBREATHE is still in its early stages and will continue the development of the three main objectives for at least two more years. As the conduction of the workshops proved beneficial for the development of a public awareness campaign in the city of Magdeburg, considerations could be made of continuing a similar setup at the partnering Ss. Cyril and Methodius University in Skopje, North Macedonia.
Additionally, an undergraduate design project will utilise the insights gained in the workshop series to develop public awareness approaches under the supervision of a cleanBREATHE research team member.
Apart from the research project, the participatory design workshops had lasting impact on the LÜSA and their consideration for public interest. Prior to the involvement within this project, there were very few situations in which citizens hat the opportunity to engage with the experts or gain deeper insight into the air quality sensing technologies that are being used. Due to the success of the collaboration, the LÜSA is looking into the development of more extensive public engagement opportunities.
Participants of all three workshops gained key insights into the topic of air pollution and stated further interest into the subject. Even more, they gained insight into their personal behavioural impact and several were positive about changing aspects in their behaviour towards environmental conservation. Namely the reduction of vehicles as personal transportation, putting a higher emphasis on correct recycling methods and consuming fewer animal based products. As for their personal environment, the workshops sensitised the participants to the health hazards of air pollution and evoked the desire to make healthier lifestyle choices. Whether these plans come to fruition is up to the participants themselves, but having participated in the workshops allows them to make more educated choices in the future.

As for the participatory design aspect of the workshops, two participants that are employed in teaching positions took particular interest in the materials used and the options of implementing similar techniques into their own courses. All materials were made available to them with an option of collaborating with the author in adapting them to their own subjects.

The author of this workshop herself has made the conscious decision to continue working with participatory design approaches and continue the development and improvement of the applied methods. After the thesis, the author will continue a role in teaching and mentoring at the University of Applied Sciences Magdeburg-Stendal and advocate for a more collaborative approach in design development. On the subject of air pollution the author will continue to educate in her personal environment and is continuing to support cleanBREATHE and the LÜSA in their goals of citizen involvement and education.

WAS TRUE PARTICIPATORY DESIGN ACHIEVED?

6.3

In the third and fourth chapter, the approach of participatory design was analysed in detail. The synopsis of the key characteristics is:

a) Complete collaboration between participants and stakeholders
b) Longterm Involvement of the target group
c) Ecological and socially benefiting subjects with optional political changes

Were these elements truly achieved in this thesis and therefore make it a true participatory design project?

There is not one clear answer, as there are a multitude of nuances and various opinions on the specifics of participatory design. However, it can be illustrated how all of the above characteristics were present within this participatory design project.
Throughout the three workshops, the participants led the process of the workshops and had major influence on the outcomes. Via questionnaires and direct dialogues, feedback on the workshop conduction and the content was received from the participants at many stages throughout the workshops, as well as during the preparation and in the aftermath. They were the key leaders of the process within the workshops, while facilitators and experts assisted with the developed materials and subject input.

As the research team of cleanBREATHE continues to involve citizens in the multi year process, there is definite involvement of the target group longterm. Additionally, as the LÜSA is considering the continuation of public lectures and interactive presentations, there is longterm involvement on multiple levels.
In aspect of political involvement, there was no influence on local politics directly. However, as the LÜSA is under direct funding and supervision of the ministry of sciences, energy, environmental protection and environment (*Ministerium für Wissenschaft, Energie, Klimaschutz und Umwelt*), it can be argued that their involvement is a form of more indirect political action.

Lastly, the outcomes of the thesis are inherently ecologically benefiting, as can be seen by the feedback of the participants. Informing the participants about the hazards of air pollution and their personal impact on the subject led to, if not behavioural changes, at least more informed decision making and sensitising on the overall subject. Additionally, the workshops inspired the use of participatory design and collaborative approaches within their personal environment which is an unexpected but greatly appreciated additional benefit.

In a final conclusion there is undeniable incorporation of all key characteristics of participatory design. While there is still room to argue that some aspects could have been empathised on, particularly the lasting political impact of the project, the approach nonetheless mirrors the key values of participatory design closely. This shows that while extensively funded design projects over a long period of time are crucial, effective participatory design can be achieved by a small team with little funding and in a relatively short timespan. It is the hope of the author that this inspires other designers to go forward in the pursuit of participatory design projects under similar conditions and not be intimidated by the extensiveness of the subject.

AKNOWLEDGEMENT

This thesis would not have been possible without the aid of many dedicated people. Primarily, I would like to thank my supervisors Prof. Dominik Schumacher and especially Victoria Batz for their dedication to the thesis, their relentless feedback and tireless support. Prof. Dr. Michael Herzog, the leader of the research group spirit and project cleanBREATHE is to be thanked for his collaboration and communication efforts. Without multiple stakeholders the workshops would have lacked much of their appeal and effectiveness, therefore I would like to thank Torsten Bayer and Katharina Roloff from the LÜSA, Annalena Becker and Ravi Jayaweera, Nadja Engel and the facilitating undergraduate students Swantje van de Ven and Valerius Weyer.
For their encouragement and support I would also like to thank my friends and family, particularly my mother for her intricate proofreading. My friends Sam, Kristin, Richard and Marv were of never ending mental support, even during the most stressful times.

Lastly, and most importantly I would like to thank all participants that took part in the workshops. Without them this project would not have been possible.

LIST OF FIGURES

All non-declared pictures, illustrations and graphics have been produced by the author as stylistic elements.

All pictures without source or protographer have been produces by the author.

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DECLARATION OF ORIGINALITY

I, Theresa Goldgrabe, hereby submit this master thesis, entitled „How to design a Participatory Citizen Workshop with the Goal to determine Engagement Strategies exemplified on the Topic of Air Pollution“ and truthfully declare that the paper is a product of my original research investigation. To the best of my knowledge and belief, it contains no material previously published or written by another person nor does it include contents that are falsified or fabricated. I also sought permission from the copyright owner to use text, illustrations, and/or framework substantively used in the paper. I understand that should the Hochschule Magdeburg-Stendal, represented by its Administrators and Faculty eventually discover that my attestations herein are not so, I accept the right of the University to impose the appropriate sanctions including the cancellation of the degree granted to me.

Date, Place

Signature

APPENDIX

APPENDIX A

PROTOCOL INTERVIEW
T. BAYER & K. ROLOFF

Protokoll vom 15.03.2022 im Landesamt für Umweltschutz (Außenstelle Magdeburg)

Thema: Vorstellung CleanBREATHE Projekt, Eruierung von möglicher Zusammenarbeit zwischen LÜSA und Projektvorhaben, inhaltliche Fragen zum Thema der Master Thesis „Partizipatives Design angewendet auf das Thema Urbaner Luftverschmutzung“

Teilnehmer:

Torsten Bayer (1),
Katharina Roloff (1),
Victoria Batz (2) ,
Theresa Goldgrabe (2),
(1)Landesamt für Umweltschutz; (2)Hochschule Magdeburg-Stendal

Mitschrift, Victoria Batz & Theresa Goldgrabe:

Über Sensor-Kits

Das LÜSA ist skeptisch in Bezug auf Datenerfassung mit Low-Cost Sensoren. Es gibt strenge DIN Normen zur Datenerhebung, um die Qualität bei der Messung zu sichern. Es ist unklar, inwiefern diese Normen bei der Messung mit Low-cost Sensoren eingehalten werden können.

Es besteht Interesse sich über Komponenten der Sensoren auszutauschen bzw. gemeinsam Sensor Kits zu testen. Eventuell wäre eine Studie anzudenken, bei der direkte Vergleichswerte erhoben werden zwischen Messstationen des LÜSA und selbst gebauten Luftsensor-Baukästen.
Es ist möglich Sensorkits an einer der Messstationen im direkten Vergleich zu testen, sobald ein Prototyp besteht.

Über Politische Richtlinien

Herr Bayer erwähnt Publikationen zu statistischen Vergleichswerten der staatlichen Messstationen und anderen Sensoren.

Aktuell dürfen die EU Grenzwerte für Feinstaubaufkommen an max. 35 Tagen im Jahr überschritten werden. Zu einer Grenzwertüberschreitung kann es neben der durch den Menschen verursachten Luftverschmutzung auch natürliche Ursachen geben wie Brände, Vulkanausbrüche, Dürre, Staub, Saharawind, Ernte, Düngung etc.
Oftmals ist der Auslöser solcher Überschreitungen mit meteorologischen Bedingungen verknüpft (z.B. Ostwind) und nur bedingt regional ausgelöst.

Das LÜSA orientiert sich an europäischen Luftqualitätsrichtlinien. Zudem gibt es eine Luftreinheitsplanung, die Vermeidungsmaßnahmen bei Grenzwertüberschreitungen vorsieht. Dazu zählen u.a. Vermeidung von Verkehrsschadstoffen, Reduktion von schädlichen Industrieanlagen, nachhaltige Gebäudesanierung, alternative Energiequellen etc.)

Die WHO hat in 2021 ihre Richtlinien und Empfehlungen für Grenzwerte der Luftverschmutzung angepasst. Sie liegen weit unter der von der EU festgelegten Verschmutzung / Schadstoffaufkommen.

Momentane Lage in Magdeburg

Neben Feinstaub ist Ozon eine wichtige Kenngröße für Luftqualität. Insbesondere in den Sommermonaten werden die Grenzwerte für Ozon überschritten. Für Ozon gibt es bereits Prognose Modelle.

Stand Luftverschmutzung in Magdeburg: Inzwischen werden Grenzwerte in Magdeburg ganzjährig eingehalten. Grund dafür: Massive Neukonstruktion in der Industrie seit der Wiedervereinigung Deutschlands 1989.
Beispiel: Bitterfeld war in den 1980ger Jahren so verschmutzt, dass die Luft regelmäßig dunstig war und schlecht roch. Heute ist davon nichts mehr zu bemerken.

In Sachsen-Anhalt hat das LÜSA insgesamt 24 Messstationen und in Magdeburg sind 3 davon: Am Schleinufer (Hot Spot), in Stadtfeld (städtischer Hintergrund) und an der Otto-von-Guericke Strasse (Hot Spot).

Hotspots werden gemessen um die höchste Belastung des Gebiets auskünftig zu machen. Die Schwierigkeit besteht darin Hotspots zu identifizieren.

Über das Messverfahren

Stationen werden nach drei Messpunkten angesiedelt: Hot Spots – Orte der höchsten Belastung und des höchsten Schadstoffaufkommens, Mittelwerte – städtischer Hintergrund wie Wohngebiete und ländliche Gebiete – Orte mit niedrigsten Werten.
Dazu kommt eine Windstatistik, die Einflussfaktoren auf die Verbreitung der Schadstoffe in der Luft ermittelt.

Die Reichweite der Messdaten sind sehr gering, sie gelten für einen Straßenlauf von ca. 200m, jedoch können je nach Bauweise benachbarte Straßen sehr unterschiedliche Luftqualitätswerte haben.

Über die Kommunikation mit BürgerInnen

Welche Kommunikationsschnittstellen zwischen LÜSA und Bevölkerung gibt es derzeit?
LÜSA Website, LÜSA App und Bürger*innen Information auf Email-Anfrage. Es ist möglich beim LÜSA Informationsveranstaltungen anzufragen ggf. Besichtigung Messstation bei Besuch aus Skopje. Öffentliche Angebote dazu gibt es zurzeit nicht.
Die LÜSA App bietet die selben regionalen Daten wie die App des Europäischen Umweltbehörde (European Air Quality), welche im Vergleich zur LÜSA App (2014) sehr viel zeitgemäßer ist (2020).

Das öffentliche Interesse an der LÜSA App ist gering. Es gibt ca. 1000 Android Downloads und 200 aktive Nutzer.
Außerdem gibt es den Tag der Umwelt (Halle), an dem Einblicke in die Messstationen gegeben wird, Luftdaten im Videotext, Presseinformationen und Zusammenarbeit mit anderen Projekten (Moldawien). Es gibt keine konkreten Kampagnen oder Öffentlichkeitsarbeit.
Presseanfragen und Kooperationen werden ebenfalls bearbeitet, allerdings sind diese zur Zeit sehr gering. Das Interesse wächst durch Wetterextreme oder politische kampagnen zum Thema Luftqualität.

In Sachsen-Anhalt gab es früher (späte 90ger Jahre bis ca.2004) am Damaschkeplatz in Magdeburg und am Frankeplatz in Halle (späte 90ger Jahre bis ca. 2011) jeweils eine digitale Infotafel. Bei Umbauen wurden sie entfernt und nicht erneuert. Grund dafür war geringes öffentliches Interesse und veraltete Technik.

Informationen über europäische Umweltagentur > Air Quality Report EU

Möglichkeiten zur Luftqualitätsverbesserung

Die Corona Beschränkungen hatten einen großen (positiven) Einfluss auf die Luftqualität. Ausstehende Analyse der Datenveränderung.
Ziel muss es sein, luftschädigendes Verhalten unattraktiv (hohe Spritpreise) zu machen und luftfreundliches Verhalten attraktiver (öffentliches Verkehrsnetz ausbauen). Durch den Einfluss des Menschen wird zum Beispiel die aktive Ozonperiode im Sommer verlängert.
Örtlich kann eine Veränderung im Straßenverkehrsnetz für Luftverbesserungen sorgen, führt aber ggf. Zu einer Umverteilung der Luftverschmutzung, dementsprechend sind solche Maßnahmen sehr komplex und müssen langfristig überprüft werden.

Frage: Wie sieht das staatliche Netz an Messstationen und die Erhebung in Skopje im Vergleich zu Sachsen-Anhalt aus?

APPENDIX B

PROCOTOL INTERVIEW
A. BECKER & R. JAYAWEERA

Protokoll vom 13.05.2022 digital über die Plattform Zoom

Thema: Vorstellung der Masterarbeit „Partizipatives Design angewendet auf das Thema Urbaner Luftverschmutzung“, Konsultation zu Agenda und Rekrutierungsmöglichkeiten, Erfahrungsaustausch zu positiven und negativen Erfahrungen partizipativer Designprozesse in Magdeburg

Teilnehmer:

Annalena Becker (1), Abgekürzt als A.B.
Ravi Jayaweera (2), Abgekürzt als R.J.
Victoria Batz (3) ,
Theresa Goldgrabe (3),
(1)Otto-Von-Guericke Universität Madgeburg;
(2) Universität Hamburg;
(3)Hochschule Magdeburg-Stendal

Mitschrift, Victoria Batz & Theresa Goldgrabe:

Über Teilnehmeraquise

Finanzielle Vergütung für die Workshopteilnahme ist eine häufig genutzte und effektive Option, oder ähnliche finanzielle Unterstützungen wie Fahrvergütung
R.J.: In einem Referenzprojekt in Cambodia wurden Teilnehmer komplett abgelöst von Institutionen rekrutiert, dafür aber mit Unterstützung der Stadt.
Zu erwähnen das die Auserwählt wurden,um ihnen das Gefühl zu geben wie toll es ist das sie dabei sein dürfen.
Vor der Workshopdurchführung gab es eine Analysephase mit internem Kernteam in Form von zwei vorherige Workshops und einem Akteurmapping.

Über die Location

Danach wurden Kriterien kategorisiert um Methodiken zu analysieren, die VOR ORT funktionieren, um gucken welche Akteure gewünscht sind und wie man diese Auswählt.
A.B.: In Magdeburg wurden poteinielle Teilnehmer angerufen und dann per Email kontaktiert. Kontakte waren z.B. die Umweltzentrale und ähnliche behördliche Institutionen. Dies hat in Magdeburg sehr gut funktioniert, sodass alle angemeldeten Teilnehmer gekommen sind oder einen Kollegen zur Vertretung geschickt haben.
Es wäre eine Möglichkeitg vorher bereits einen Steckbrief oder Ähnliches anfertigen lassen, dieserhöht den Druck auch zu erscheinen

Idee für diesen Workshop: Firmen deutlich machen dass sie davon protitieren, sodass Leute wirklich teilnehmen. Schriftliche Anmeldung fordern.

R.J.: Die Teilnehmner aus der bekannten Umgebung entfernen ist besonders bei grade bei Transformations- oder Innovationsprojekten relevant.
Wie wird mit einer unbekannten Location umgeganden?
A.B. : Viel Planungsarbeit, Organisation, enger Kontakt mit den verantworlichen der Location bringt große Vorteile. Am Besten ist es wenn man eine eigene Location hat.

Szenario zur Ankunft der Teilnehmer

R.J.: Ein sehr langes, Informelles ankommen ist empfehlenswert. Beispielsweise zunächst mit Kaffee trinken und sich informell Vorstellen.
Während dem Ankommen schon ein Namensschild mit vorher eingeteilten Gruppen bereitstellen. Dies vereinfacht den Verlauf des Workshops und folgenden Programmpunkten.

Beispiel A.B.:Eine Projektion wunde an die Wand geworfen mit der Frage:Was ist Ihr Lieblingsort in der Stadt?

Vorstellungsrunden bei 25 Personen oder mehr Personen sind Unvorteilhaft aufgrund des Zeitaufwands.
A.B.: In dem Referenzprojekt in Magdeburg gab es eine sehr traditionelle Vorstellung und Positionierungsfragen mit Raumaufstellung

Wissensinput während dem Workshop

R.J.: Direkter Input wäre eher unproduktiv gewesen bei dem Preferenzprojekt in Cambodia, stattdessen wurden bündige Handouts angefertigt. Diese waren von Vorteil um die Atmophäre ungewungener zu halten als sie während einem Workshop gewesen wäre. Teilnehmer hatten in diesem Szenario allerdings bereits das nötige

Vorwissen und kamen alle aus einem ähnlichen Umfeld.
Am Anfang kleinen Überblick um die Leute “abzuholen”.

Workshopmethoden

A.B.: Eine relativ einfache Frage als „Hausaufgabe“ mitgeben könnte gut funktionieren. Ein verbindendes Element zwischen mehreren Workshops ist eine sinnvolle Idee. Man könnte zum Beispiel eine mobile App dafür ggf benutzen (wie European Air Quality Index).
Tipp: https://www.mentimeter.com

R.J.: Eine gute Strategie ist es ganz viele Ideen in Kleingruppen zu sammeln und dann im Plenum zusammengetragen. Das reduziert das Risiko es im Plenum zeitlich nicht zu schaffen und die Teilnehmer zu überlasten.

Wie gut haben Kreativmethoden mit Nicht-Kreativen geklappt?
R.J. :Mind-mapping und Brainstorming war nicht problematisch. Allerdings war der Verlauf für viele Teilnehmer zu strukturiert und dadurch sehr unangenehm. Malen und LEGO war auch Optionen, die den Teilnehmern angeboten wurden, diese wurden aber nur sehr wenig genutzt.

A.B.:Es gab einige Kandidaten für die Kreativmethoden sehr schwierig waren. In der Moderation wurde darauf geachtet und dementsprechend angeleitet. Wichtig war es Personen, die mental abschalten zu Wort kommen zu lassen und anschließend Feedback abzufragen.
Tipp: Aufpassen, dass man solche Teilnehmern in kreativen Übungen nicht verliert. In Kleingruppen kann man immer besser eingreifen.

Workshopdokumentation

A.B.: Hiwis haben während dem Referenzprojekt in Magdeburg Protokoll von den Großgruppendiskusionen geführt. Es gab keine ausführliche Evaluation nach dem Workshop.

R.J.: In Cambodia gab es einen Fragebogen. Vorher und Nachher wäre besser gewesen, aber zeitlich zu aufwendig.Fotos/Filmen??
Der Fragebogen wurde am nächsten Tag ausgegeben.
Im Fragebogen befanden sich organisatorische Fragen und wissenschaftliche für die weitere Forschung.

Gab es nach den Workshops ein Update für die Teilnehmer?
R.J.: So etwas wurde noch nicht gemacht, soll aber noch passieren. Den Teilnehmern wurde das Gefühl gegeben, dass die Veranstalter weiter im Kontakt bleiben wollen.

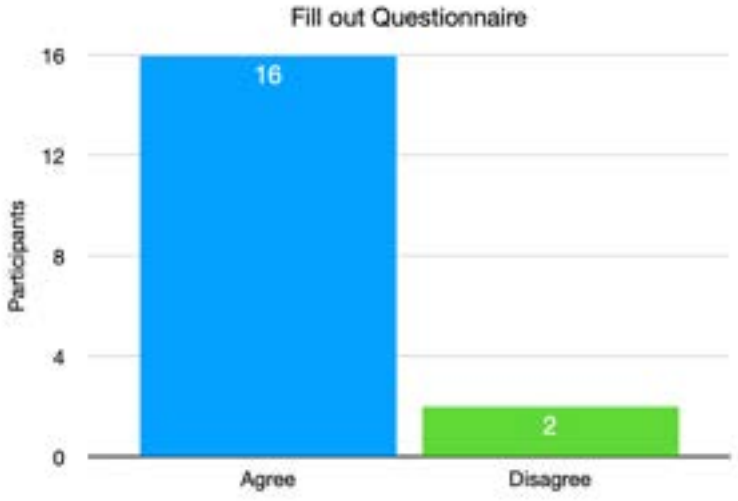
Moderation

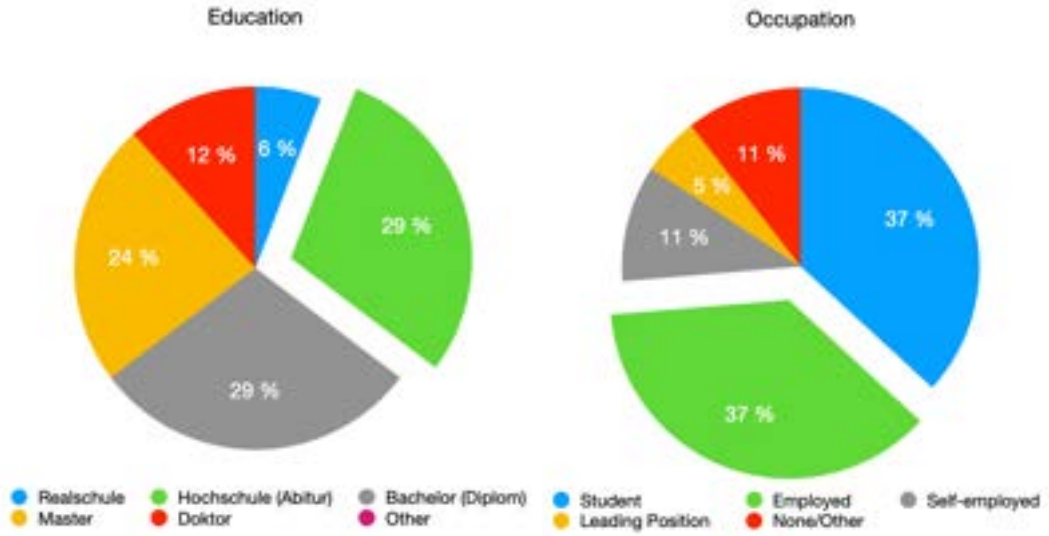
A.B.: In Kleingruppenphasen gab es stehts mehrere Betreuuer, z:B. Hiwis oder den Moderatoren,...In der Moderation selbst gab es eine Person. Ich [der Hauptveranstalter] habe nur mitgemacht wenn es nötig war oder etwas Relevantes sonst untergegangen wäre.

Feedback zum vorläufigen Workshopaufbau

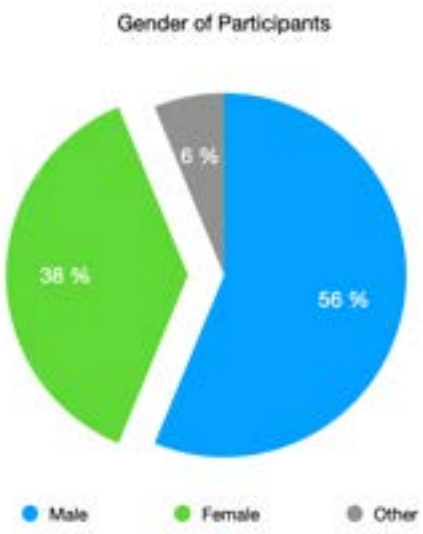
A.B.: Warum gibt es eine Kreativsession, was genau wird dabei gemacht?Rauszuarbeiten was dabei relevant ist.
Ist prototypisches Arbeiten in der Workshopthematik überhaupt notwendig. Zeitlich ist alles etwas eng.

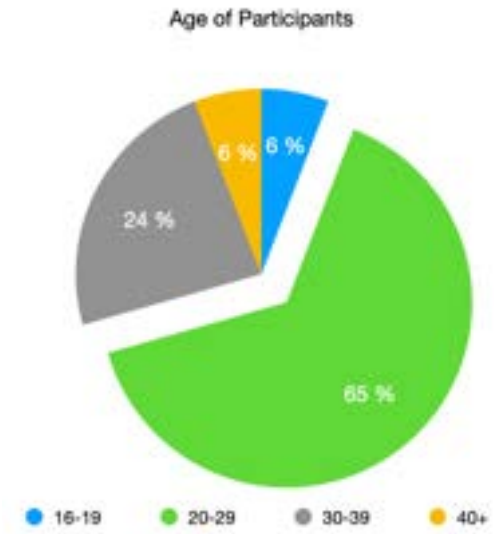
APPENDIX C
WORKSHOP STATISTICS

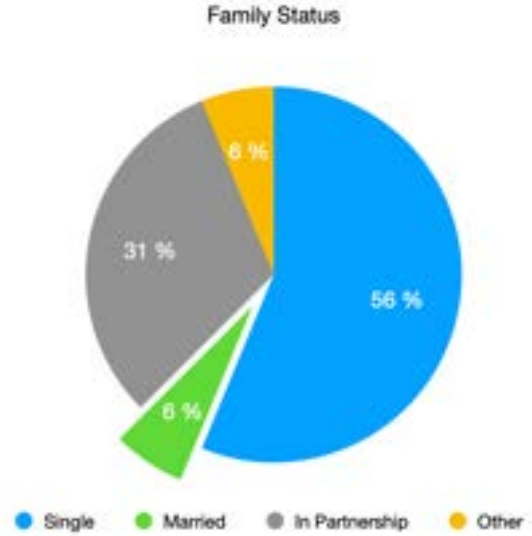




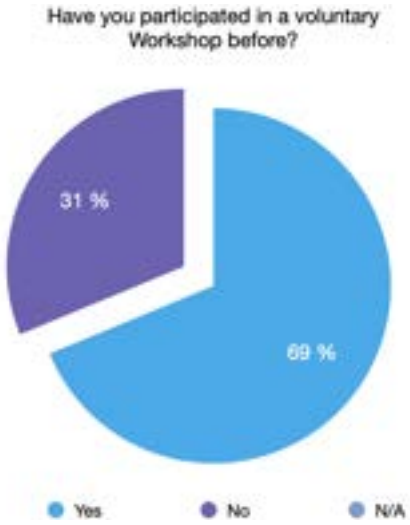
DEMOGRAPHICS

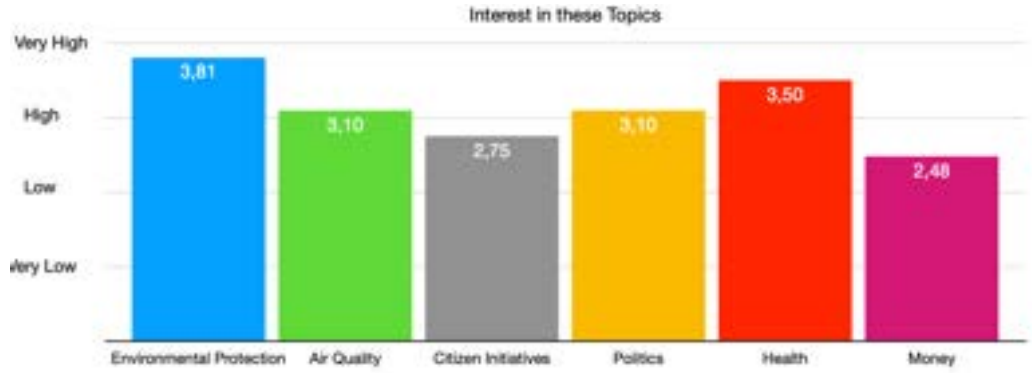


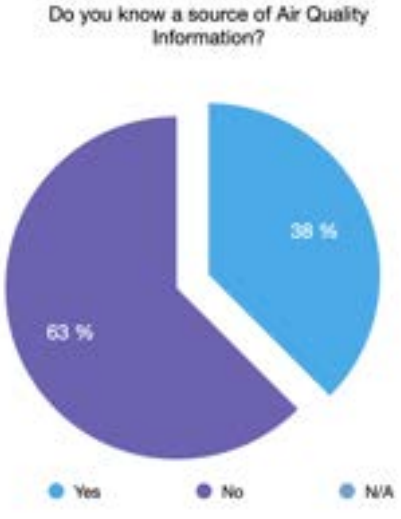


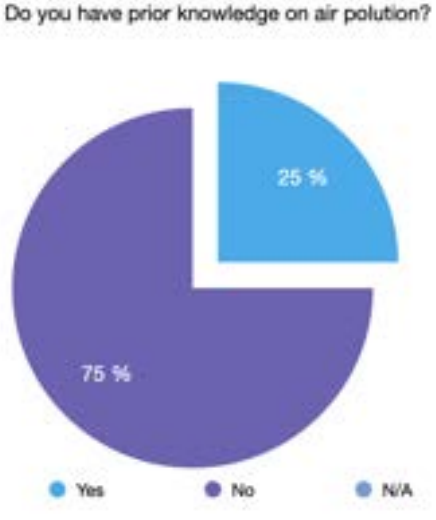


INTEREST AND EXPERIENCES

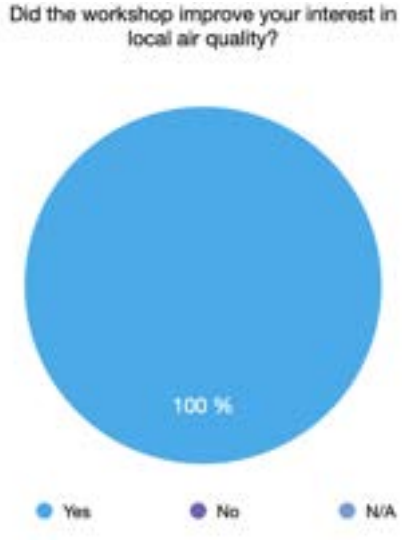


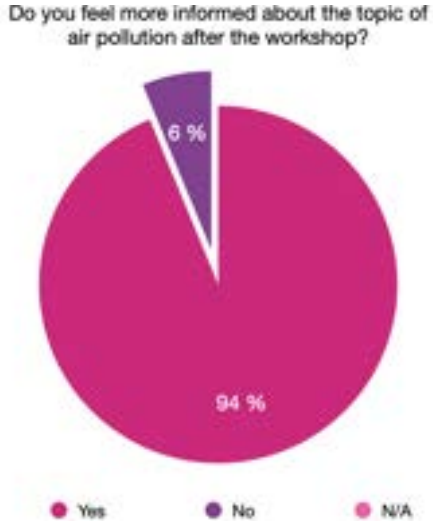


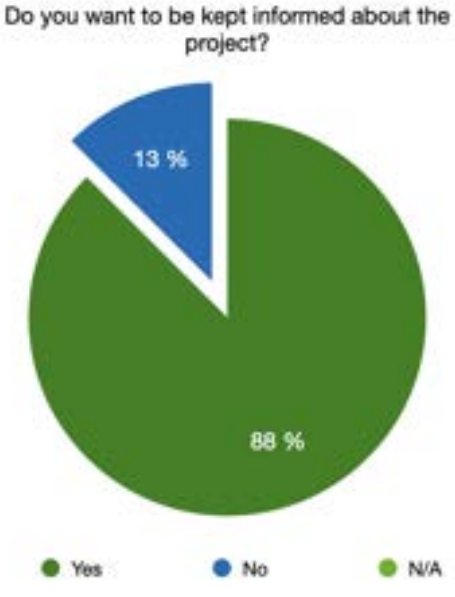




FEEDBACK

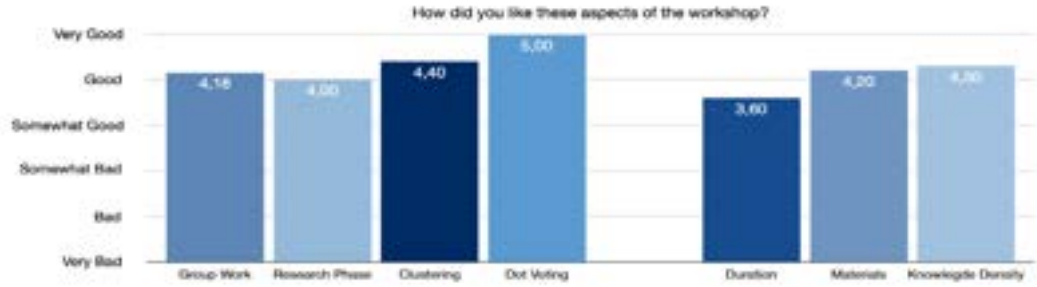




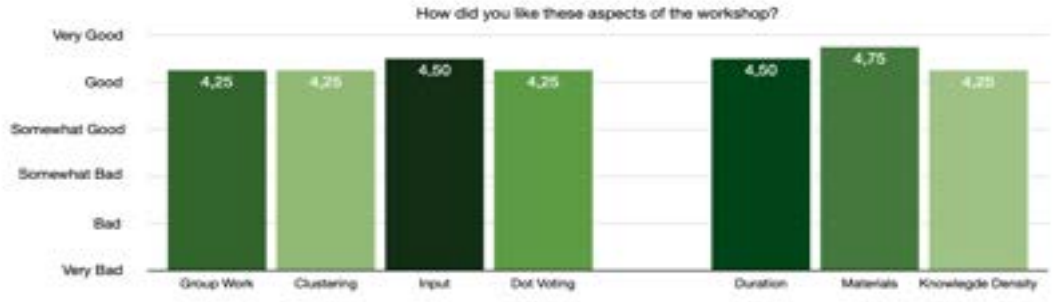


FEEDBACK METHODS

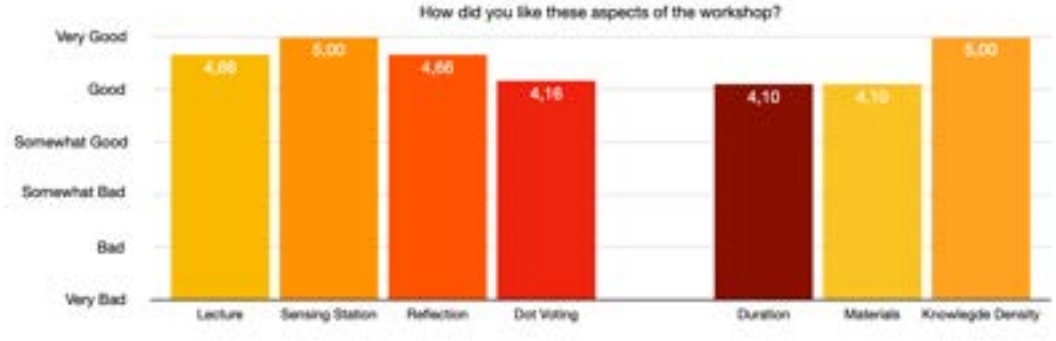
Workshop 1



Workshop 2



Workshop 3



APPENDIX D
WORKSHOP MATERIALS

The workshop materials of all three workshops amount to over 70 pages and have therefore not been included into the thesis. As they are a crucial part of the process and methodology, they can be accessed in their entirety through the QR-code and weblink below. Please note that the materials are in German and currently not available in other languages.
The reader is encouraged to take inspiration from them and utilise the elements that are helpful for their own objectives, or adapt them entirely to their own needs. For further guidance feel free to contact the author directly.

Or access directly by clicking here!