



Clear

Air Quality Data as a tool
for the enabling of learning
and community action.

A service design diploma project by
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with supervision from
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With support from
Difi and MiljøDirektoratet

Foreword

This project is the culmination of my learning experience at The Oslo School of Architecture, from august 2016 until june 2018. In these 2 years, I've gotten closer to my objective: becoming a designer who is more socially aware and that has access to tools that are capable of promoting social change for the common good. I've always chosen to take part in the studio courses which allowed me to work closer to the public sector. I believe that Service Design can be an interface between people and their rights as citizens, and this experience certainly fills me with lots ideas of how to make this come to life.

I would like to thank my family for the unconditional support, my friends back home in São Paulo for being present despite the distances (and heartaches), my newfound friends in Norway for the good times had together and AHO's faculty for the openness and goodwill.

Oslo, May of 2018.
Made with love <3



5 Executive summary

Clear is an exploration of how Service Design can be used in the public sector to generate awareness and trigger action regarding environmental topics – in this particular case, air pollution. It is also an exploration of how Systems Oriented Design can help designers to maximize the positive effects of their proposals in the face of complex societal challenges.

Air pollution is a sad side effect of carbon-based industrialization. The more industrial activity and growth around the world, the more air pollution. Studies on the adverse effects on health of bad air quality are beginning to surface and the news are not good: some authorities are calling this an global epidemic.

This is also true regarding Norway. Big cities in the country have to deal with the effects of growth. But what appears to be clear

and obvious, for a big part of the population is still out of sight. Trying to remediate the situation, Miljødirektoratet has engaged in several efforts to spread awareness of the data about air quality, hoping this data would trigger some sort of behaviour change in citizens. But the scenario is very complex, the data is not contextualized and people already have a lot of worries. Air quality maybe is just another one of them. How to reach them, fulfil Miljødirektoratet's mandate

and establish conditions for action?

Navigating complexity

My process started with a thorough attempt to understand as much as possible of the complex system that connects people, authorities and air quality. Merging Systems Oriented Design methods and Service Design research, I found some barriers for the

understanding of air quality. Instead of crashing against this barriers, I decided to circumvent them, aiming my project towards children. They are the new generation and should be informed now about Air Quality so they can make better decisions in the future.

An Educational Platform about Air Quality

I created a concept called 'Up & Around', an educational platform for children between 8th to 10th grades, 'Up & Around' is an educational platform for children between 8th and 10th grade that aims to raise awareness around the topic of Air Quality, using data gathered by the sensing network already established and mobile applications to aid teachers and students in their learning journey. 'Up & Around' aims to engage the community around Air Quality and connect young people to local authorities, in order to discuss solutions for areas with constant bad air quality.

This educational platform is offered by Miljødirektoratet in partnership with local environmental agencies as a service for schools in big cities. The service is delivered through a number of touchpoints. The two most important ones are the Onboarding Kit, which gives all the necessary

information for educators to adopt 'Up & Around', and two interlinked iPad applications – a teacher's app and a student's app. The apps serve as a means to deliver content about air quality to both, and allows teachers to structure study plans to their liking and follow up on student's activities, and student's to record their activities and interact with air quality data in a novel way, contextualized to their lives.

The service ends on a high note, with all the schools running 'Up & Around' getting together for an 'Air Quality Gathering', where children have the opportunity to present their journeys to parents, environmental workers, local authorities and the media, giving a new face to data and engaging their local communities around the topic.

Outcomes

The service can be a great way to reach adults: children become the guardians of the knowledge regarding air quality and can influence habits and decisions. The project can also become a model for how Miljødirektoratet can engage in educational projects and reach local communities. In the end, I deliver a project that has potential to evolve up to implementation.



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Introduction

Air Quality Data as a tool for the enabling of learning and community action.

Get to understand the basis for the project and how it was structured.

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How the project was set up

This diploma project was developed in the context of the Stimulation Scheme for Innovation and Service Design in the State, a partnership between Difi and DOGA to accelerate the adoption of service design innovation in the public sector.

The Environment Directorate, The Road Authority and the Meteorological Institute have already engaged with a design consultancy to develop a solution for their original brief. The aim of the project has been to **increase knowledge about air quality data**

and trigger action by users to reduce pollution and limit the amount of damage that pollution can cause.

This was previously done through a traditional website that is linked to a number of measurement stations that show concentrations of air pollution in different places in Norway.

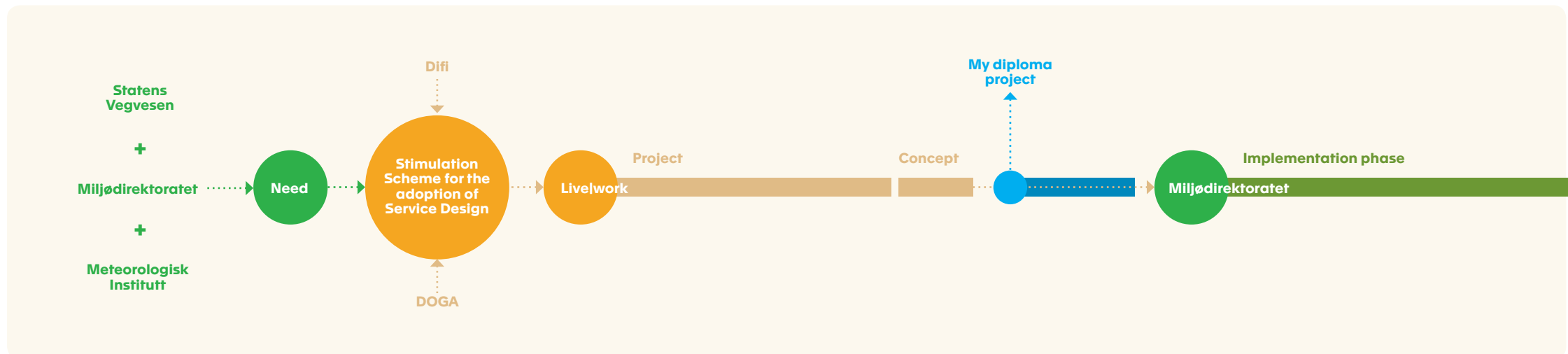
Livelwork, the commercial partner selected, developed a concept that is very pragmatic, grounded in what can be done right now. Their solution involves the development of a new website that centralises air quality

data. This new website could be used by the public in general and by municipality workers to trigger warnings and send messages to citizens. Their solution also involves a strengthening of social media channels to hand out information and the development of an API to allow other actors to access the data. The concept hasn't been implemented yet by the Environment Directorate.

In my opinion, there was a lot of space to complement Livelwork's delivery, specifically regarding the engagement of citizens around the topic of Air Quality in order to trigger action. Their project was focused on strengthening channels of delivery of information, while I think there are opportunities of framing a solution in the realm of social relations in the specific context of

communities affected by bad air quality, with the goal of promoting social change.

I have had access to Livelwork's research material and their findings. These are described in the 'Research and Analysis' chapter (p.xx) of this report, as well as how I utilized them.



Air Quality in context

There's something in the air... and it doesn't smell right.

The World Health Organization (WHO) defined in 2014 air pollution as “a major public health concern”¹ and “the single biggest environmental health risk” of our current times. Air pollution is responsible for 3,2% of the total global burden of disease, being connected to very diverse effects ranging from adverse pregnancy outcomes to

myocardial infarction. WHO also stated in 2013 that the air we all breathe is carcinogenic, linking the results of several studies with a highly increased rate of lung cancer in people that are exposed to high levels of air pollution continuously. Records levels of pollution are recorded day after day. It is fast becoming a pandemic.

¹Exposure to Air Pollution: A Major Public Health Concern. 2010. World Health Organization.

Air Quality in Norway

Even though Norway has made progress in the last few years, air pollution levels are still higher than the values expected by the European Free Trade Association. Norway has been in breach of EEA laws regarding pollutants that were exceeding the allowed limits in several occasions since 2008. The impacts on health are felt by populations with respiratory

and cardiovascular diseases, as well as children and elderly citizens. Low income populations are also heavily affected. In the Norwegian context, the most important air pollutants are:

- Soil dust, also known as particulate matter (PM)
- Nitrogen dioxide (NO₂), which occurs when emissions from road traffic and shipping

industry combine with ground level Ozone

- Sulfur Dioxide (SO₂) caused by some types of industrial activity
- Carbon Monoxide (CO) produced by fuel combustion
- Ozone, a type of pollutant that reaches Norway travelling from continental Europe, mostly.

There are several factors that affect the amount of air pollution: emissions from various sources, proximity to areas where pollution is emitted and local meteorological and climate-related conditions. These different factors acting in conjunction mean that air pollution varies a lot. In Norway, the winter worsens air condition: wood burning for house warming increases and cars run on lower engine torque, which increases exhaust. In addition, meteorological inversions occur which cause poorer dispersal conditions in the winter. Road and traffic related air pollution is very high during winter, which means that communities that are situated along busy traffic corridors are usually more affected by air pollution. Indoor air pollution is also a factor to be considered, as sometimes it is even higher than outside, specially for communities affected by continuous outside air pollution.

The legal situation

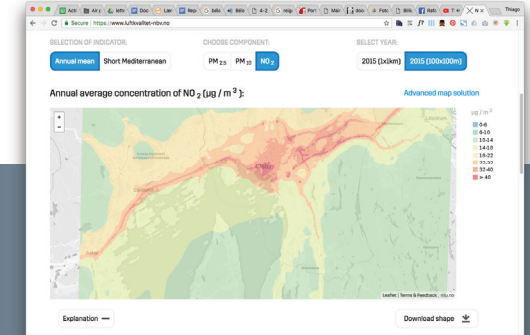
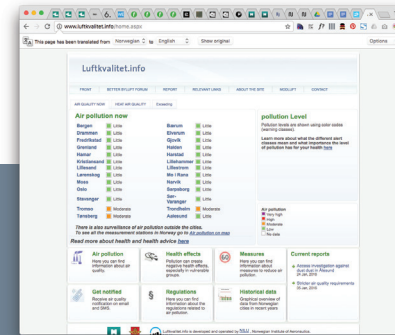
The subject of Air Quality in Norway is handled by three main devices:

- Pollution control regulations: legal devices that enforce the control of air pollution. The municipalities are responsible for ensuring that data is collected in the expected quality

and that measures are taken when needed. These regulations also state the pollutants responsibility to take measures to curb its emissions;

- The government national and local targets for Air Quality: national targets are projections and local targets are goals. This limits are legally binding;
- Air Quality Criteria: The Norwegian Institute of Public Health and the

Environment Directorate state levels of pollutants that are safe for everyone, including the most vulnerable groups in society.



Air Quality and Data

Municipalities and Statens Vegvesen are responsible for generating local data about Air Quality using high quality measuring stations. This data is aggregated in databases managed by the Norwegian Institute for Air Research (NILU), who is also responsible for maintaining the monitoring stations. This data can be accessed by the general public via two touchpoints. Even though they are available for everyone, their

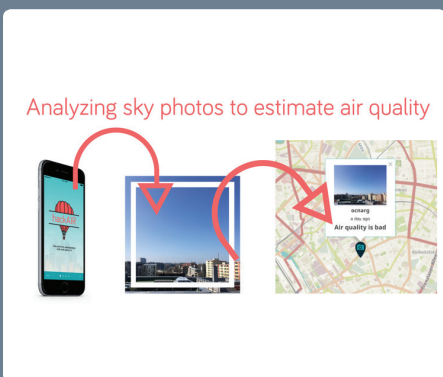
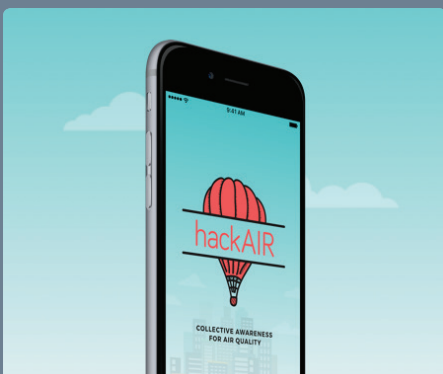
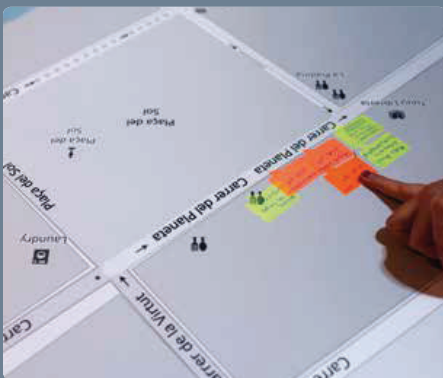
penetration in the Norwegian population is very small. Both websites are more used by public agents that are in charge of monitoring local air quality and by the public that has a direct interest in air quality (i.e. populations with asthma, lung disease).

Luftkvalitet.info

A website that displays concentrations of pollutants captured through measuring stations across Norway. Municipalities have access to a dashboard which allows for specific reports on concentrations of varied pollutants. It's important to note that these are 'snapshots in time': they show pollutants in a place and time. But since atmospheric and geographic conditions are constantly changing, they cannot give a precise account of what is really happening.

National Calculation Tool for Air Quality

A website that presents models for Air Quality for selected places in Norway, using datasets from 2014 to 2016. The website presents maps and air quality calculations, population exposure maps and emission sources maps and their contribution to the total sum. The website is targeted at "air quality experts in the management and consulting companies".



19 Citizen engagement and participation

As of now, citizen participation in the topic of air quality is very diminished. There are very few open forums for discussing this issue and for the interaction between citizens and public agents. Citizens are regarded mostly as recipients of information and have a very passive role in this ecosystem. Some initiatives around the globe are exploring the concept of

Citizen Science – allowing the general public to contribute to the scientific debate by providing tools for citizens to generate data and creating forums where the academic establishment meets the general public for collaboration. I highlight two projects, that serve as reference points to what is possible and also some of the pitfalls these kinds of initiatives face:

Making sense

An European project that aims to “explore how open source software, open source hardware, digital maker practices and open design can be effectively used by local communities to fabricate their own sensing tools, make sense of their environments and address pressing environmental problems in air, water, soil and sound pollution.”

It was organized around “campaigns” in Amsterdam, Barcelona and Kosovo, which discussed topics such as radiation, noise

levels, air pollution, citizen participation and making. The main project output is a toolkit to plan and create similar campaigns. The toolkit is open for all to access at: www.making-sense.eu

hackAIR

This project aims to “develop an open technology toolkit for citizens’ observatories on air quality, supported through the EU programme on Collective Awareness Platforms for Sustainability and Social Innovation”. This is an ongoing project that will span until the end of

2018 and is present in 5 cities in Europe, including Oslo.

The hackAIR platform consists of three parts: a digital service where users can connect DIY sensors and see results on a map, a database where Air Quality data from different sources is fused and a workshop package for the implementation of ‘Air Quality workshops’.

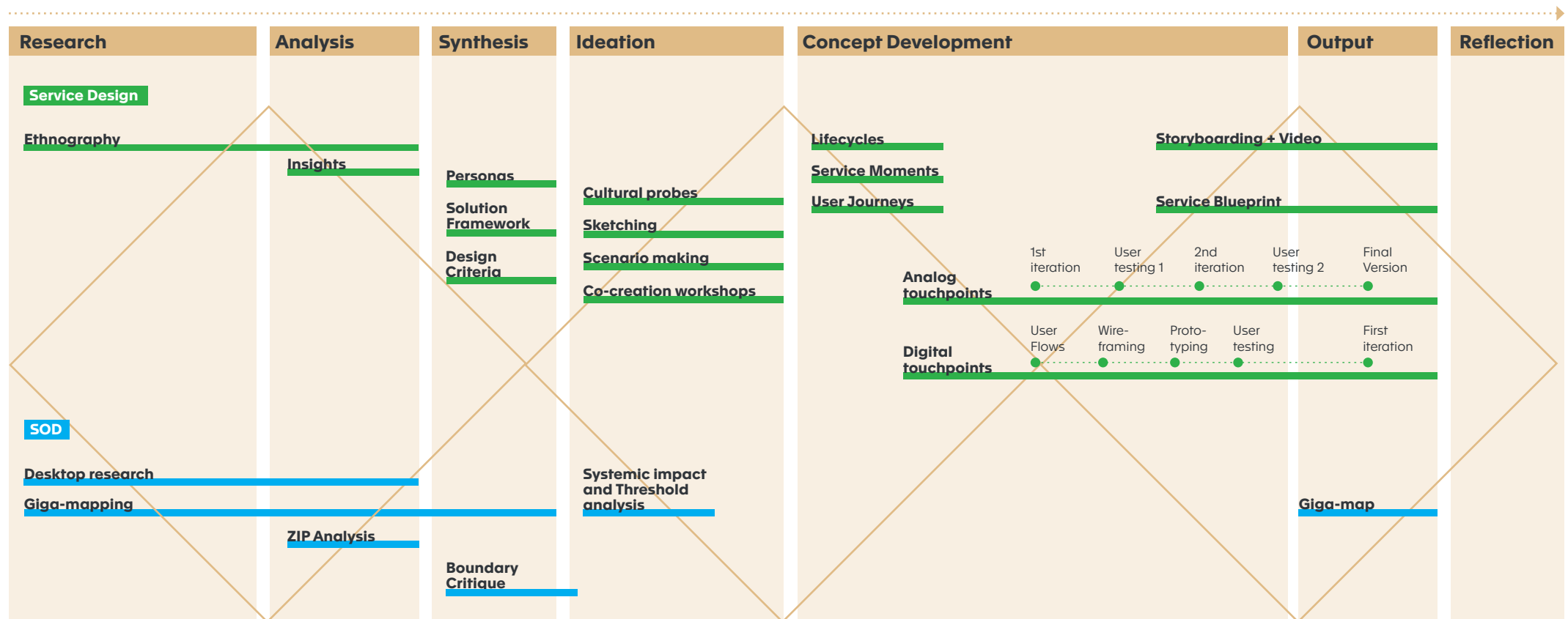
Even with all this, hackAir adoption is very low, specially in the Norwegian context. The digital platform currently has little user input and appears somewhat dead.

Methodology

The Air Quality ecosystem involves a multitude of different actors, in complex relations. In order to understand and grasp this complexity I used Systems Oriented Design (SOD) methods. I used Service Design research approaches to drill down to the personal level and uncover user needs and insights. I used rapid prototyping and evidencing to shape

concepts, evaluated subsequently with users and important stakeholders in co-creation workshops.

These methods are carried out on a sequence of divergent and convergent phases inspired by the 2005 British Council's Double Diamond, as explained by the following diagram:



The scope of this project and what does it aim to achieve

This diploma project was focused on Service Design and explored how data can be used to spark public debate and engage citizens, specialists and public agents around solutions, moving from awareness to action.

'Clear' outlines a complete service delivery, which includes a number of different touchpoints. Some of these touchpoints will be more detailed than others, according to the relevance they have for the service delivery

I gave special attention to digital touchpoints, as I believe that they can become a very perceptible and tangible materialization of the the design process as a whole, thus making its value immediately visible to partners and stakeholders. I would like to note, however, that these developments represent more the manifestation of user needs than a

finished digital product. That is not my intention and I place it outside the scope of my project.

The ultimate goal of this project is to create a service that promotes civil engagement and cooperation between all the stakeholders in the system, discussing Air Quality as a democratic issue.

In this sense, this diploma project is not so much about data *per se*, but more about what data means in citizens lives and the possibilities that the use of data can give birth to.

Desired outcomes

- 1 A service that is feasible and that could run as a pilot with some minor iterations
- 2 Communities that are more empowered to discuss Air Quality and engage with the public sector
- 3 An open channel for the above mentioned engagement to happen
- 4 Common understanding of the results of air quality in the user's specific contexts

Research and analysis

Air Quality Data as a tool for the enabling of learning and community action.

In this chapter, I will discuss how the topic of Air Quality was investigated and what are the main findings that arose from this process.

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Previous Research and Concept

I had access to the research material developed by Livework. This material contained the results of interviews with a group of users consisting of citizens with varied backgrounds and public agents from different municipalities and directorates. I condensed this material to the most essential findings:



Citizens in general

- People in general have low levels of awareness of Air Quality and don't understand complexity
- Information needs to be contextualized
- They expect the government to come with solutions
- People are not worried about the data being 100% accurate, they want concrete advice



Municipal workers

- Air Quality is only one factor in decision making
- Municipalities need help to reach citizens in a consistent manner
- Roles and responsibilities between public actors are not clear between
- There's a need for systemic learning and sustainable efforts



Kindergarten workers

- Different kindergartens have different levels of awareness and are equipped differently to handle bad Air Quality situations
- Procedures are not standardized and there's too much room for workers interpretation
- Kindergartens don't share experience between themselves

↓ A slide from Livework's concept presentation, detailing the six parts of their proposal.
 ↘ Some conceptual images that illustrate their delivery.

En helhetlig luftkvalitetstjeneste



I also had access to the concept developed by Livework. Their proposal is divided into six parts, as shown in the above image.

My initial perception was that the deliverable was very adequate and feasible but didn't push Miljødirektoratet into new territories. As a matter of fact, my contacts in the organisation appeared to be a bit overwhelmed on how to implement the concept, and ended up just settling for the redesign of 'Luftkvalitet.info' as the main takeaway from the project, in a two year internal initiative that is

already underway and will require a lot resources.

This means that the first part of the original brief – "to increase knowledge about air quality data" – is already being taken care of. Therefore, I was allowed to take a more critical stance where I was able to challenge the original brief, hoping to arrive in a different place, more focused in an expected "action" (or engagement, as I will call it from now on). This also allowed me to have the definition of who the "user" is open during beginning of the project.



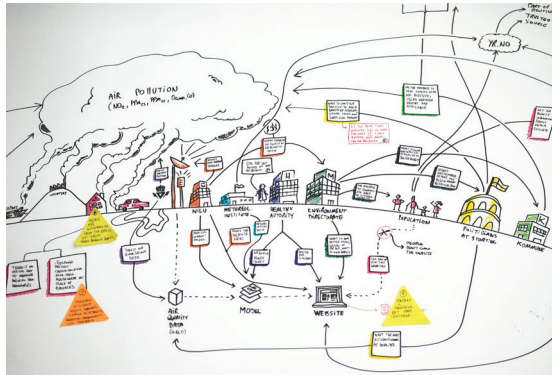
Giga-mapping air quality as a system

One of the very first exercises I did was to try to gigamap the Air Quality ecosystem. It is composed of several governmental and private actors, that exchange value in different moments, carry various degrees of responsibility and interact with several different technological interfaces. This represents one of the first problems of the system: the delimitation of responsibilities to gather air quality data, understand its implications and act locally and nationally is overlapping between different actors and not always clear cut. Another problem that became apparent is the tension between the complexity of the data infrastructure, the needs of governmental actors regarding data and the relevance of this data to the general population.

A second iteration of the Gigamap was developed in parallel to the rest of the research phase. I created a model that presents objective reality in five superimposed layers:

- the atmosphere, where physicochemical processes of air pollution take place.
- the sociosphere, where individuals and organisations interact with each other and exchange value
- the personsphere, where individuals express their world views and needs
- the datasphere, which models the other spheres in the form of data
- the geotechnosphere, which is the sum of the built environment plus the geographical topography

The Gigamaps allowed me to have an understanding of points to intervene as a designer to obtain the biggest possibility of generating engagement; this exercise quickly put me out of a very data-driven technological approach, towards contextualization of data to specific contexts of users and a focus on social relations around communities.



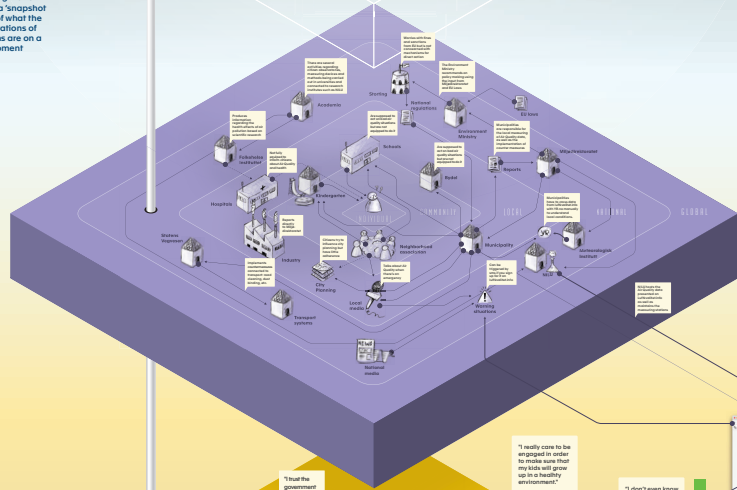
↑ First draft of the Gigamap with ZIP Analysis!
 ↓ Mockup of the final version of the Gigamap.
 Format: 200 x 90 cm



SOCIOSPHERE

Measuring stations capture a "snapshot in time" of what the concentrations of pollutants are on a given moment

Humidity and precipitation alter the way pollutants interact with the air and ground

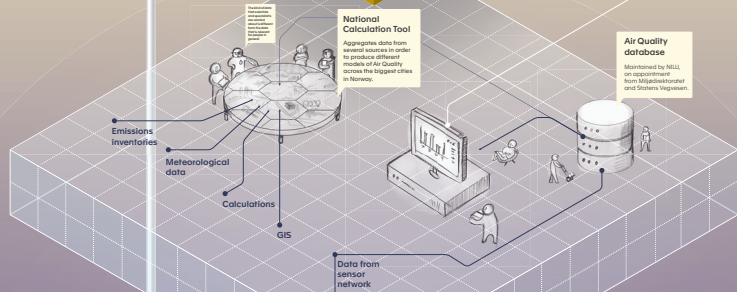


Lufkvalitet.info
Aggregates data from several sources in order to produce different models of Air Quality across the biggest cities in Norway.

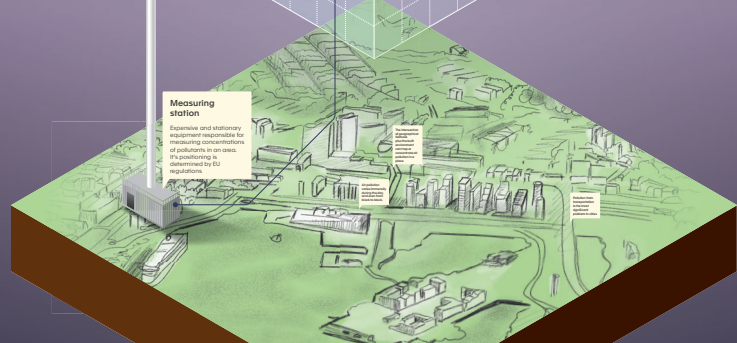
PERSONSPHERE



DATASPHERE



GEOSPHERE + TECHNOSPHERE



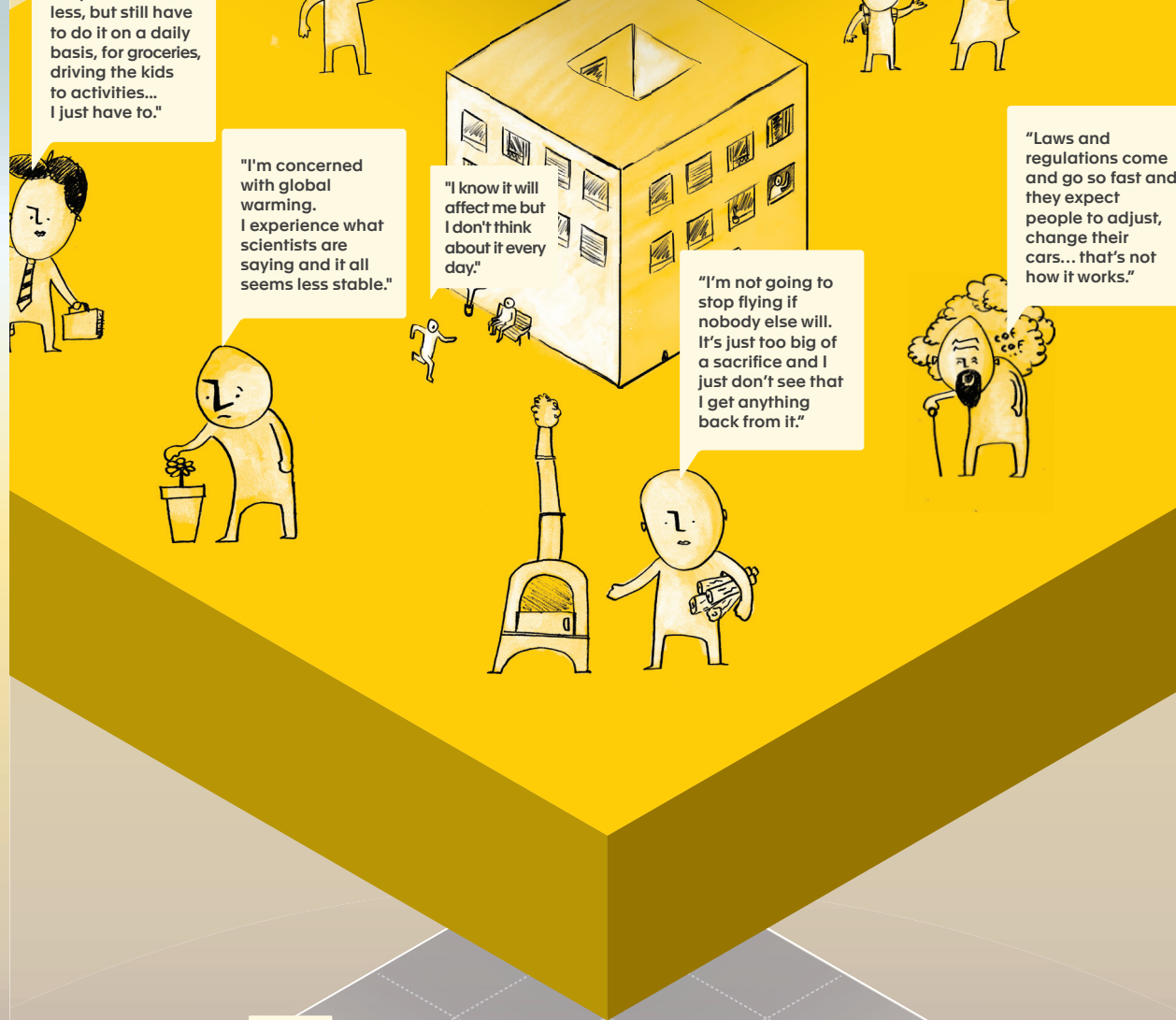
less, but still have to do it on a daily basis, for groceries, driving the kids to activities... I just have to."

"I'm concerned with global warming. I experience what scientists are saying and it all seems less stable."

"I know it will affect me but I don't think about it every day."

"I'm not going to stop flying if nobody else will. It's just too big of a sacrifice and I just don't see that I get anything back from it."

"Laws and regulations come and go so fast and they expect people to adjust, change their cars... that's not how it works."



Meteorological data

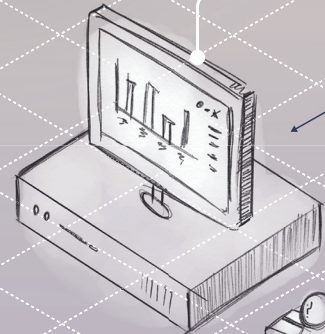
Calculations

GIS

The kind of data that scientists and specialists are worried about is different from the data that is relevant for people in general

National Calculation Tool

Aggregates data from several sources in order to produce different models of Air Quality across the biggest cities in Norway.



**“Until the great society
is converted into
the great community,
the public will remain
in eclipse.”**

John Dewey in *The Public and It's Problems* (1927)

Desktop research

In parallel to Giga-mapping, I started researching on topics related to Air Quality to build a solid knowledge base to work with. I was mainly interested in the mechanisms that allow people to understand environmental issues (and also the ones that disable this capacity).

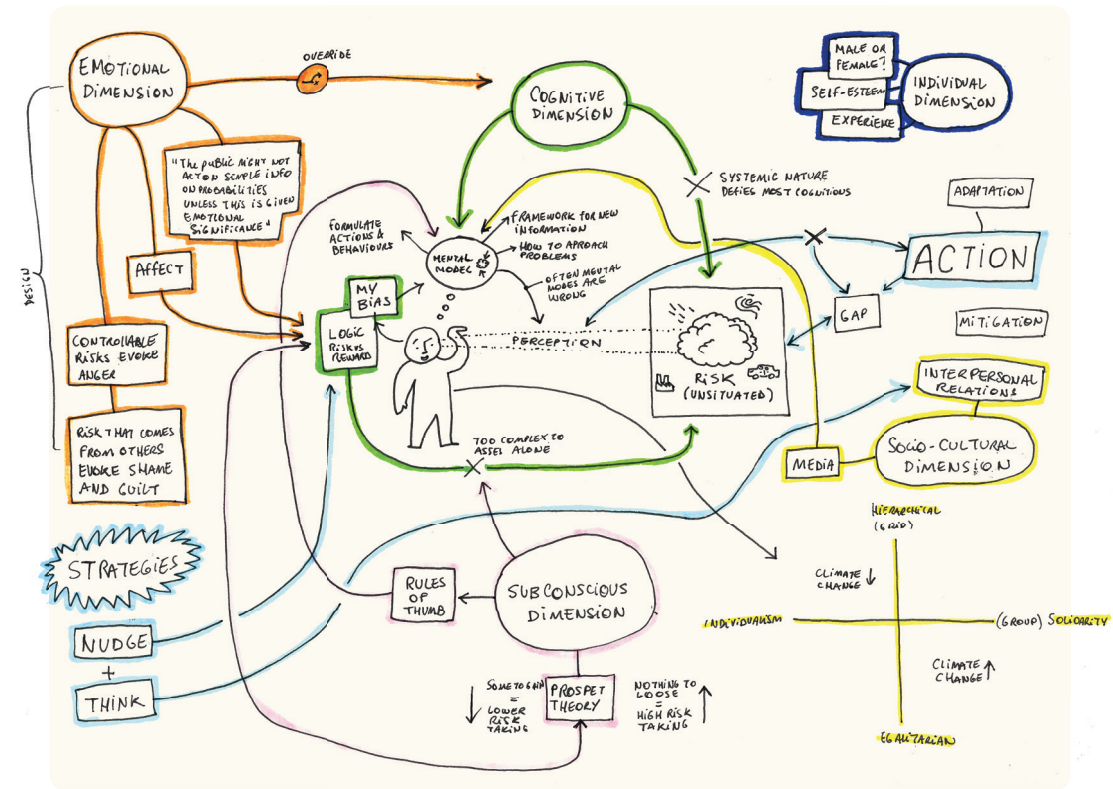
The topic of risk perception is a broad field of study that has been explored by psychologists, anthropologists, sociologists and economists. Its study became relevant during the 1960s, when ecological awareness began to flourish and major scale public technology programs with potentially hazardous consequences like Nuclear Power began to be deployed. As politicians and policy makers began to refer to these studies, several different ways to do risk analysis were developed.

Sander van der Linden works in the department of psychology of the University of Cambridge and is one of the leading researchers on risk perception in connection to climate change – a topic that is intertwined with atmospheric pollution. His work pushes towards a more “comprehensive and holistic

understanding of risk behaviour”, using an interdisciplinary approach to connect the role of knowledge, learning and mental models in shaping public perceptions of climate change¹.

He outlines “five fundamental processes that help form, shape and guide human perceptions of climate-related risks”: cognitive, subconscious, affective, socio-cultural and individual factors. These processes, however, are not isolated and act together (diagram to the right) to form a system of perception, in which individual’s cognitive capabilities are interpolated by these other processes, which can jam, alter or reinforce perceptions of risk.

What I could learn from Linden’s work is that creating a channel for information to reach citizens is only the very first stage in actually making people understand the risks related to Air Pollution, at the risk of even perpetuating a warped perceptions. Linden points to strategies of ‘nudge’ (minimizing the cost of behaviour change for individuals) and ‘think’ (which relies on the design of democratic institutional platforms where citizen-led investigation can



trigger changes in shared risk perception).

Ever since reading the book *Dark Ecology*, I have been fascinated by Timothy Morton and his capacity to unveil a more magical and less solidified view of the world. In one paper, he talks about the “contemporary tendency to need to quantify everything around us”², something that reminds me a bit of how stakeholders

who work with air quality are infatuated with data. Morton proposes that the present moment is “empty”, that it is just a tension between the aesthetic qualities of the past and the essence behind the material world, which is the future. In the present, people can get together to discuss the shape of the past and to project the essence of the future, in order to consent to the now.

Connecting this to air quality: generating more and more data in finer resolutions of time and space is not likely to trigger more change.

What we need to achieve then is creating this space of mutual learning and construction, much like the “design things” and “laboratories of circulating references” described by Thomas Binder, Pelle Ehn and others.

¹ Linden, S. V. den, Helgeson, J. and Chabay, I. (2012) ‘The role of knowledge, learning and mental models in public perceptions of climate change related risks’, in *Learning for sustainability in times of accelerating change*. Netherlands: Wageningen.

² Morton, T. (2012), ‘Everything We Need: Scarcity, Scale, Hyperobjects’, in *Archit Design*

³ Binder, T. et al. (2015) ‘Democratic design experiments: between parliament and laboratory’, in *CoDesign*.

Expert interviews

"We have to get the data out to municipalities. But do we know what the users really need?"

**Isabella Kassin,
Miljødirektoratet**

This interview helped me to understand the stakes held by many of the actors in the previous developments, as well as the main driver of the project for Miljødirektoratet: to get more people aware of Air Quality Data. At the same time, her biggest takeaway from the engagement with Difi and Livelwork is that design can be the tool they needed for finally understanding citizens actual needs.

"Collaboration is necessary for awareness because different actors hold different parts of the puzzle"

**Astrid Langnes,
designer at
Livelwork**

Astrid was one of the designers involved with developing the project carried out by Livelwork. Astrid gave me a look behind the curtains of how the project, highlighting the different expectations from different actors. In her opinion, solutions that involve these different actors have a good potential to succeed.

"People are busy. Who is going to tell researchers how much wood they are using and when they are using it? The amount of data that we need is too high and engaging people is very challenging. We underestimated this challenge."

**Susanna Lopes-
Aparicio, senior
scientist at NILU**

She works with emissions in city and regional scale, contributing to the generation of Air Quality models. I was interested in a project that she was involved in called iResponse, which attempted to crowdsource data from residential wood burning emissions using an online form as well as datamine it from publicly available sources. The engagement was low, as users didn't gain much from the experience.

"I think the problem is not that there isn't information, it's that people don't understand it."

"If it's a different technology it should be used in a different manner."

"There is a big element of trust in how your perceive information."

**Alena Bartonova,
research director
at NILU**

I talked to Alena about citizen science, microsensors and the relationship of these initiatives with government. She is very careful and sees a potential for personal measuring devices to undermine, if abused, the trust in central reference instrument measuring owned by governments. For her, it's necessary to equip citizens not only with technology, but also with data literacy.

"On a daily basis I work with Air quality, but when we are trying to communicate with politicians we have to try to connect the dots or show a bigger picture."

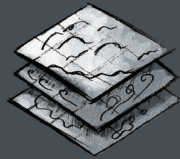
"I don't really know how many people know that air quality is a health issue."

**Tore Nordstad,
Trondheim
Municipality**

Tore works with Air Quality in Trondheim. He thinks that data needs to be better communicated even with politicians, and he actively tries to digest raw data into formats they can understand. He also believes in education to make people understand that the effects of air pollution are very much on ground level and not only in this "environment" which is floating around and no one can really see.

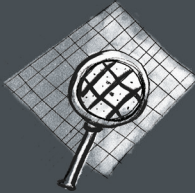
Findings that appeared throughout:

"Bymiljøetaten is not involved in political decisions. We advise, of course, but only when asked for."



Better Air Quality Models

Most actors would like to see improved AQ models, that could be accessed in real-time and with more data. Some work is already underway to accomplish this.



Finer granularity in data.

Most actors would like to see improved AQ models, that could be accessed in real-time and with more data. At the same time, this does not translate to immediate effects for the general public.



Strategies to reach citizens

It was a consensus that there is a need to think of different strategies unlike the ones currently in use.

Åsne Løseth, Bymiljøetaten, Oslo Municipality

We discussed the routines and complexities of her day-to-day work. She divides her time between following up on the data from the measuring stations and checking their working conditions, and being in contact with other authorities such as Statens Vegvesen to take topical measures such as road cleaning. They also rely a lot on other instances of local government such as schools to engage directly with citizens.

User interviews

While I had access to the user research made by Livelwork, I felt the need to carry out my own, already focused on the sort of questions brought up on my previous research.

I wanted to understand people's relationships to the concept of Air Quality, their habits in relation to what's out there on the atmosphere and and how it

impacts their routines daily.

I was also interested in the topic of civil engagement: what makes people connect to a specific cause or not, what things they do as a part of the community and even what they thought about the concept of *dugnad*, for example. I briefly talked about data and trust in government to handle data properly.

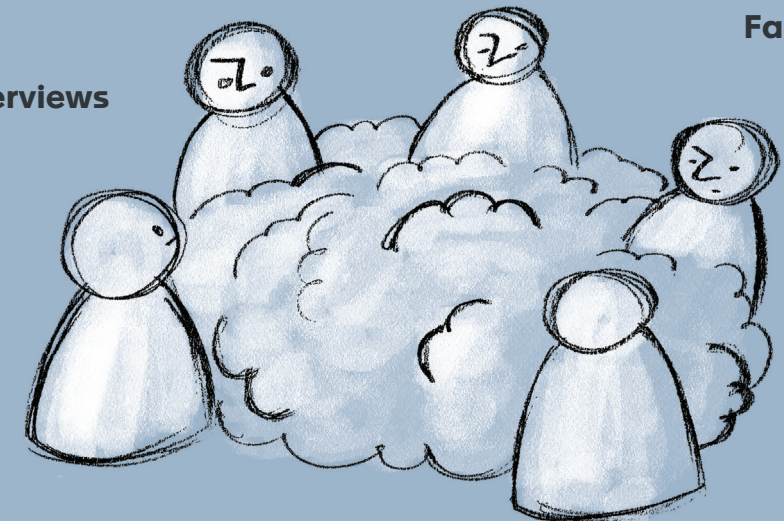
The interviews were mostly carried out in person, in sessions that lasted and hour and a half in average, in a semi-structured manner. The profile of the interviewees was diverse: from students, to teachers, psychologists, engineers and creative directors. From singles to families of different sizes. All living in Oslo, but on different parts of town.

Living in Oslo

Singles

Families

8 interviews



Expressions

How interviewees manifest their views towards these topics

Routine and planning

"I try to use the car less, but still have to do it on a daily basis, for groceries, driving the kids to activities... **I just have to.**"

"I have a thermometer so sometimes I **don't even check my cellphone.**"

"I get stressed in the morning, feels like there are **too many things to think about.** Thinking about Air quality would be yet another one."

"We plan 6 months ahead, **always around the kids activities.** We usually take place in groups about things the kids do."

"This website (luftkvalitet.info) is ok. But **what can I do** with this information?"

Data, sensors and government

"**I trust the government would tell me** if it's dangerous to go outside."

"I'm alright with sharing data, **as long as I know what is being done with it** afterwards."

"I'm alright with having sensors in my house. **We already have so many devices.** It would be just another one."

"**I don't even know what bad air quality means.** I just don't know where to start."

Air Quality and environment

"**There are many kids with asthma** in my neighborhood and it seems above Oslo average."

"In a bad air day, I guess I would stay inside... but then the air inside is coming from the outside so **I don't know if it helps at all.**"

"I know it will affect me but **I don't think about it every day.**"

"**I'm concerned with global warming.** I experience what scientists are saying and it all seems less stable."

"I think it's unfair. **People have different amounts of time** and others sometimes get really mad when you don't do what they expect."

Engagement

"I'm not going to stop flying if nobody else will. **It's just too big of a sacrifice** and I **just don't see that I get anything back** from it."

"I've been biking to work for the past 3 years. You start doing it because you believe in it, but **after a while feels like nothing changed.**"

"I really care to be engaged in order **to make sure that my kids will grow up in a healthy environment.**"

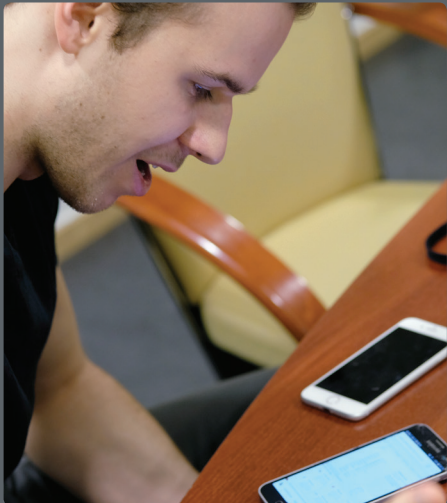
"Laws and regulations come and go so fast and **they expect people to adjust,** change their cars... **that's not how it works.**"

"I think politicians might want to do something, but **it hasn't been put in the agenda by citizens.**"

"Some people think that the Oslo municipality is **more worried about the west part than the east.**"

"They cannot just say 'Hey, this is better for you'. **They are not offering a better way of living** for people."

Politics



Outcome from user interviews

The overall feeling I had was that the topic was very hard for a lot of people. It puts one's personal views and attitudes towards the world in the spotlight: how selfless can you be, how thoughtful about the big questions you are, how informed are you as a citizen and how much do you fight for your rights. The tone of the conversations

was much more political than I expected. The recent activities from local government regarding Air Quality somewhat divide people: nobody disagrees with taking measures to make the air better, but a lot of them think the government is not taking into consideration people's actual needs, in a very top-down manner.

Three main insights:

1 Air Quality adds complexity to already complex lives

Most people feel a discomfort: they know that there's air pollution, yet they don't know what to do about it. In some cases, this leads to ignoring the problem.

2 People have a hard time seeing the results of their own actions

If you stop driving or start biking, will you see the results? Air Quality is invisible. The further it is down the line in the future, the harder it is to comprehend.

3 Confusion demands more assertive government action and open forums

Government in the local level needs to create the spaces where Air Quality is discussed democratically with the lowest threshold possible. This needs to be a sustained effort with long term goals.

**“Successful problem solving
requires finding the right
solution to the right problem.
We fail more often because
we solve the wrong problem
than because we get the wrong
solution to the right problem.”**

Russell L. Ackoff in *Redesigning the future* (1974)

Problématique + boundary framing

After completing user research and constructing a view of air quality as a system with all its stakeholders and their motivations, some things looked murky, while others started to become much clearer.

In the realm of the personsphere, I felt a lot of resistance from citizens in general to have a frank conversation about this topic. One thing is to nudge habit change when there is a will or a clear necessity to do so (gamifying weight loss or exercise, for example, has numerous cases of success and whole industries are built around them). The other is to create a pull towards overhauling city dwelling habits from the city dwellers themselves. I kept looking for the champions of change, but they were either very isolated or being muffled by the noise in public debate; the low levels of understanding of the complexities of air pollution mechanisms makes this even worse, as sometimes people are defending arguments based much more on preconceptions than actual facts.

This makes the authorities job much harder: they are taking hard measures to curb emissions in a move that is perfectly rational, but they are facing

a public discourse that is not rational and fueled by lots of skepticism and a good deal of negativity.

Reaching a turning point

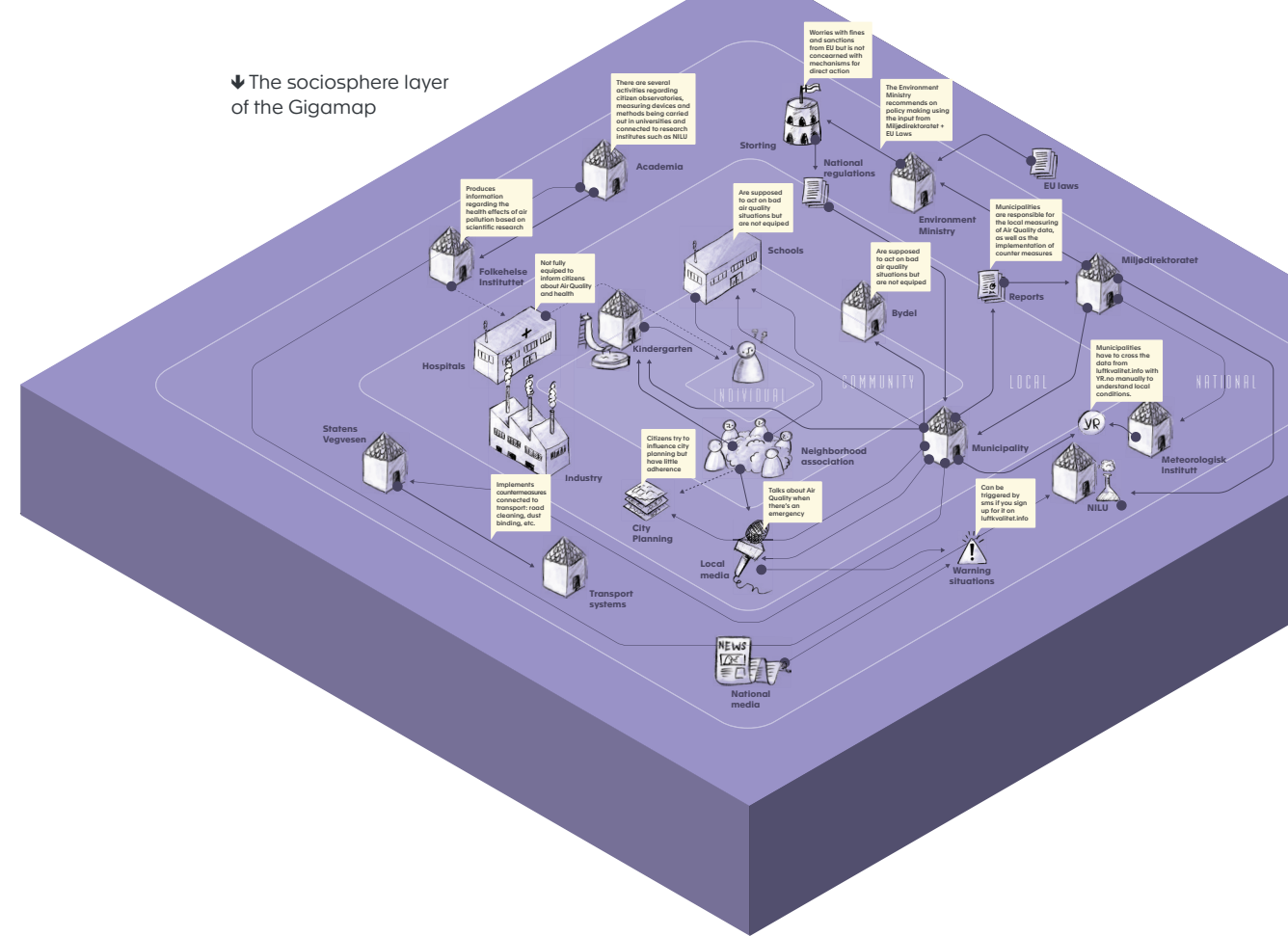
This was a complex moment during the project, a point where I could see no possibility of a positive impact as a designer. What I really didn't want was to create something that had the same fate as a lot of other design interventions that are not scoped carefully: low adherence, confusing offerings, generating even more noise in an already noisy landscape. This became a period of heavy incubation¹, where I spent some time working on visual expressions for the project to try to let it all sink and maybe flourish in new light.

Teaching in order to understand

In light of this, education around Air Quality began to crystallize as the relevant *problématique* – a problem field or network of problems. Other relevant topic that began to arise was finding a place where national and local instances of government could connect to individuals. Some insights stuck to this problem areas:

- Governments need to consider

↓ The sociosphere layer of the Gigamap



the possibility of opening up permanent forums for the discussion of topics such as air quality, which have the potential to disrupt deeply rooted habits and rattle world views.

- If governments want to promote deep changes in habits connected to air quality for the long term, they need to start working with education

that allows this to be understood fully.

If you observe on the sociosphere of the Gigamap, schools are instances of local government which are open for the engagement of the community. People are free to enter the school, to congregate around topics, to share ideas and to have direct connection to teachers,

educational advisors and principals (who are representatives of local government). It's a permeable instance of government, where education, cooperation and tolerance are key values.

- Schools are places where citizens with completely different backgrounds can get together to discuss the future – with a



big success rate. The future is expressed by making the school an optimal environment for the development of their children. In this sense, children become the tangible future. And things that are tangible are much more easy to understand and discuss.

- In my research I found out that the recycling campaign in Oslo started inside of schools. Children would be taught about how to separate trash and became the “champions of change”. The same thing is happening nowadays regarding recycling power stations: they are brought on tours to the recycling stations and go home with the complete information about how the power stations are running. This has the capacity to change

family’s perceptions of these power stations, as was the case from a family I visited in Risløkka who lives very close to one. They had negative feelings about being neighbors with that chimney, but after discovering that 96% of dangerous fumes are filtered – through the information provide by their children – they began to accept it more.

A hopeful conclusion

With this being said, it was clear that framing the boundaries¹ of my project to the sociosphere would allow me to work with topics that are central to how air quality is discussed in society at large. The context of this project, then, shifts focus: from the general, unspecified population to the citizens that orbit around the local school.

¹Romm, J., & Paulsen, A., Sevaldson, B. (2014). *Practicing systems oriented design: a guide for businesses and organizations that want to make real changes*. Oslo.

Main takeaways from this phase:

- 1 Data by itself is not sufficient to trigger action.
- 2 Citizens feel paralyzed when talking about Air Quality.
- 3 People expect the government to facilitate dialogue and create spaces for democratic discussion on the topic.
- 4 Government agents need to think about data under a different light.
- 5 Education is central to get action in the right direction. Children are the tangible future and the next stewards of Air Quality.

Synthesis and ideation

Air Quality Data as a tool for the enabling of learning and community action.

In this chapter, I describe how insights were transformed into stepping stones towards a design concept.

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Design Framework and Criteria	pg. 54
Design for Who?	pg. 57
Cultural Probes for Children	pg. 60
Sketching out ideas	pg. 65
Co-creation Workshop	pg. 68
Benchmarking	pg. 72

The original brief:

To increase knowledge about air quality data and trigger action by users to reduce pollution and limit the amount of damage that pollution can cause.



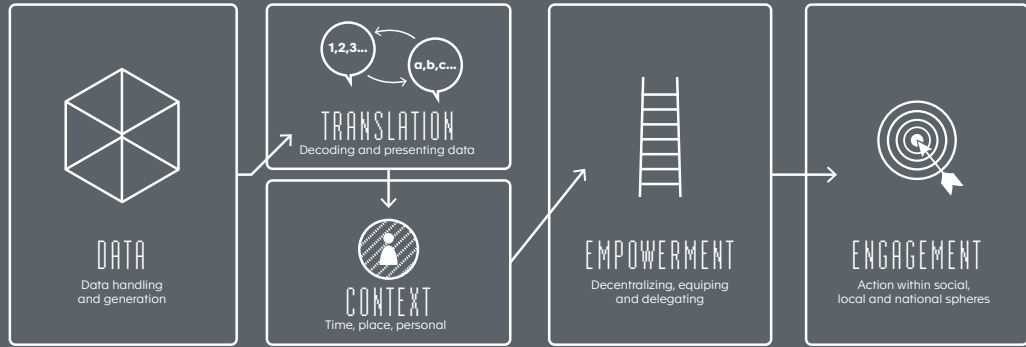
How I reframed it:

How can we design a service that allows children to learn about air quality and engage them in positive action for their local communities?

Design framework and criteria

Using the insight gathered in the previous phase of the project, I designed parameters that would help me during my ideation process.

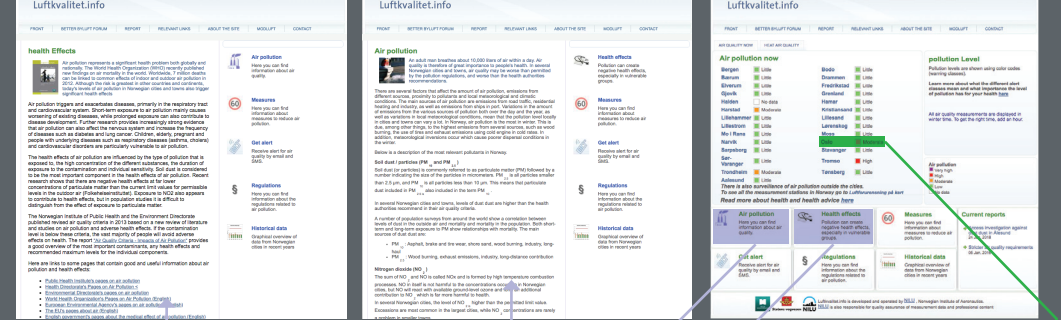
A framework for a new service



This framework is the basis for proposing solutions to my new reframed brief. This new service offered by Miljødirektoratet should start by observing how data is generated and handled. This means paying attention to the mechanisms that allow for Air pollution to be encoded into data – in this particular context, municipalities generate data through sensors placed

according to laws and regulations and hands this data off to a repository: luftkvalitet.info.

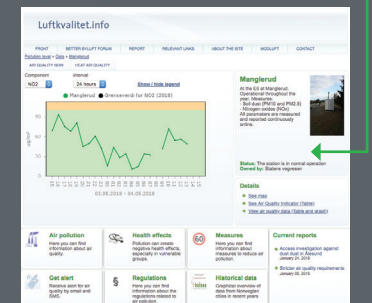
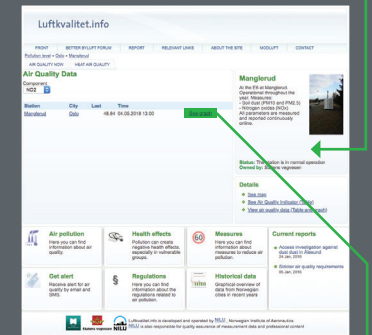
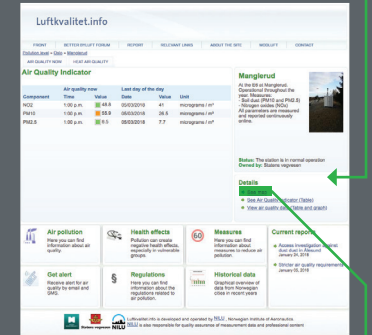
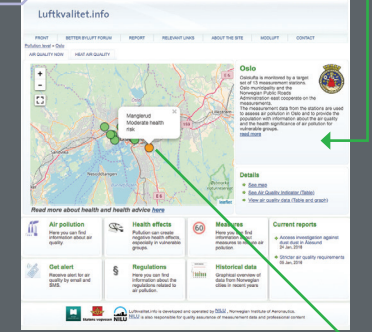
Then, this new service needs to address the question of how this data is translated and presented and how it's put into context. Right now, through luftkvalitet.info you have a convoluted interface which hides the data under



several levels of the website's architecture. If you live in the area of Manglerud, for instance, and you want to see pollution in your context, it's necessary to go through 5 pages to actually get to a visual representation of the data on a time series (**follow the green arrows to the right**). Other kinds of contextualization of information (information regarding health, measures, regulations) are on static content pages separated from the data, leaving it up to the users to connect the dots (**the violet arrows**). This is mostly an example of how not to do it.

A new service needs to better integrate contexts in order to make data more relevant and actionable. With better contextualization, users can start seeing data as a tool. They can start discussing the data and, with the right incentives, maybe even generating data of their own. Data that is not necessarily quantitative, but most probably qualitative, attached to specific regions, personal stories and communities.

Having considered the previous steps in the framework, engagement becomes second nature: empowered, citizens become able to engage with government agents in democratic participation as well as with their own community.



A set of design criteria

These are some criteria I used to evaluate my ideation process. An optimal solution would rate highly in most of them. These criteria would also allow me to mix and match ideas based on how well they perform on each.



**Generates
Hyperlocal data**



**Contextualizes
Air Quality**



**Generates
Qualitative data**



**Innovative ways
to present data**



**Multistakeholder
engagement**



Civic engagement



**Flows data
upwards**



**Experiential
learning**

Designing for who?

In order to be successful, this project needs to connect to 4 user groups. Their needs will serve as the basis for establishing a service. I will briefly outline these groups, why is it important to target them specifically and some strategies to connect them.



Environmental workers

They are working with Air Quality on a day-to-day basis. They would like to share their understanding of data with the general population, but have very little resources to do so.

Why is it important?

They are the ones who will kickstart the service and also the holders of the output.

Strategies to reach

They need solutions that are simple, self-contained and sustainable

Educators

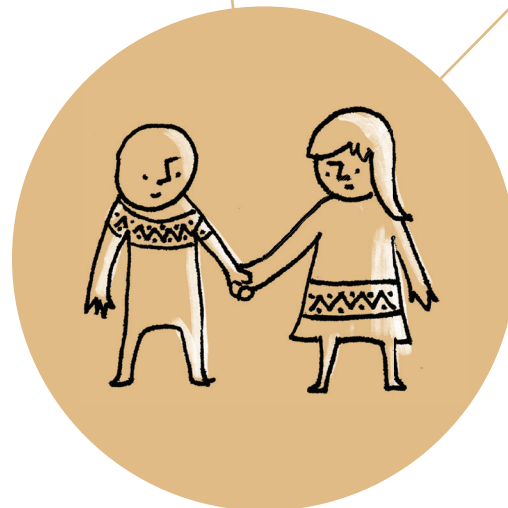
They are open and caring professionals that curate knowledge for their schools. They are always looking for new and interesting ways to teach, and observe what other schools are up to.

Why is it important?

A conversation I had with a representative of Utdanningsetaten in Oslo made it clear that educators in schools are the gatekeepers of what content reaches children in the school context. Every school is completely free to choose what content they want to work with. So, if we can convince educators, we are on our way to reach children.

Strategies to reach

Providing content that is really relevant not only from the standpoint of air quality, but mostly from what educators need to teach children already.



Students

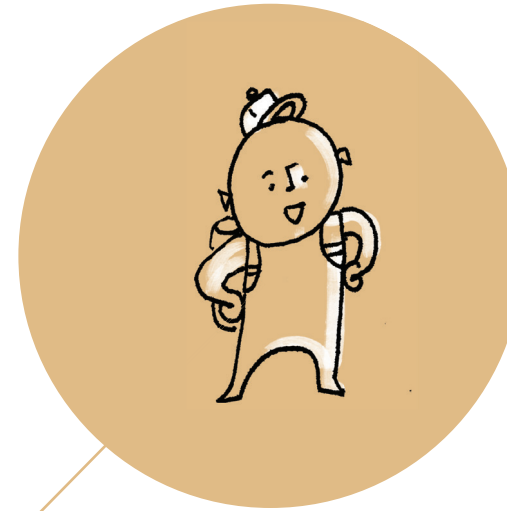
They are hyperconnected and very attentive to environmental topics. They get super engaged with technology and are opened to questioning the way things are.

Why is it important?

Children can be the carriers of knowledge to households. According to ssb, in 2017 there were 636.551 people living in households with children in Norway. In total, there are more than 633.000 students in Norway.

Strategies to reach

Make it fun and use their curiosity.



Parents

They are usually very busy, running around to meet the various demands of parenthood: driving kids around, participating in school activities, for example.

Why is it important?

They have the power to do bigger changes in habits and political outcomes, yet they are harder to convince. Can be regarded as secondary users.

Strategies to reach

"Hijacking" the engagement in their children's education to talk about air quality; making them a part of the service in symbolic moments, like openings and closures.

Cultural probes for children

At this point in the project, I had many ideas about why it would be important to reach children, but not exactly how to do so. I felt that I would face a barrier to engage directly with children mainly because of language barriers. So in order to circumvent this, I designed a package of cultural probes that would allow me to have insight into what children understand about the topic of air quality and also inspiration, "fragmentary clues about their lives and thoughts". I didn't know exactly the age group of children I would target for my concept, so I didn't restrict them by age. I set out a two week period for the answering of the probe.

My idea was to try to keep the activities simple and very open, based on previous research made with probes for children². I designed a package of eight activities that ranged from logging into luftkvalitet.info everyday for a week to take notes of air quality levels to making drawings of a "new air cleaning machine" or a sort of collaborative moodboard where children would mark with an x on a scale of "cool" or "not cool". One of the activities was also to create a "super simple air quality monitor": a piece of white cardboard, a clothes peg and some vaseline, that would be left outside to capture fine dust.



↓ Making the kit: a lot of folding and packaging

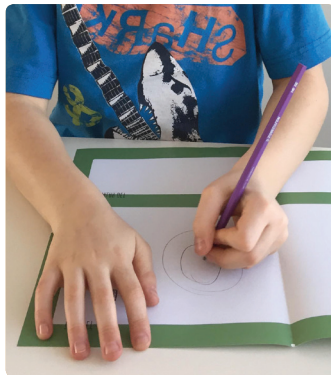
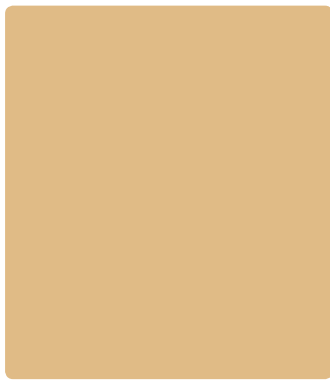


↓ I called the probes "Air Quality Research Team": children would join the team and become air researchers



¹Gaver, W., Boucher, A., Pennington, S., & Walker, B. (2004). "Cultural Probes and the Value of Uncertainty". *Interactions*, 11(5).

²Wyeth, P., & Diercke, C. (2006). "Designing cultural probes for children". In *18th Australia conference on Computer-Human Interaction*. Sydney.



The results

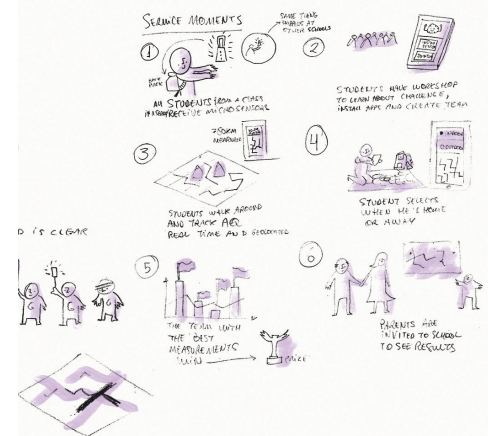
In my opinion, the cultural probes experiment was a failure. But failure in a design process is also a moment to learn. The main reason why I consider it to be a failure lies in the fact that the level of response was much below what I expected. Most of the kits returned without many responses in a lot of activities.

But this also gave me some information: apparently, the younger the child the less able he or she was to engage with the activities, specially the ones more connected to air quality and a more open ended creative process. The level of response was higher the older they got. The activities with more visual stimulation where also the ones with bigger response.

After talking to some of the parents, it seemed like the activities that happened through time were harder to achieve. Without a proper pressure/incentive to do so, most of them forgot about it and needed to be reminded to get back to it. The supersimple air quality sensor, for instance, was rated well, but without more structure or demand, the whole experiment was not followed until the end most of the times.

The collaborative moodboard activity generated a lot of interesting insight. Children apparently think that science experiments, laboratories and robots are super cool, while more contemporary pop culture expressions of technology (i.e. Pixar and Ben10) rated worse than expected.

NEED TO STAND?
 WHAT IS PROBLEM?
 HOW IT LEAVES FROM?
 - SENSORS
 - HABITS
 WHAT IS AQD?
 - MEASURING
 HOW IT IS MADE + SENSITIVITIES
 - ALTERNATIVES
 HOW TO MEASURE IT
 BY SENSORS?
 - SENSORS + APP
 - CENTER VISUALIZING
 - IN THE AREA
 - HEALTH EFFECTS - PEEK RESEARCH
 - TO DO AND NOT TO DO'S
 EXPERIMENT
 SHARE



IDEA!
 2. WHAT IF SCREEN BECOME A GAME FOR KIDS?
 + EXPRESS & TALK ABOUT
 + CONTENT FOR CHILDREN AND PARENTS
 + INCREASABLE MEASURES
 + AIR QUALITY
 + CENTRAL SENSOR
 + TEST SCREEN
 - LEARN ABOUT + CENTRAL DATA



IDEA!
 6. WHAT IF AQD WERE PRESENTED IN THE CONTEXT OF PLAY?
 - SUBSTITUTION
 - PLAY - 0 - MEASURE
 - EVALUATION + CONTENT
 - GAME - VISUAL - TEST - TEST OR PLAY

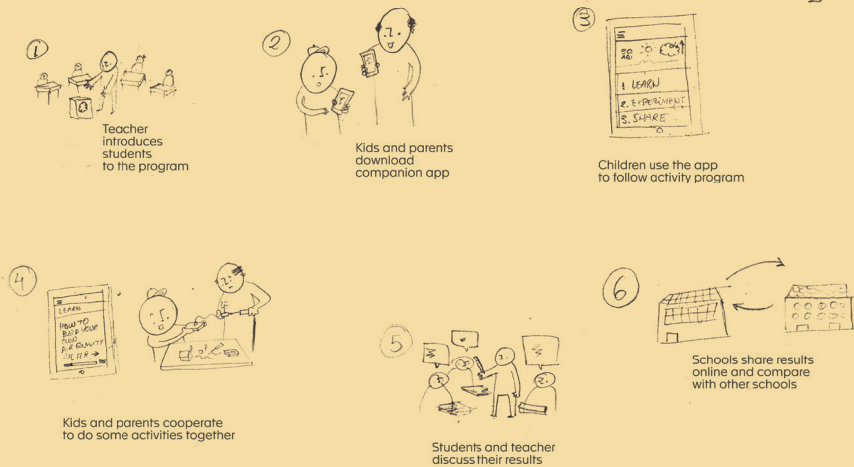


Sketching out ideas

I started by asking hypothetical questions like "What if you could actually see air quality?" or "What if learning about air quality was fun?". These questions became triggers for sketching: I sketched out how a possible service idea might answer them, trying to detail service moments

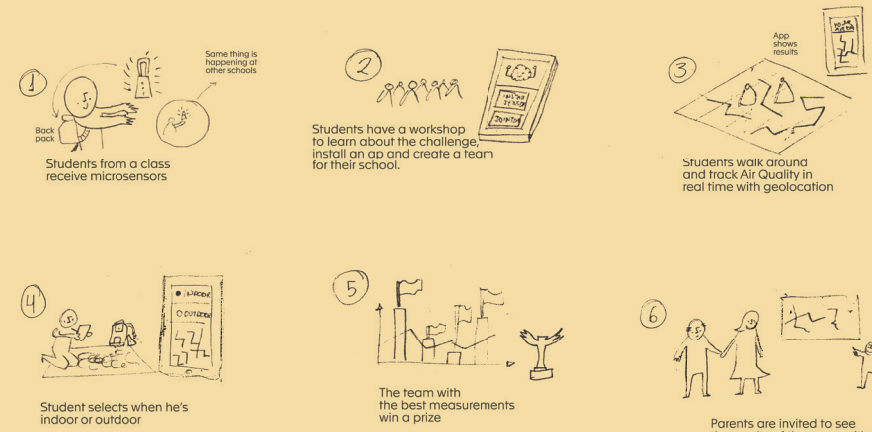
that represented these ideas. I came to 8 service ideas in total, which I took around to colleagues and my tutors. I rated the ideas based on the design criteria I developed before. From this point, I mixed and matched some of them into four scenarios:

Scenario 1: What if kids become Air Quality experts?



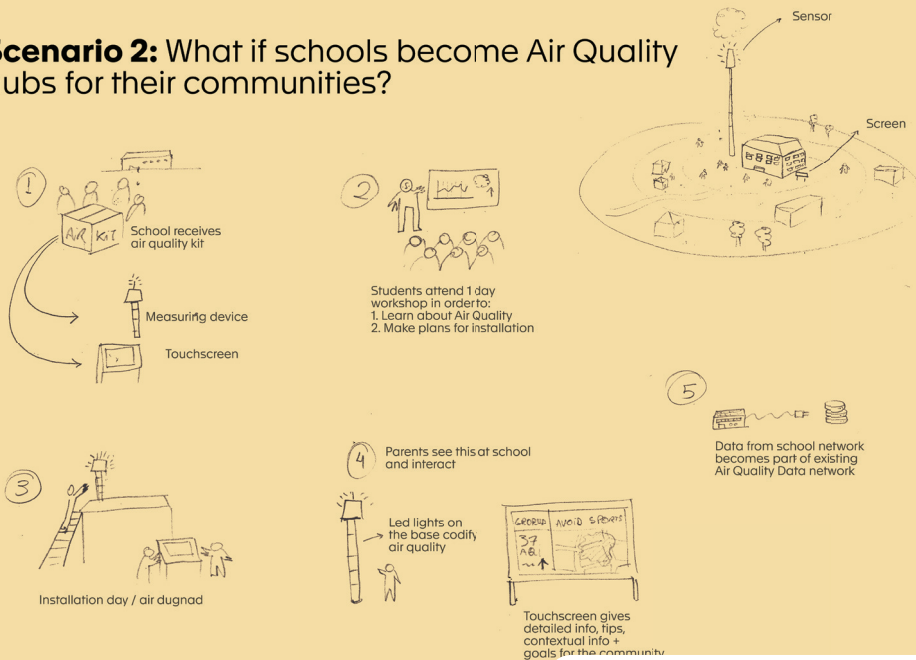
This scenario is basically an educational platform that uses digital touchpoints as learning aids.

Scenario 3: What if schools compete to track Air Quality in their communities?



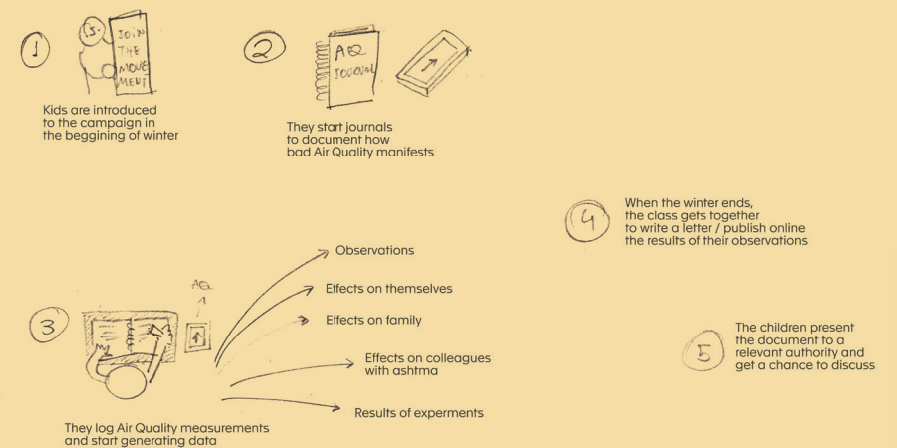
This scenario is a competition between schools to track air quality regionally using personal micro-sensors for each child.

Scenario 2: What if schools become Air Quality hubs for their communities?



This scenario involves measuring devices and a touchscreen in the school to track Air Quality locally.

Scenario 4: What if children become advocates for better Air Quality policy making?



This scenario involves allowing children to document their relationship with air quality and engage with local authorities

Co-creation workshops

I took these 4 scenarios to three workshops. The goal was to understand feasibility and desirability of these scenarios, from three different perspectives: the school educational advisor, the data scientist and the pedagog.

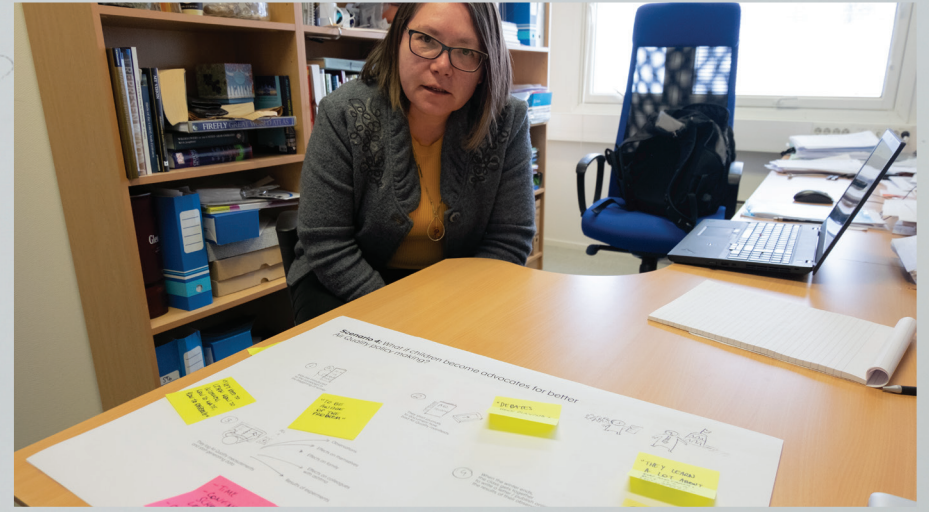
↓ Eirik Olavson, educational advisor at the Vålerenga Skole



↓ Gjøg Johannes Sunde, pedagog from Utdanningsdirektoratet



↓ Alena Bartonova, lead researcher at the Norwegian Institute of Air Research



"If it's an app, it could be installed into the student's iPad. We just ask for the IT personnel to do it and the next day it's on all devices".

"We want students that have an inner drive"

"It should not be plug-and-play: the teachers need room to edit and adapt to their own needs"

"You need to think about strategies to make it sustainable and not a one-shot thing"

"in the curriculum we don't give methods, we have competency goals for students to achieve. The content and method are free of choice for the schools"

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Synthesis and ideation
Co-creation workshops

The educational advisor's feedback

In my workshop with Eirik, I learned that in a lot of schools (around 40% in Oslo) kids are already using iPads. He considers technology to be a big aid in teaching. Educationally, he told me that it's important to give room for kids to self-determine – to be able to fail and to work in their own pace, with constant evaluation.

The scenario that talks about community engagement seemed very interesting to Eirik: he thinks children learn about politics but on a very high level. It would be an interesting opportunity to introduce local level politics for children. This conversation also helped me to scope an age group to target: kids from 8th to 10th grade.

The data scientist's feedback

Alena discouraged me to pursue the scenario that involved arming kids with microsensors, because she thinks the technology is not mature yet and I would spend much valuable time simply configuring all these devices and could stumble on problems when handing these out to children, as it happened on other projects¹. But she was quite pleased with the other scenarios and thinks education is the way to go. She encouraged me

to make this project open enough so it can be used several times and in different contexts.

The pedagog's feedback

Dag gave me some good pointers on what makes content really relevant for educators. He introduced to the national curricula and to the concept of competence goals: skills and competences that need to be built by schools with children during a specific timeframe. It's up to schools to decide upon how to build competence. He pointed out that because of this, any content should be adaptable because different schools and teachers have different ways of going about. If you restrict it too much, you might lose some of them.

Another important point for him was to think about assessment for learning: it should be on-going and bidirectional, it should be easy for teachers to understand student's improvement in face of the goals for each task and should try to connect creative and critical thinking.

Lastly, he was very positive about the environmental theme – sustainable development is one of the main threads of the new national curricula, to be implemented by the year 2020.

For more details on results, see appendix

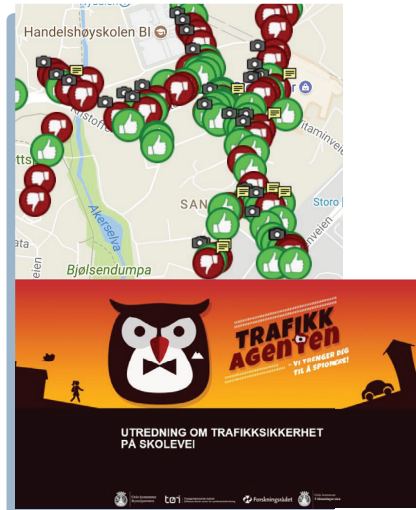
¹Robinson, J. A. (2015). Empowerment initiative in Air Quality (Master Thesis). Jožef Stefan International Postgraduate School, Ljubljana, Slovenia.

Benchmarking



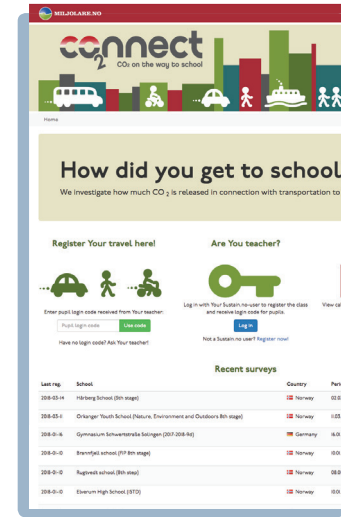
Barnetråkk

"Barnetråkk is a digital tool and educational program that allows children to tell planners, local authorities and local politicians how to use the place where they live and what they want different." It revolves around an interactive map, where children tag activities and impressions of their area. It's tries do connect itself to competence goals and makes participation easy by using FEIDE, an widespread educational login tool.



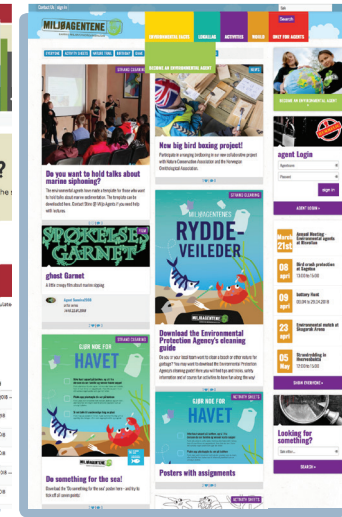
Trafikkagenten

Similarly to Barnetråkk, Trafikkagenten is a phone app that allows children to tag on a map dangers around their commute do school. Children could tag comments, photos and likes, dislikes. This was a project done by Bymiljøetaten in Oslo, Utdanningsetaten and others, with the goal of making the area around schools safer.



Miljølære

It's a webpage with content "for training in sustainable development", created by the University of Bergen. The activities range from static pages about butterflies to interactive tools that allow a student to input their commute to school and get a value in CO₂ to compare with other students. The page looks very old, and it's not really engaging. It also uses FEIDE as a login key.



Miljøagentene

A digital community for children, where kids can get together around activities such as picking up trash at public places. It's not connected to the school environment. The interesting thing is that it's not so much focused on learning, but much more on doing. And in the end, children become part of several public gatherings where they get to talk and voice their opinions.



NAAF Luftagent

An educational campaign from the Norwegian Association of Alergy and Asthma around indoor air quality. It features 8 weekly activities and equips schools with indoor sensors for measuring air quality inside of classrooms. Data is sent back to NAAF, but it's not clear what is done to the data.

Main takeaways from this phase:

- 1** Any design solution needs to involve environmental agents, teachers, students and parents.
- 2** Children need to be of sufficient age to understand Air Quality concepts.
- 3** Teachers are the gateways for the experience and we need to cater for their teaching and evaluation needs.
- 4** This project arrives at the right time, since environmental topics will be central in schools by 2020.
- 5** Schools are using more and more digital aids and we can use that to deliver value.

**"Intentions are fairly easy to
perceive, but frequently do
not come about and are not
fulfilled. Design is hard and
not to perceive. But it is design
and not intention that creates
the future."**

Kenneth Boulding in *Human Betterment* (1985)

Concept development

How it all came together in a proposal for a new service.

Contents:

Introduction	pg. 80
Elevator Pitch	pg. 82
Service Brand	pg. 84
Service Blueprint and Offering	pg. 86
Experience for Students	pg. 89
How to Onboard Schools	pg. 95
Content	pg. 99
Digital platform	pg. 106
- Screens	pg. 112
Air Quality Gathering	pg. 122

Designing the experience



An educational platform as an enabler of community action

From all the insight gathered so far in the previous phases of the project, it became clear that education could be the pathway to engaging children in the topic of air quality, with the aim of creating a positive wave of reflection and action that would reach busy parents and local authorities.

An educational platform can be regarded as a system for learning. The work of Béla H. Banathy, a thinker of

systems design concerned with how systems thinking could be applied to education, outlines "process values" – a "collective set of beliefs that we share and uphold as we travel through a journey in creating a better educational system for our communities." ¹. Values such as caring for children's future, respect, social responsibility and justice, strengthening a sense of community, creativity and collaboration are central

to what Banathy regards as an "ideal"² future for any educational system.

While Banathy's work is focused on the design of larger and more complex educational systems, I am concerned with a more pragmatic approach to solve a particular educational problem. At this point, the Service Design

methods take over to give shape to this intention.

This educational platform will deliver content and activities to teachers and students using digital touchpoints. Parents and environmental workers will become engaged in the service in specific moments, according to the needs previously

expressed in this report. In the following pages, I will describe how the service will be delivered, detail the process of developing the core touchpoints and outline the supporting ones. I will also discuss strategies to implement the service and a roadmap to further development and improvement of this platform as a whole.

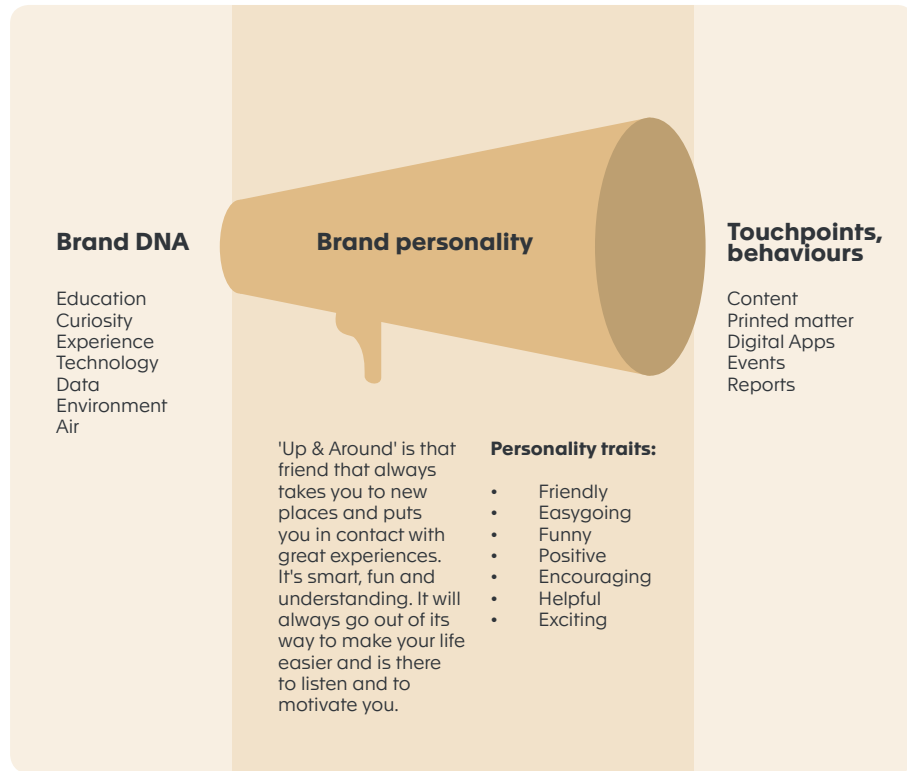
¹Joseph, R., Jenlink, P., Reigeluth, C., Carr-Chelman, A., & Nelson, L. (2010). "Banathy's Influence on the Guidance System for Transforming Education". in *World Futures*, 58(5-6), 379-394.

²Banathy, B. H., & Jenks, C. L. (1990). "The Transformation of Education: By Design." In Annual Meeting of the American Educational Research Association. Boston, USA.

Up & Around: a journey to learn how Air Quality is important for you and your community

'Up & Around' is an educational platform for children between 8th and 10th grade that aims to raise awareness around the topic of Air Quality, using data gathered by the sensing network already established and mobile applications to aid teachers and students in their learning journey. 'Up & Around' aims to engage the community around Air Quality and connect young people to local authorities, in order to discuss solutions for areas with constant bad air quality.





The service expressing itself through its brand

The brand carries the symbolic charge of the service and needs to be aligned with users needs. In order to communicate the attributes of the service, I worked through some brand exercises proposed by the AT-ONE method.

Since one of 'Up & Around's goals is to engage the community, I found it interesting to try to be specific about

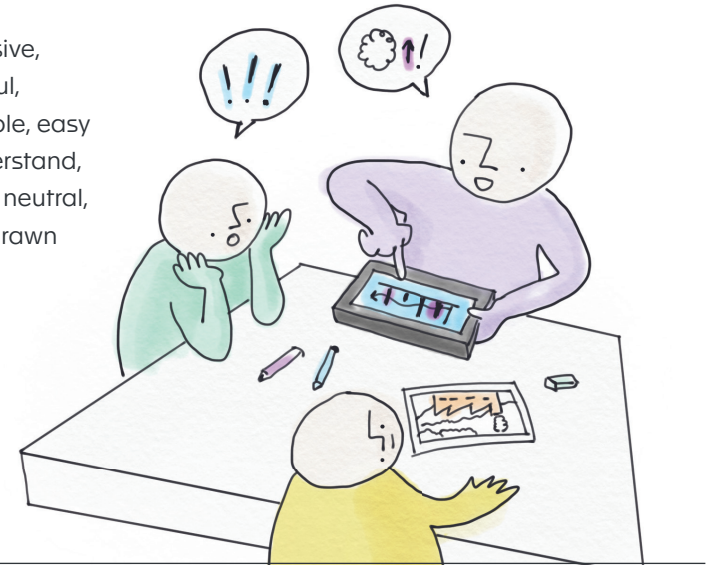
the brand personality: what personality traits does it have and how does it relate to other personalities out in the world. I used the "Brand Megaphone"¹ model to plot this out into personality traits and a personality description.

This helped me in trying to maintain a tone of voice that is consistent throughout the touchpoints and expressions of the service.

¹Clatworthy, S. (2016). How to Design Better Services: The AT-ONE book. Oslo: Oslo School of Architecture and Design.

Illustrations

Expressive,
colourful,
accessible, easy
to understand,
gender neutral,
hand-drawn



Typography

Apax

abcdefghijklmnopqrstuv wxyzøåæ
 ABCDEFGHIJKLMNOPQRSTUVWXYZ
 WXYZØÅÆ
 01234567890

Color

Main colors



Accent colors



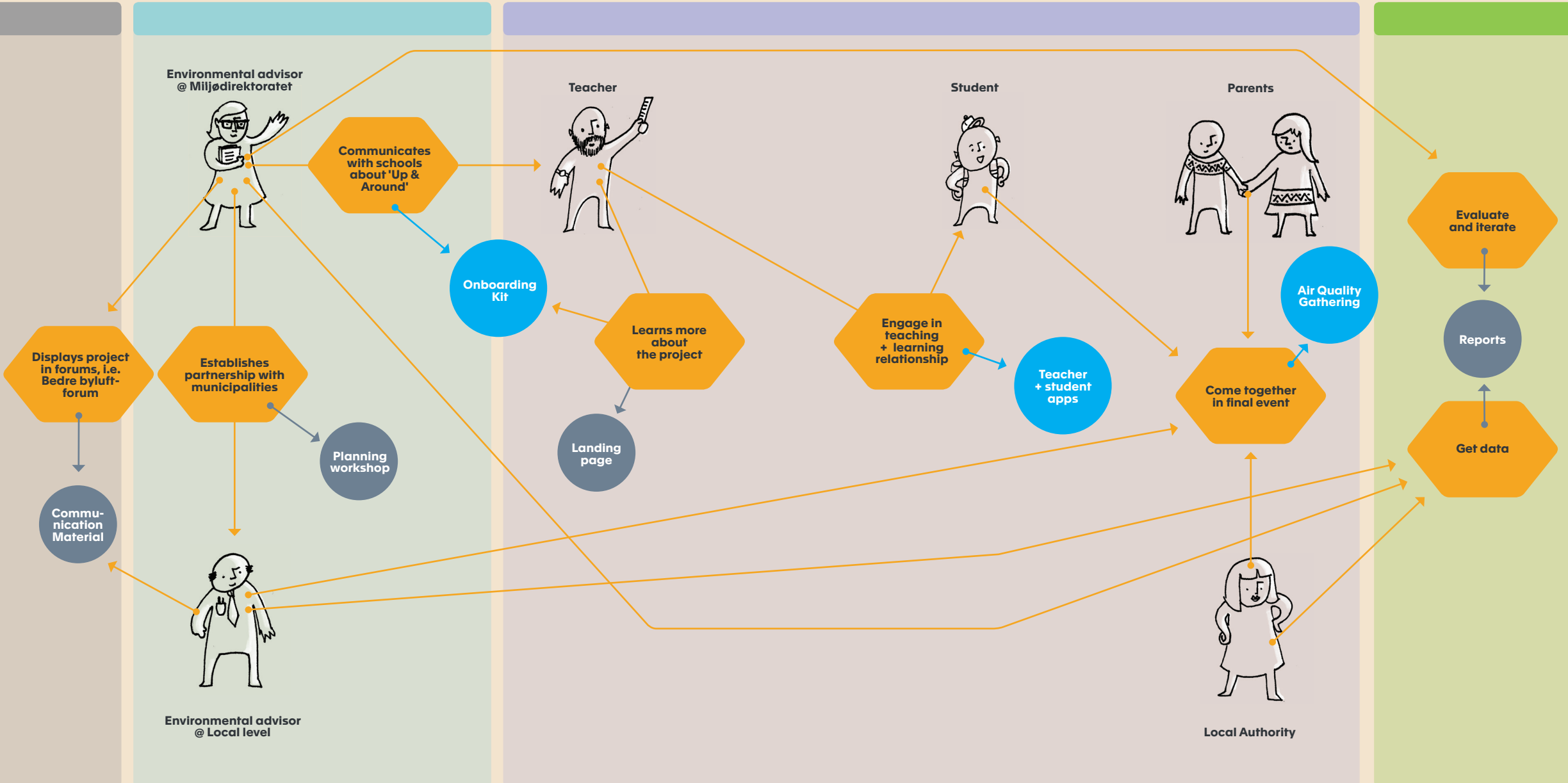
Support colors



How does the service work and what does it offer

● Action ● Core touchpoint ● Support touchpoint

AWARENESS PLANNING PHASE CAMPAIGN PHASE EVALUATION PHASE



← The first sketch of the serviceblueprint had more phases and touchpoints. It was simplified to increase feasibility.

'Up & Around' is a service that will help environmental workers at Miljødirektoratet in their mandate to communicate air quality data. It will also help environmental workers at local level, who need new strategies to reach citizens and data about particular areas.

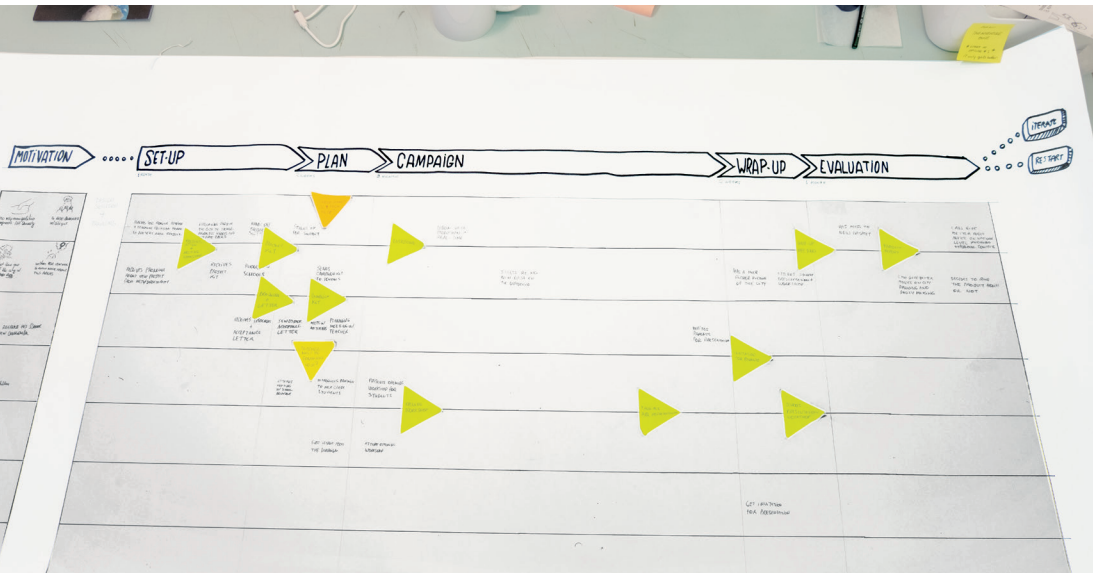
Establishing partnerships with local governments

It's important for Miljødirektoratet that this project is carried out together with local environmental agencies, in order to counter issues of mandate (national agency offering solution to local community; hence the partnership) Awareness about 'Up & Around' can be generated in the yearly meetings that take place to talk about air quality and partnerships can be set-up. For local authorities, it's a very favourable deal: they receive an educational platform and support for implementation and

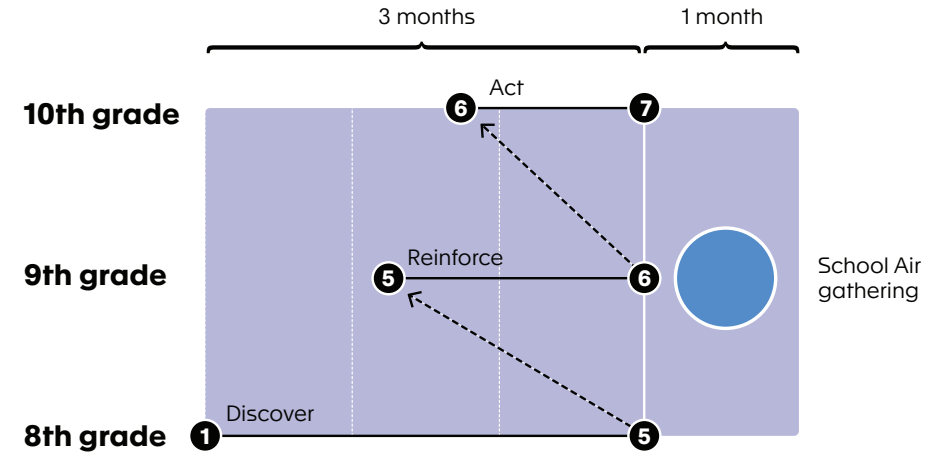
they need to commit to a couple of events and offer insight about local conditions and actors.

The project's planning phase is kicked-off by Miljødirektoratet in a 'Planning Workshop' with a local environmental agency. In this meeting, Miljødirektoratet explains the project in depth and then together they decide areas in the municipality where they think it is relevant to know more about and to generate awareness of air quality. In this meeting, they might also define together goals and indicators to gauge the success of the project.

From this point, Miljødirektoratet starts communicating 'Up & Around' to schools.



A sustainable platform to learn and reinforce learning



From the point that the campaign is running, multiple classes inside the same school can run 'Up & Around'. The children's experience will be one of continuous progress; as they learn and move through the app, they will be able to unlock new levels.

There are seven levels in total. The progression goes from knowing nothing about air quality on Level 1 to understanding basic concepts on Level 2; from having a regional understanding of the topic on Level 3 to being able to connect it to a global scenario on Level 4. The 5th Level is the maximum students can reach on the

8th grade. At this point they become advocates for better air quality and can represent their communities.

The 6th and 7th levels are reserved for 9th and 10th grade students. They reinforce what they learned previously and go out in the world to do practical things and document their deeds.

The students who have never used the platform will always start at Level 1, independently from grade. This ensures that 'Up & Around' can run several times in the same school, and knowledge and experience can be transferred between students.

The learning journey through the eyes of the student



1

Still in the dark...

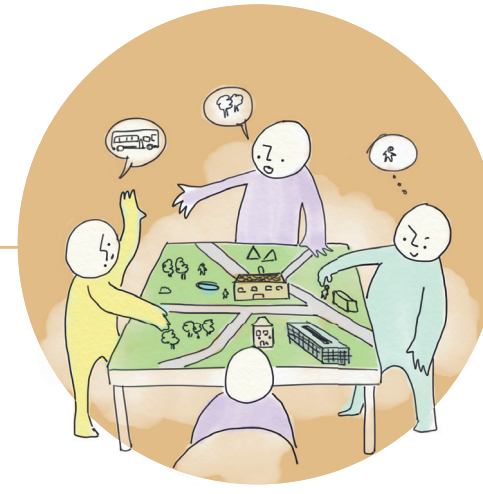
This is how you start. You don't know anything about air pollution and air quality and have probably no idea of what's going on in the atmosphere. 'Up & Around' will help you: just go out there and do some activities to learn more



2

Novice air explorer

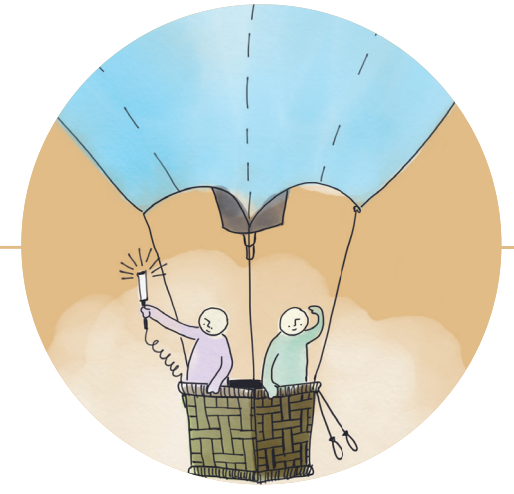
You are on the first step of your journey to getting to know what is happening in the air around you. You know the basics, but there is much more to learn and explore. Use your new tools to progress even further.



3

Zooming out

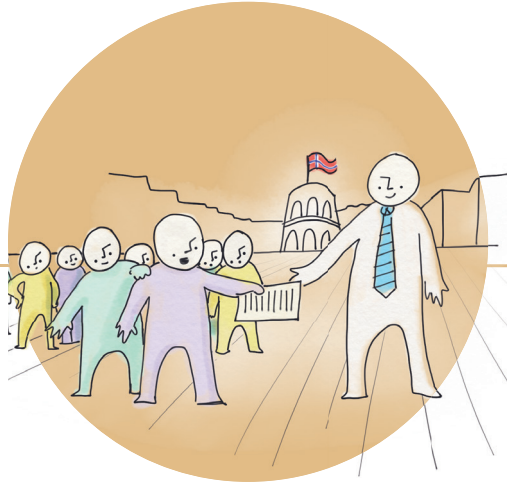
Wow! You are really progressing! At this point, you have understanding of how air pollution is a problem not only for you but also for the people around you. You are starting to see its effects on your local community and that is great!



4

Environment expert

At this point, you can see the problems that arise from bad Air Quality from afar. You are able to see it in the global context and discuss the topic with your colleagues. You are on your way to something big!



5

Community Gatekeeper of Air Quality

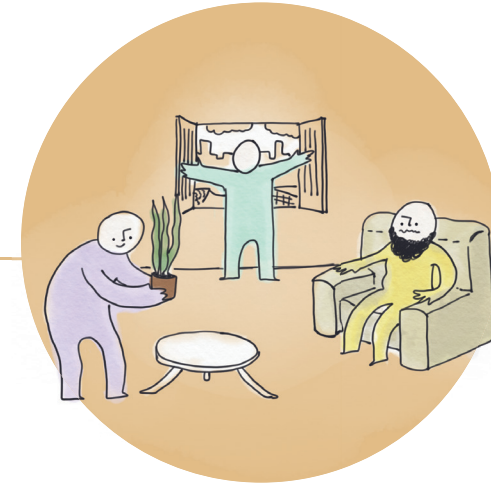
Congratulations! After learning all you can about Air Quality, you are ready to be a spokesperson for your community. You have the knowledge as well as the experience to engage locally and to help make things better. Your journey doesn't end here: take the flag of "good air quality for all" everywhere you go and wear your badge with pride.



6

Air quality ambassador

Now it's time to pass what you learned to a new generation of Air Explorers. You are able to explain concepts related to Air Quality to students from the previous grade and help out with the learning.



7

The doer

You have gotten your hands dirty this time around, eh? You managed to transition from knowledge to action, and to reach out for your community in a positive way. This is no easy thing! By doing this, you are taking concrete steps to create a world that is better for everyone. Congrats! Spread the word about your deeds in the next Air Quality Community Gathering!

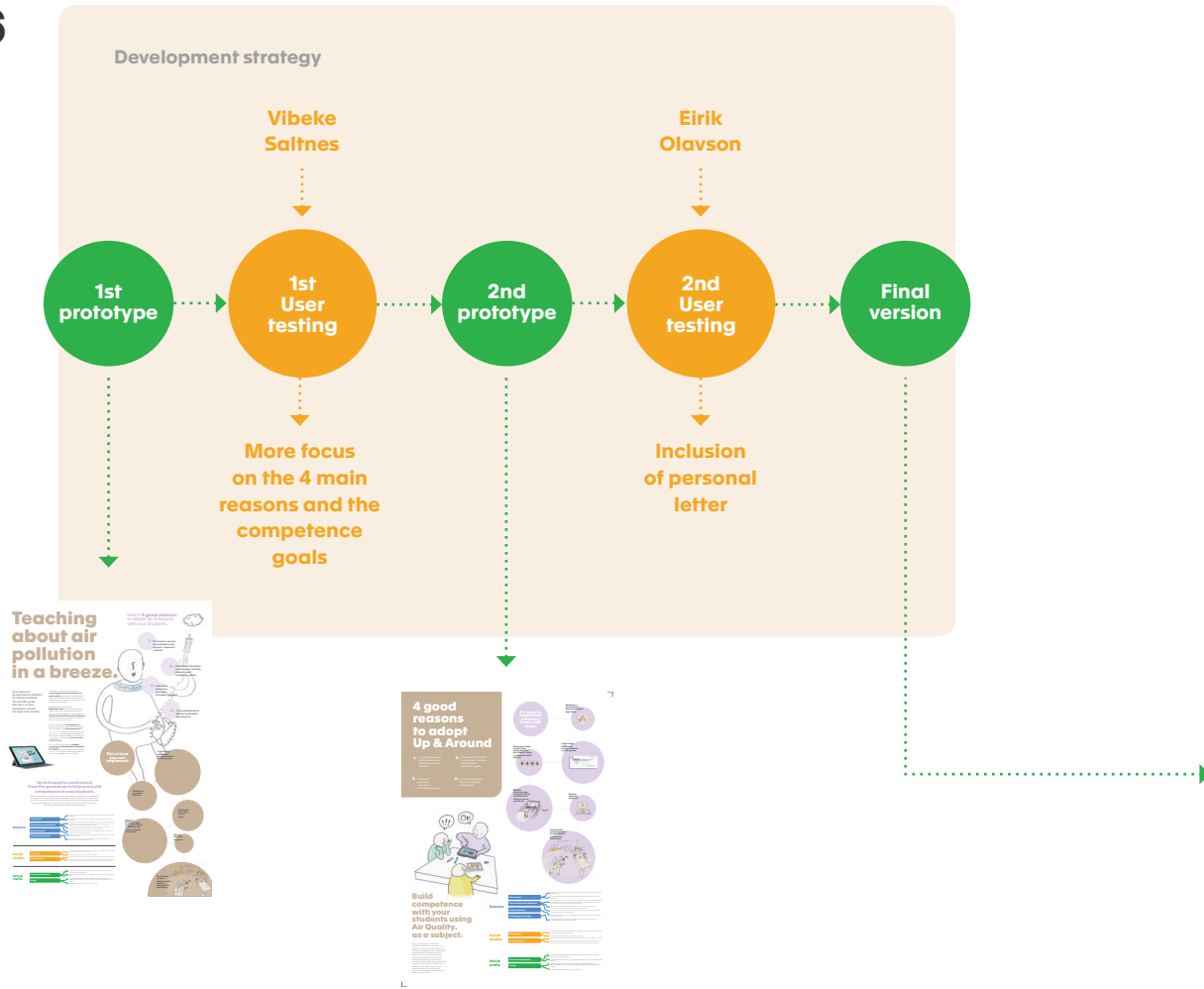


How to onboard schools into 'Up & Around'

Two factors are positive for the adoption of the project: there is no structural barrier for the adoption of technology and content by schools (meaning every school is free to self-determine methods, technologies and contents without having to subscribe to a central authority) and the threshold for reaching out for teachers and principals is low (meaning that they are open to new pedagogical opportunities and that short hierarchical ladders inside of schools allow content to reach

educators easily). On the other hand, education professionals have almost limitless content offer to choose from. This makes them stick to what is "tried and tested".

In my conversation with Utdanningsdirektoratet an idea of an onboarding kit was born. It should show that 'Up & Around' is good for students but also for teachers. It should also be simple and cheap enough to allow for it to be sent to several schools at the same time.



I had two opportunities to user test the Onboarding Kit. One was with Vibeke Saltnes, principal of the Brynseng Skole in Oslo. She regarded the project as interesting as a whole and agreed with the communication strategies. However, she found the layout a bit hard to follow and suggested to focus more on the 4 reasons I outline which make 'Up & Around' relevant for teachers, as well as on how the project is connected to the national curricula and competence goals.

The second opportunity to test was with Eirik Olavson from Vålerenga Skole. He regarded the kit as efficient, but felt like it was too much to absorb at once. He gave an idea of including a personal letter from someone at Miljødirektoratet that briefly sums everything up, to give it an "official look" and also to create a contact with someone that school personnel could get in touch with to ask for help or anything else, solving two things at once.



Relevant content: the key to unlock teacher participation

The best way to make content that is relevant for teachers is to connect it to the competence goals of the national curricula. This means that time spent on 'Up & Around' is not lost – it can be used to develop competence in students.

also follows the progression of the student's learning journey, going from basic concepts related to air pollution, understanding of local scale air quality, connecting it to global scale, touching upon personal stories and reflecting on the experience as a whole.

I crossed the content that children need to learn about air quality with competence goals in science studies, social studies and art. The content

4 good reasons to adopt Up & Around

- It's simple to use and customizable to any teacher's needs and methods.
- It's based on the official curricula and it will help students reach competence goals.
- It allows for continuous evaluation of students' progress.
- It is a valuable tool to discuss sustainable development.

It's easy to implement following these easy steps:

- Download the Teacher's App from Apple's App Store.
- Assign pin codes to your class and make sure the Student's App is installed in their devices.
- Login using FEIDE and assign students to your group.
- Done! Students login using their FEIDE and follow the study program you set up.
- Review students' progress.
- Present your school's work in the Air Quality Community Gathering.

Build competence with your students using Air Quality as a subject.

Up & Around presents a number of activities that teachers can assign to a study plan in the Teacher's App. The content is designed to reach children how to understand Air Pollution and how it affects lives locally and globally. These activities are developed to match the competence goals from the national curricula from 9th to 10th grades. With Up & Around you can take your students on a journey that will transform them from passive consumers of environmental pollution to community gatekeepers of a better air quality for all.

Science

- The scientist**
 - Extract and process scientific information from texts in different media and create a presentation
 - Use digital aids to record, process and publish data from experimental work and field work
- Phenomena and substances**
 - Account for the use of some energy sources before and now and obtain information and statistics from various sources to describe and discuss possible impacts of energy use on the environment locally and globally
- Body and Health**
 - Explain the concept of climate, know some causes of climate change and investigate and record the consequences of extreme weather
- Technology and design**
 - Explain how substances are structured and how substances can be transformed using the terms atoms and molecules
 - Explain how the body protects itself against disease, and how to prevent and treat infectious diseases
 - Describe the lifetime of a product and discuss to what extent the product is compatible with sustainable development

Social studies

- The explorer**
 - Discuss social science topics with respect for others' views, apply relevant discipline and divorce between facts and facts
- Social Sciences**
 - Reading about humans living in different conditions
 - Make sense of what a society is and reflect on what people are looking for in society
 - Deal with the main power institutions in Norway and their main tasks and discuss differences between living in a democracy and in a society without democracy

Arts & crafts

- Visual communication**
 - Compile and evaluate how the writing and image communicate and influence each other in different contexts
- Design**
 - Photograph and manipulate images digitally and reflect on the use of subjects and views
 - Make simple forms of use in different materials and be able to explain the relationship between idea, choice of materials, craft techniques, shape, color and function
 - Use different graphical techniques in your own work

Science

- The scientist**
- Phenomena and substances**
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- Technology and design**

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 - Use different graphical techniques in your own work

	ACVITIY 001	ACVITIY 002	ACVITIY 003	ACVITIY 004	ACVITIY 005	ACVITIY 006	ACVITIY 007
	There is something in the air...	What is air pollution, anyways?	Why are we talking about this?	Seeing Air Quality through Data	Air Quality and Air Quality Index	Putting Air Quality in perspective	What are the of Air Pollut
Description	We learn very early that in the air we breath there are two things: oxygen and CO. But all around us, there are many more things that we need to know about, that come from different places. What else is out there? What is their chemical composition? What are the different molecules and gases? Do some research around this topic and present to the class your findings. Don't forget to quote your sources: they are as important as what you find out!	Ok, now we know that there are several different gases and particles in the air. What does that mean? Are these substances naturally occurring or man made? First define what is pollution, then let's sort out what is an air pollutant and what is not.	Air pollution is hard to see and feel, but an average human usually breaths in 10 thousand liters of air everyday! It can have a very serious impact on health. Do some research and present what are the effects of air pollution in your body: What sort of diseases it can cause? What are the risk factors involved? What particles are more dangerous? In the end, let's reflect on our community: who is most vulnerable to air pollution? Do you know anyone who suffers with it? Make a presentation for the class, and as always, don't forget to quote your sources!	Log in to Luftkvalitet.info and track air quality where you live for a week. Do it everyday, at the same time. Cross this data with meteorological data from YR. Compare this data with the Air Quality Monitor from your school. What did you find out? What are your impressions and feelings about it? Present your data in visual form and write a one paragraph conclusion about it. Share your results with your classmates and discuss it.	The problem of air pollution is being discussed all over the world, and in order to do so, a lot of data about Air Pollution has been generated by researchers. The pollution data has been analyzed by different governments, and health authorities have established parameters for what is good quality of air and what is bad: this is called an Air Quality Index. Define how these indexes are created and what are the different indexes available. Then, find out what is the index used in Norway and what does it mean.	Now that you are familiar with the concept of Air Quality Index, make a visualization of the places in the world with the best and the worst Air Quality: you can use cardboard, markers and scissors, photoshop or lego! Have some fun with it! Explain how you chose the data that you are working with and why is this data scientifically sound and what does it mean for people living all around the world. Do you think this is fair? How could we make the air quality better for everyone?	Pollution is not something that naturally occurs, it is introduced by human activity. When we start creating pollution, we are also creating health problems. Let's go through the air quality index and find out where the pollution is coming from: what sources are related to? Who is responsible for the largest part of the emissions?
Duration	1 week	3 days	1 week	1 week	3 days	1 week	3 days
Deliverables	Presentation in class, Digital Report	Digital Report	Presentation in class	Digital Report, presentation in class	Digital Report	Presentation in class	Digital report, presentation in class
Category	Learn	Learn	Learn	Experience	Learn	Experience	Learn
Competence goals	The Scientist	Phenomenas and substances	Body and Health, Social Sciences	The Scientist	The Scientist	The Scientist, The Explorer, Arts and crafts	Phenomenas and substances, Design and design
Skills involved	extract and process scientific information from texts in different media and create a presentation; explain how substances are structured and how substances can be transformed using the terms atoms and molecules	explain how substances are structured and how substances can be transformed using the terms atoms and molecules	Describe in essence the heart and lung system and what function it has in the body; Explain how the body itself protects against disease, and how to prevent and treat infectious diseases; make sense of what a society is and reflect on what people are looking for in society	Use digital aids to record, process and publish data from experimental work and field work	extract and process scientific information from texts in different media and create a presentation	extract and process scientific information from texts in different media and create a presentation; discuss social science topics with respect for others' views, apply relevant discipline and divorce between facts and facts; Reading about humans living in different conditions; compile and evaluate how the writing and image communicate and influence each other in different contexts; make simple forms of use in different materials and be able to explain the relationship between idea, choice of materials, craft techniques, shape, color and function	account for the use of materials before and now and of different statistics from various sources and discuss possible impacts on the environment; locate and describe the lifetime of different materials; discuss to what extent different materials are compatible with sustainable development
Media							
Available sources			http://www.who.int/ipcs/assessment/public_health/air_pollution	Luftkvalitet.info			

This is the spreadsheet used to create the content.

Competence goals and skills developed through the activity.

Content structure

Thinking already on the translation to the digital realm, this content structure can be used to develop a specialized "content type" in a CMS (content management system; like Wordpress or Drupal for example), to allow for easy editing of the content in the back-end, to add more content in the future or even overhaul the categories and competence goals when these are reviewed in the future.

Activities fall in two categories: learn or experience.

Activity cards

These are some activities you will find inside Up & Around. They are the basis for taking your students on the journey to understand Air Quality. Shuffle them around in time, customize them for the needs of your class and use them as inspiration for your own activities.



Learn — There is something in the air...

Proposed duration
1 week

Proposed evaluation
**Presentation in class,
Digital report**

We learn very early that in the air we breathe there are two things: oxygen and CO₂. But all around us, there are many more things that we need to know about, that come from different places. What else is out there? What is their chemical composition? What are the different molecules and gases? Do some research around this topic and present to the class your findings. Don't forget to quote your sources: they are as important as what you find out!

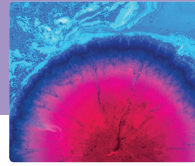
Competence goals

Science

The Scientist

Extract and process scientific information from texts in different media and create a presentation

Explain how substances are structured and how substances can be transformed using the terms atoms and molecules.



Learn — What is air pollution, anyways?

Proposed duration
1 week

Proposed evaluation
Digital report

OK, now we know that there are several different gases and particles in the air. What does that mean? Are these substances naturally occurring or man-made? First define what is pollution, then let's sort out what is an air pollutant and what is not.

Competence goals

Science

Phenomena and substances

Explain how substances are structured and how substances can be transformed using the terms atoms and molecules.



Learn — Why are we talking about this?

Proposed duration
1 week

Proposed evaluation
Presentation in class

Air pollution is hard to see and feel, but an average human usually breathes in 10 thousand liters of air everyday! It can have a very serious impact on health. Do some research and present what are the effects of air pollution in your body; What sort of diseases it can cause? What are the risk factors involved? What particles are more dangerous? In the end, let's reflect on our community who is most vulnerable to air pollution? Do you know anyone who suffers with it? Make a presentation for the class, and as always, don't forget to quote your sources!

Competence goals

Science

Body and Health

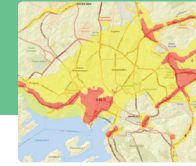
Describe in essence the heart and lung system and what function it has in the body

Explain how the body itself protects against disease, and how to prevent and treat infectious diseases.

Social Studies

Social science

Make sense of what a society is and reflect on what people are looking for in society



Experience — Seeing Air Quality through Data

Proposed duration
1 week

Proposed evaluation
**Presentation in class,
Digital report**

Log in to Luftveiverte and track air quality where you live for a week. Do it everyday, at the same time. Cross this data with meteorological data from YR. Compare this data with the Air Quality Monitor from your school. What did you find out? What are your impressions and feelings about it? Present your data in visual form and write a one paragraph conclusion about it. Share your results with your classmates and discuss it.

Competence goals

Science

The Scientist

Use digital tools to record, process and publish data from experimental work and test work



Learn — Air Quality and Air Quality Index

Proposed duration
3 days

Proposed evaluation
Digital report

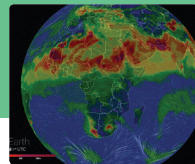
The problem of air pollution is being discussed all over the world, and in order to do so, a lot of data about Air Pollution has been generated by researchers. The pollution data has been analyzed by different governments, and health authorities have established parameters for what is good quality of air and what is bad: this is called an Air Quality Index. Define how these indexes are created and what are the different indexes available. Then, find out what is the index used in Norway and what does it mean.

Competence goals

Science

The Scientist

Extract and process scientific information from texts in different media and create a presentation



Experience — Putting Air Quality in perspective

Proposed duration
2 weeks

Proposed evaluation
**Presentation in class,
Digital report**

Now that you are familiar with the concept of Air Quality Index, make a visualization of the places in the world with the best and the worst Air Quality: you can use compass, markers and scissors, photoshop or legal. Have some fun with it! Explain how you chose the data that you are working with and why is this data scientifically sound and what does it mean for people living all around the world. Do you think this is fair? How could we make the air quality better for everyone?

Competence goals

Science

The Scientist

Extract and process scientific information from texts in different media and create a presentation

Social Studies

The Explorer

Discuss social science topics with respect for others' views, apply relevant descriptive and discursive between facts and facts

Reading about humans living in different conditions

Arts and crafts

Communication

Compile and evaluate how the writing and image communicates and influence each other in different contexts

Make simple forms of use in different materials and be able to explain the relationship between idea, choice of materials, craft techniques, shape, color and function



Learn — What are the sources of Air Pollution?

Proposed duration
3 days

Proposed evaluation
**Presentation in class,
Digital report**

Pollution is not something that magically occurs, it is introduced in the environment by human activity. When an activity is creating pollution, we call this an "Emission". Let's go through the air pollutants we know and find out where these emissions are coming from: what sort of activity it is related to? Who is responsible for the largest part of the emissions?

Competence goals

Science

Phenomena and substances

Account for the use of some energy sources before and now and obtain information and statistics from various sources to describe and discuss possible impacts of energy use on the environment locally and globally

Technology and design

Technology and design

Describe the setting of a product and discuss to what extent the product is compatible with sustainable development



Experience — Emissions Safari

Proposed duration
1 week

Proposed evaluation
**Presentation in class,
Digital report**

It's time to go chase some emissions! Go around your house and neighborhood and document with pictures or drawings the things or activities that are generating air pollution. Find out the thing that is making the most mess! How does it fit in a healthy air environment? Is it sustainable? Follow your guts (and your nose!)

Competence goals

Arts and crafts

Communication

Use different graphical techniques in your own work

Photograph and manipulate images digitally and reflect on the use of subjects and views



Experience — How to make a low-tech Air Sensor

Proposed duration
1 week

Proposed evaluation
Digital report

There are other ways to measure air quality than with expensive digital monitors. Put a generous amount of vaseline on a piece of white cardboard, like the inside of a milk carton. Find a place that you think is very polluted. Place the cardboard there with a clothes peg and leave it for a day or two. Repeat this in your house, near the school, anywhere you want. Make as many cardboard air sensors as you can. Document the results systematically.

Competence goals

Science

The Scientist

Use digital tools to record, process and publish data from experimental work and test work



Experience — Laws and regulations in Norway

Proposed duration
3 days

Proposed evaluation
Digital report

How are laws and regulations regarding Air Pollution today? How do they affect regular people? Are there sectors of society who benefit from it?



Learn — What can we do about it?

Proposed duration
1 week

Proposed evaluation
Debate in class

Prepare some arguments to discuss with your classmates what sort of things we can do to limit our own emissions. Also prepare arguments to discuss why some of these things we can do are so hard to do.



Learn — Air Pollution and Climate Change

Proposed duration
1 week

Proposed evaluation
Presentation in class

Now that we are aware of how pollution and Air Quality influence our lives here in our local context, what about around the world? What are the planetary effects of air pollution? How is it connected to Climate Change? How different parts of the world are affected? Make a presentation and discuss with the class.



Experience — From global to personal

Proposed duration
2 week

Proposed evaluation
**Presentation in class,
Digital report**

Let's zoom back in to your community. Make an assessment of your school, your family, your friends. How many people have respiratory problems? How many people have heart conditions? Interview them about what do they know about air quality and air pollution and how investigate how it impact their lives. Prepare the interview beforehand and think about what do you want to know. Document your interviews using photos or videos. Make a report with the main things you found out. Present it in class.

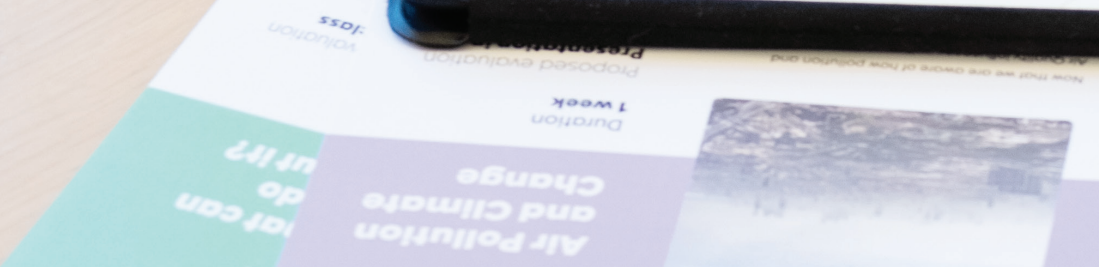
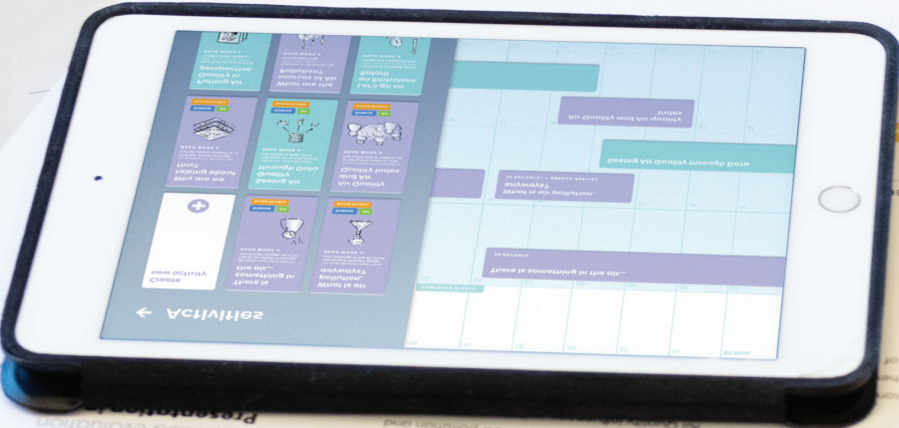


Final activity — Represent your journey to the public

Proposed duration
3 weeks

Proposed evaluation
Presentation in event

It's time to wrap it up: the whole class needs to decide how you are representing what happened during the past three months. Are you making a documentary? Are you making a diorama that represents your area? Are you making a theatre play that explains the dangers of air pollution? You decide! You will present this together with other schools that are also studying air quality in an event: invite your parents, and the school will invite local authorities and the news. Let's spread the word!



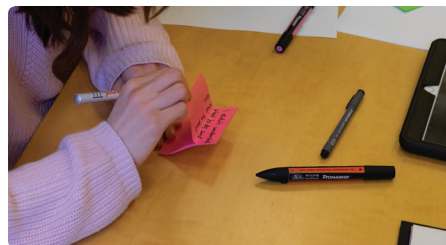
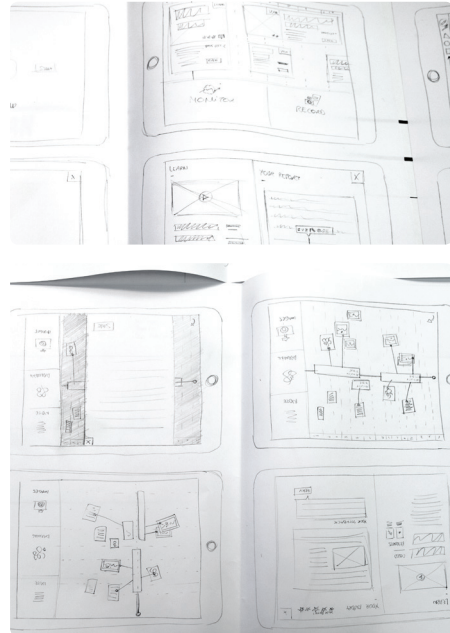
A digital platform for teachers and students

In order to make the apprehension of this content as simple as possible for both teachers and students, I chose to deliver it using two dedicated iPad apps. Since a great percentage of schools are adopting iPads (and it's growing), I chose to design specifically for these devices.

Putting this content inside an app is a good idea because it allows for the content to evolve: since it's structured digitally in a database, it can be manipulated in different ways:

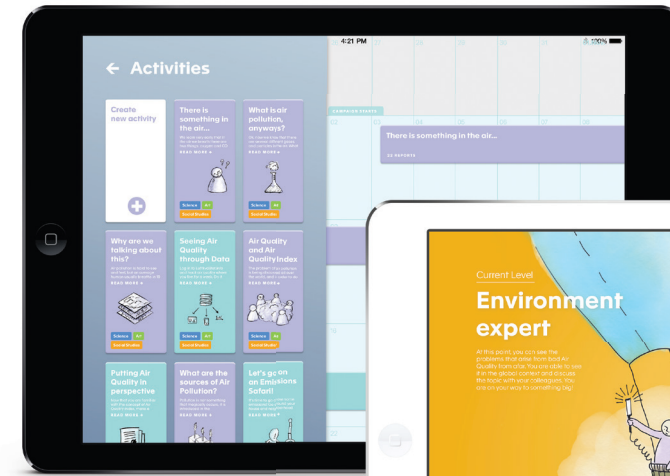
teachers can edit it to their liking, and Miljødirektoratet can crowdsource these editions to improve the content in further iterations. Digital delivery allows it to become multimedia. Content can have attached videos, hyperlinks and other interactive possibilities.

Going digital also allows me to capture the air quality data that is already out there (luftkvalitet.info) and re-contextualize it: both in terms of shaping it visually in a different manner and in the putting it in the context of



↓ To the Left: sketching the Teacher and Student Apps
To the right: user testing session at Vålerenga Skole

The Teacher's app



The Student's app

educational support for students from inside the application.

The two apps in the context of the project

After going through the Onboarding Kit and deciding to use 'Up & Around', the teachers are ready to enter the campaign phase. This is when teachers engage with the apps the

first time. At this point, the two apps become the focal point of the service: the exchange between teachers and students happens mostly inside the app.

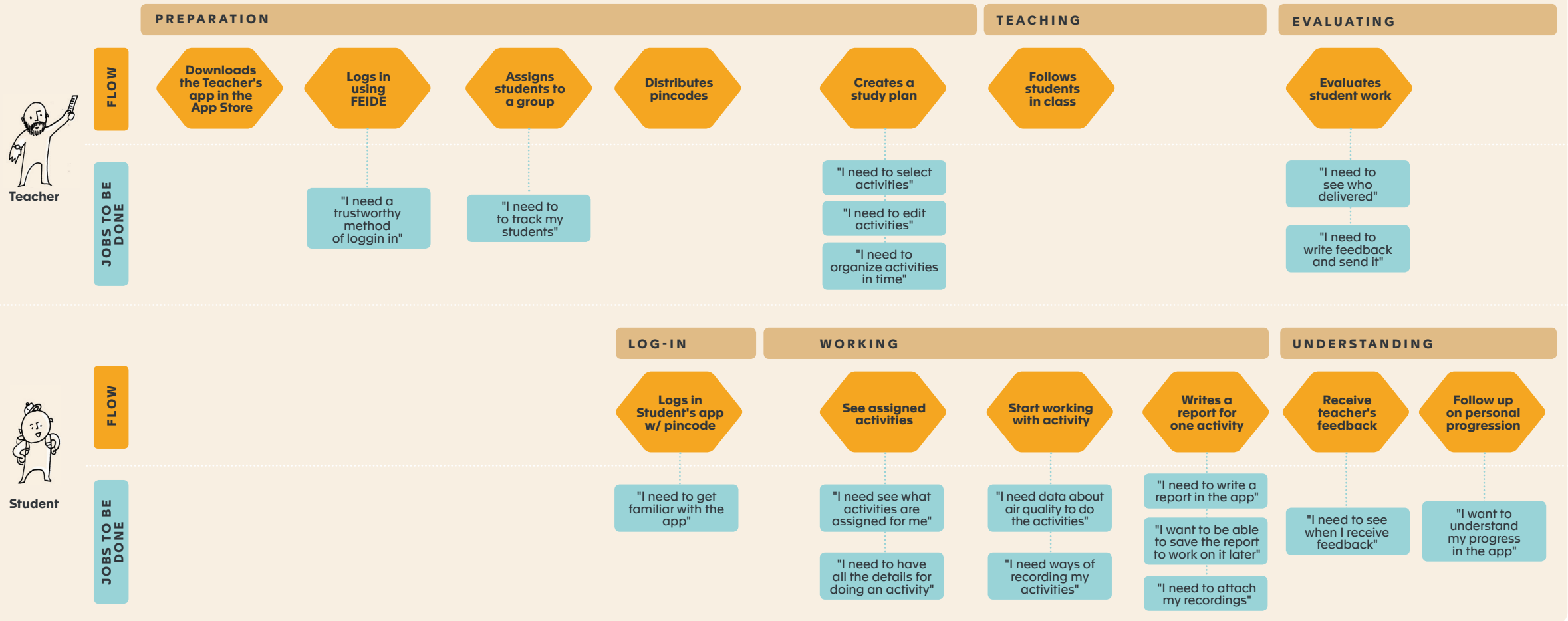
Teachers deliver content to students, who use the app to work on activities and deliver reports, which in turn get reviewed by teachers also from inside the application. It allows for the

time spent in class with the students to be more focused on assistance, presenting work and feedback, rather than giving out content.

Developing the first iteration

Since my time in the project is limited, I chose to develop the first iteration of the two apps, focusing on prototyping the most

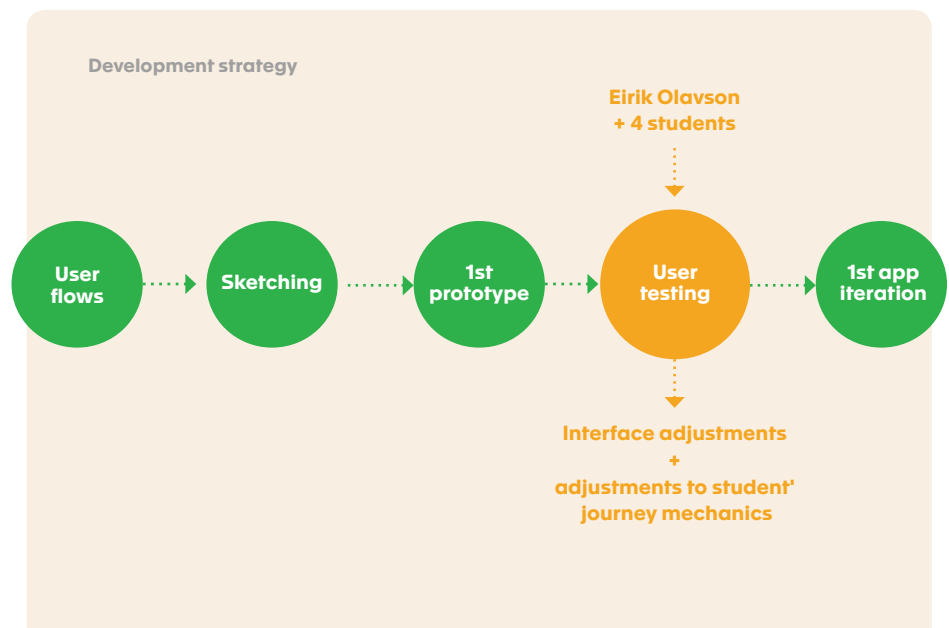
CAMPAIGN PHASE



important functions of each of the apps. I detailed the user flows inside the campaign phase and described 'jobs to be done' for each action. These became the features that were prototyped. I worked from paper sketches, up to static layouts in Sketch and interaction prototypes made in Principle.

These interactive prototypes were taken to a user testing workshop with 4

students from the Vålerenga Skole. The student's app performed well. There were minor interface changes. Eirik Olavson also saw the both apps and recommended a change in how to present the student's journey, in order to avoid creating an unhealthy climate of competition between students and demotivate those who are not performing as well. The changes were implemented and will be described in the next pages.





This is the
Splash Screen
for both the
Student and
Teacher's
apps.

[Click to start](#)

*A journey to learn how Air
Quality is important for you and
your community and what we
can do about it.*



Creates a study plan

"I need to select activities"

"I need to edit activities"

"I need to organize activities in time"

Creating a study plan

When teachers add activities to the calendar, these activities show up in the student's apps timeline. Teachers can choose from 'Up & Around' ready made activities – they are the same ones the teacher received on the Onboarding Kit – or they can create new ones as they see fit.

Air Quality and Air Quality Index

The problem of air pollution is being discussed all over the world, and in order to do so, a lot of data about Air Pollution has been generated by researchers. The pollution data has been analyzed by different governments, and health authorities have established parameters for what is good quality of air and what is bad. This is called an Air Quality Index. Define how these indexes are created and what are the different indexes available. Then, find out what is the index used in Norway and what does it mean.

Duration: 7 days

Deliverables: presentation in class

The activity is:
 Optional
 Mandatory

Resources:
 PDF: WHO Report.pdf
 WWW: Ecolabna Homepage
 +: Add resource

Competence Goals in Science:
 The Scientist: extract and process scientific information from texts in different media and create a presentation.

Add to study plan

Activities home

← Activities

Create new activity

There is something in the air...

What is air pollution, anyways?

Seeing Air Quality through Data

Air Quality and Air Quality Index

Putting Air Quality in perspective

Why are we talking about this?

What are the sources of Air Pollution?

Let's go on an Emissions Safari!

The new activity is added to the calendar and can be re-arranged in time



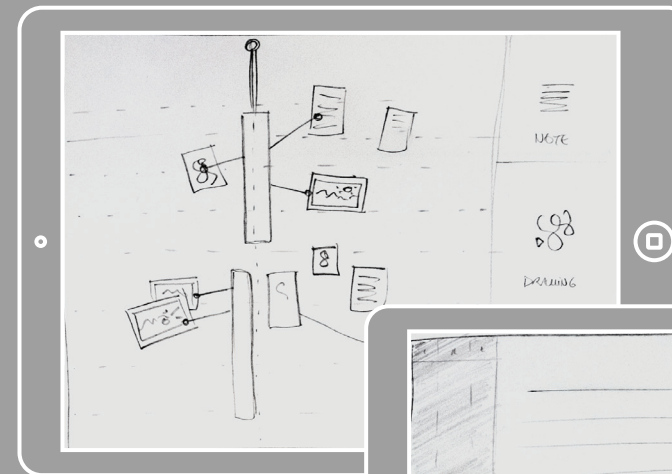
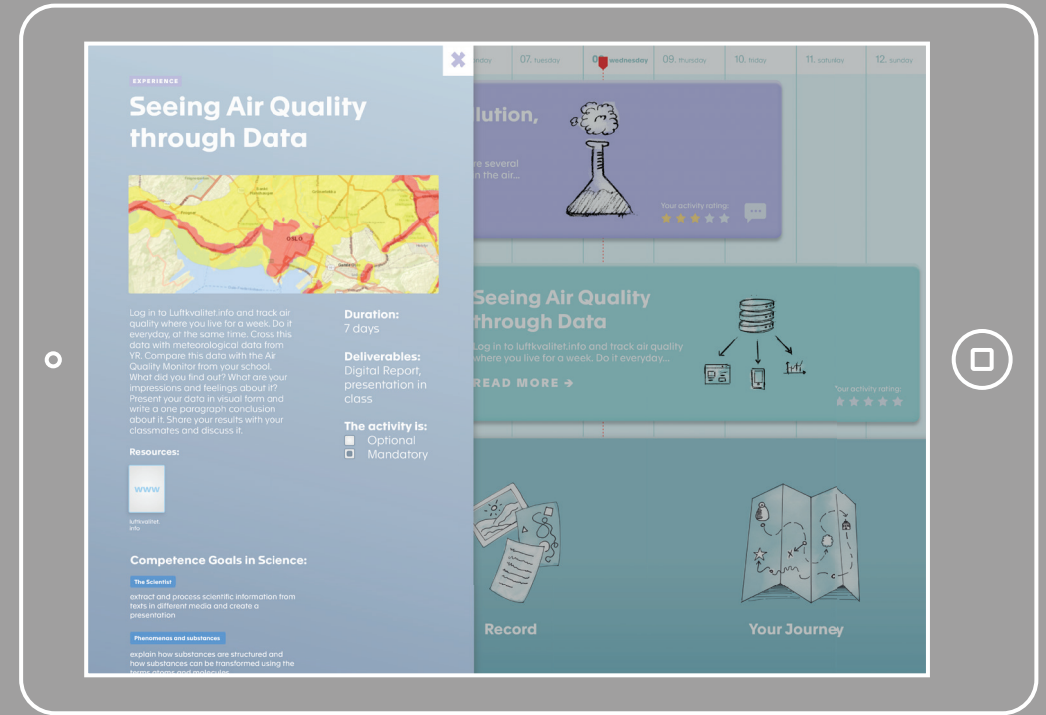
Working with the activities

The student's timeline is simplified in comparison to the teacher's calendar, focusing on what's immediately at hand to do next. Students can have two activities running at the same time: they are responsible for organizing themselves to deliver both. This page is also the homepage of the Student's app.

See assigned activities

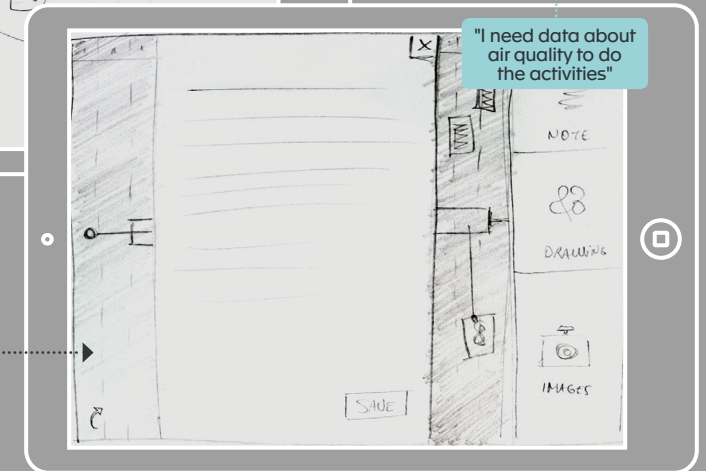
"I need see what activities are assigned for me"

"I need to have all the details for doing an activity"



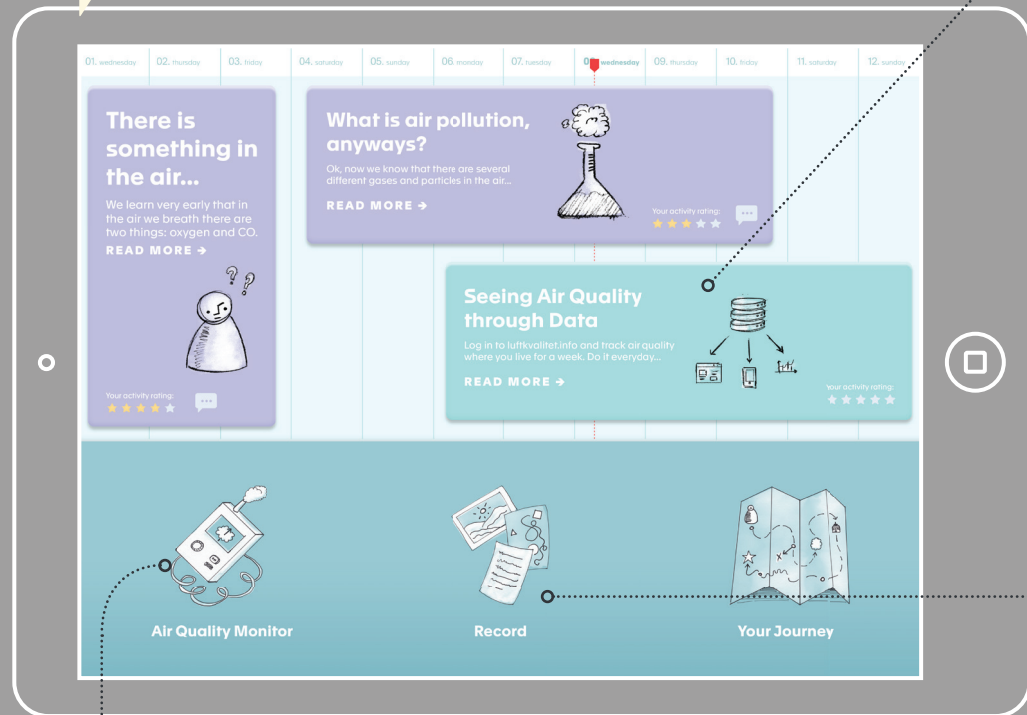
Start working with activity

This function allows students to record pictures, drawings and notes. Due to time constraints I didn't make a high fidelity version of this function.



"I need data about air quality to do the activities"

Student's app timeline





Air Quality Monitor

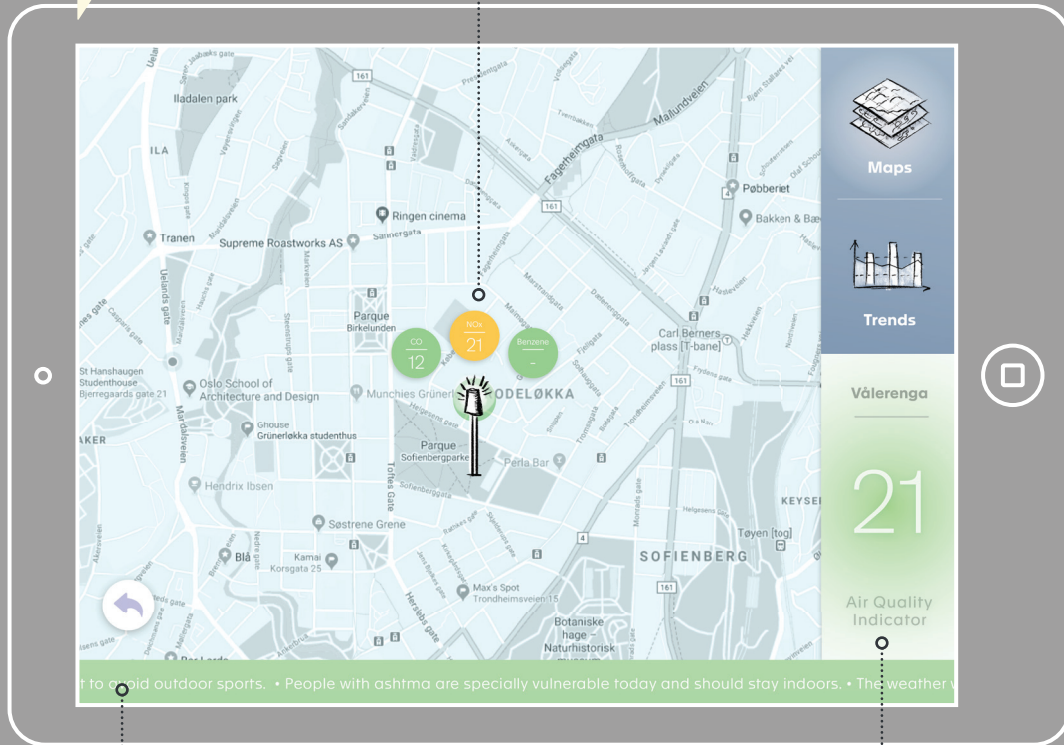
Start working with activity

"I need data about air quality to do the activities"

This function allows students to see Air Quality data from inside the app. Data is collected from Luftkvalitet.info. This is a simpler and more contextualized way of seeing the same data. This function is also available in the Teacher's app.

Displays measuring stations on map and displays latest concentration measurements available

AQ monitor/ Maps



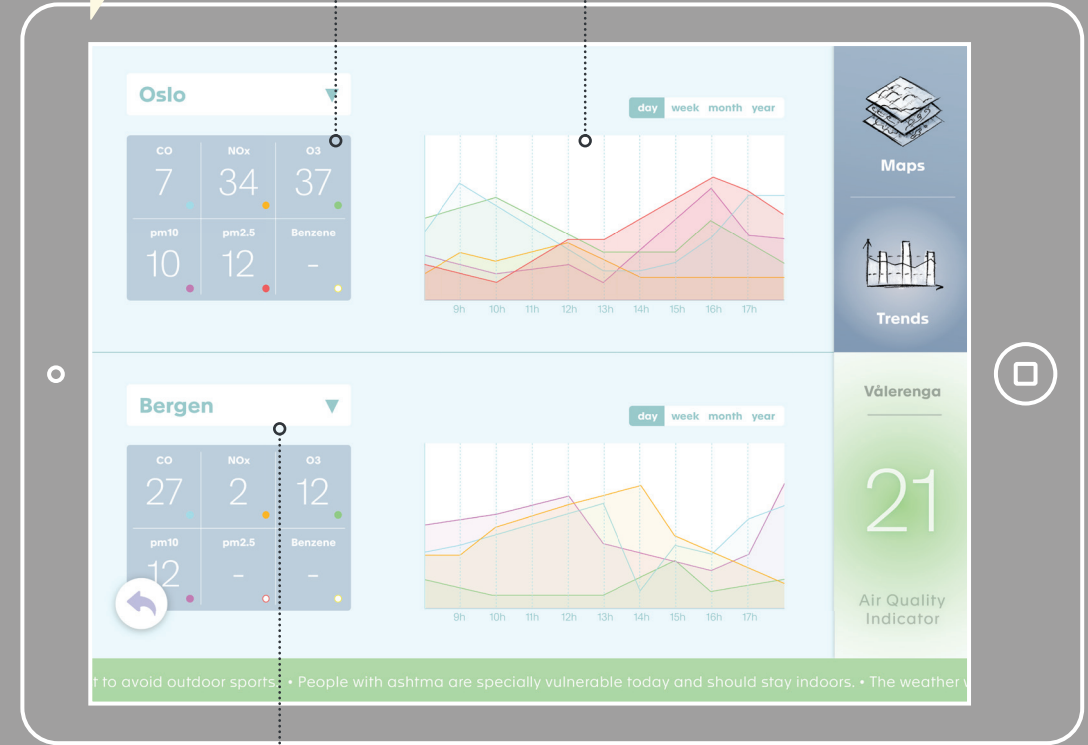
Teletext (i.e. cnn, bloomberg) with realtime information and advice

Represents Air Quality Index close to GPS of the device. Color changes to inform good, moderate or bad Air Quality

Average pollution concentrations per city

Pollutants represented in time series

AQ monitor/ Trends



Students can compare the air in two cities at the same time. All data comes from Luftkvalitet.info



Reporting and evaluating

Writes a report for one activity

"I need to write a report in the app"

"I want to be able to save the report to work on it later"

"I need to attach my recordings"

From inside each activity, the student can write a report. He or she can attach pictures, drawings stored on the app. When he is ready, he can send the report. The teacher will see by each activity who delivered and who didn't. When the teacher writes a feedback, the student will get a notification.

Student's report

Seeing Air Quality through Data

Your report

Air pollution occurs when harmful or excessive quantities of substances including gases, particulates, and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and also death of humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Human activity and natural processes can both generate air pollution.

Indoor air pollution and poor urban air quality are listed as two of the world's worst toxic pollution problems in the 2008 Blacksmith Institute World's Worst Polluted Places report. According to the 2014 World Health Organization report, air pollution in 2012 caused the deaths of around 7 million people worldwide, an estimate roughly echoed by one from the International Energy Agency.

Air pollutant emission factors are reported representative values that attempt to relate the quantity of a pollutant released to the ambient air with an activity associated with the release of that pollutant.

Duration: 7 days

Deliverables: Digital Report, presentation in class

The activity is: Optional Mandatory

Resources: [www](#)

Competence Goals in Science:

The Scientist
extract and process scientific information from texts in different media and create a presentation

Phenomena and substances
explain how substances are structured and how substances can be transformed using the knowledge of chemical reactions

Edit **Send**

Success!
Your report will reach your teacher soon.



Evaluates student work

I need to see who delivered

I need to write feedback and send it

Teacher's review activity pane

Review

From 3:00 to 3:00
There is something in the air...

From 3:00 to 3:00
Seeing Air Quality through Data

Delivered

Lasse Refunes	Marte Andressen	Anolie Mørk	Hanne Skrede	Danielle Fortos
Gustav Thomaaig	Julie Helgesen	Bjornar Røhald	Saleha Abassi	Martin Frøven
Ragnard Blandha	Osdu Christine	Victor Ferrandtz		

Overdue

Lasse Refunes	Marte Andressen	Anolie Mørk	Hanne Skrede	Danielle Fortos
Lasse Refunes	Marte Andressen	Mørstod	Hanne Skrede	

Bjørnar's report

Air pollution occurs when harmful or excessive quantities of substances including gases, particulates, and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and also death of humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Human activity and natural processes can both generate air pollution.

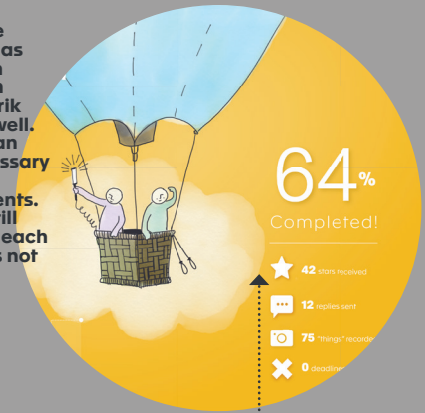
Indoor air pollution and poor urban air quality are listed as two of the world's worst toxic pollution problems in the 2008 Blacksmith Institute World's Worst Polluted Places report. According to the 2014 World Health Organization report, air pollution in 2012 caused the deaths of around 7 million people worldwide, an estimate roughly echoed by one from the International Energy Agency.

Air pollutant emission factors are reported representative values that attempt to relate the quantity of a pollutant released to the ambient air with an activity associated with the release of that pollutant.

Rate contribution: ★★★★★

Write feedback

I was using the activity rating as a gamification element, but in testing with Eirik this didn't do well. For him, this can create unnecessary competition between students. So, students still get ratings for each activity but it's not gamified.





Follow up on personal progression

"I want to understand my progress in the app"

The students learning journey

This function introduces a light gamification element: the more activities a student does, the higher level he achieves.

See all the screens of the first iteration in the digital attachment.

Levels already completed appear in subdued colors

The student's current level is shown in bright colors

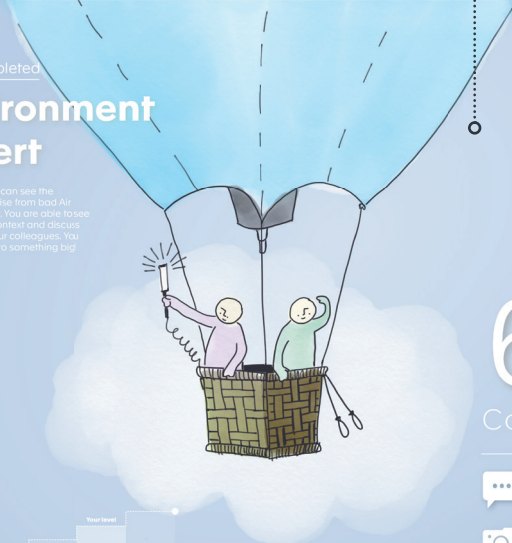
Percentage of the total activities done

Levels that are still locked appear greyed out and blurry

Level completed

Environment expert

At this point, you can see the problems that arise from bad Air Quality from afar. You are able to see it in the global context and discuss the topic with your colleagues. You are on your way to something big



64% Completed!

- 12 replies sent
- 75 "things" recorded
- 0 deadlines lost

Your Journey

Current level

Community Gatekeeper of Air Quality

Congratulations! After learning all you can about Air Quality, you are ready to be a spokesperson for your community. You have the knowledge as well as the experience to engage locally and to help make things better. Your journey doesn't end here: take the flag of the good air quality for all everywhere you go and wear your badge with pride.

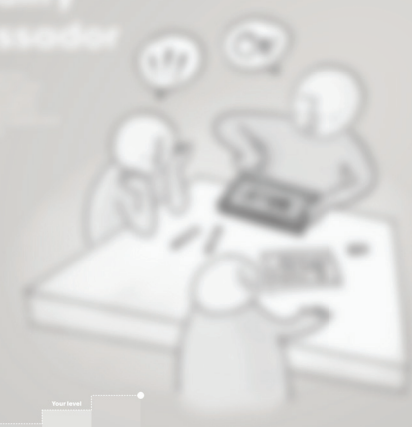


64% Completed!

- 12 replies sent
- 75 "things" recorded
- 0 deadlines lost

Level locked

Air quality ambassador



64% Completed!

- 12 replies sent
- 75 "things" recorded
- 0 deadlines lost

Levels are triggered by specific activities: this one is unlocked after the activity "From Global to Personal" is finished

The students performance is show here



A moment to share and reflect as part of the community

The final activity of the campaign entails students creating something that represents their experience throughout these 3 months. It could be a map, a diorama of their region, a documentary... they decide together.

When the campaign is done, the several schools that are running 'Up & Around' get together for the 'Air Quality Gathering'. In this event, the

several tangible representations are presented to a number of guests: parents, community leaders, local environmental workers, the bydel representatives, local politicians and even the media.

The idea is to give a face to data: children become the owners of data and advocates for positive action in their community.

Output and reflections

Summarizing the project and a meta-analysis of my own work.

Contents:

My Design Proposal	
- Onboarding Kit	pg. 126
- Teacher and Student's App	pg. 130
The prototyped Experience	
- Storyboards	pg. 134
Implementation Strategy	pg. 144
Barriers for the adoption of Service Design in the Public Sector	pg. 146
Reflections on Systemic Impact	pg. 147
My Contribution as a Designer	pg. 148
Acknowledgements	pg. 150
References	pg. 151

My design proposal

Check out all the print materials in full size in the digital appendix.

Onboarding Kit

The main tactic to reach out for potential schools to participating in the 'Up & Around' campaign is sending out the Onboarding Kit to several schools. The kit is cheap to reproduce and easy to send. This kit is composed of three parts:

An introductory letter

The letter aims to be a very brief statement of what the project is about. It also serves the role of authenticating the source of the project and connecting the recipient to a person in Miljødirektoratet.

Poster

The poster explains the project more in-depth, gives a step-by-step tutorial of how to use 'Up & Around', outlines 4 reasons to use the project and connects the offered content to the national curricula competence goals.

Activity cards

They show the teacher how air quality can be presented in a school setting to enable learning. They give a taste of what educators will find inside the Teacher's app.





Experience
Emissions Safari

It's time to go chase some emissions! Go around your house and neighborhood and document with pictures or drawings the things or activities that are generating air pollution. Find out the thing that is making the most mess! How does it fit in a healthy or unhealthy environment? Is it sustainable? Follow your gut!

Duration
1 week

Proposed evaluation
Digital report

Competence goals

Arts and crafts

Communication

Use different graphical techniques in your own work. Photograph and describe images digitally and sketch on paper.

Experience
Seeing Air Quality through Data

Duration
1 week

Proposed evaluation
Presentations in class, Digital report

Competence goals

Science

Social Studies

Arts and crafts

Experience
Putting Air Quality in perspective

Duration
2 weeks

Proposed evaluation
Presentations in class, Digital report

Competence goals

Science

Arts and crafts

Experience
What are the sources of Air Pollution?

Duration
3 days

Proposed evaluation
Digital report

Competence goals

Science

Technology and design

Arts and crafts

Communication

Use different graphical techniques in your own work. Photograph and describe images digitally and sketch on paper.

My design proposal

See all the screens of the first iteration in the digital appendix.

Teacher and Student apps

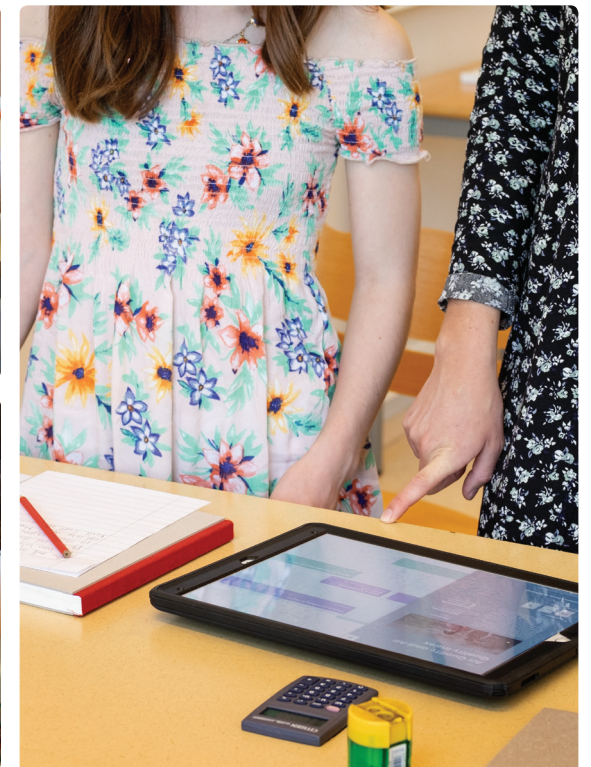
The two apps are the interface from where content about air quality is delivered to teachers and students.

The teacher has a dedicated app where he can manage content, structure a study plan arranging content on a calendar and can also review student activity, rating and writing feedback.

The Student's App is the workstation for students to interact with 'Up & Around'. They will see a timeline with activities,

be able to go through the content, write reports, record pictures, videos, drawings and notes and follow their progression throughout the campaign, leveling up as more activities are complete.

Both apps have access to an "Air Quality Monitor", a function that gathers data from luftkvalitet.info and presents it in two ways: as a map with the position of measuring stations and as trends on a time series. The app also brings tips and warnings to deal with air quality.





The prototyped experience

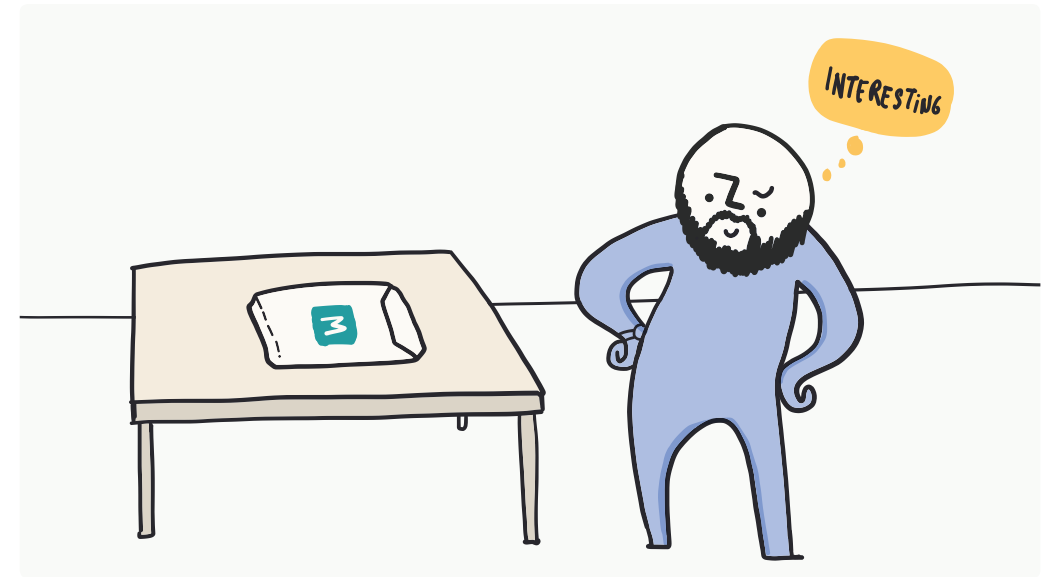
Storyboards

In order to create a better understanding of how the service works, I created the storyboard for a video, running the service from the perspective of the teacher. The video outlines the teacher's journey, the

most important service moments and the core touchpoints that make the experience of the service. The video also can be used as a communication material for Miljødirektoratet when reaching out for schools.



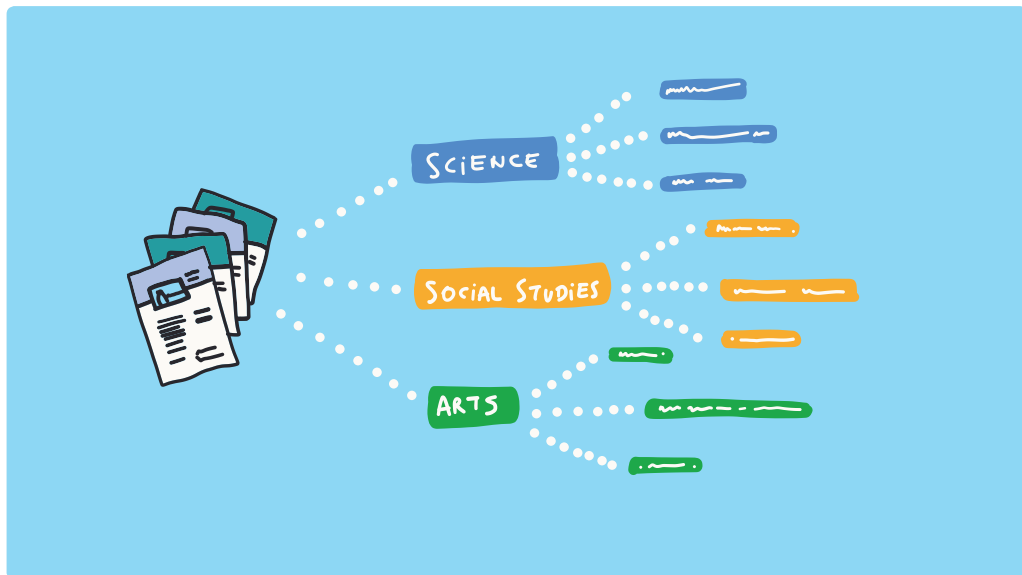
"Meet Magnus, he is a teacher in the local school for kids in the 8th grade."



"He arrives at work and finds a package from Miljødirektoratet for him. Interesting!"



"He opens the package and finds a letter explaining about a new project for teaching children about air pollution. He also finds a poster, which explains all the details about the project and how to set it up. The package also contains activity cards..."



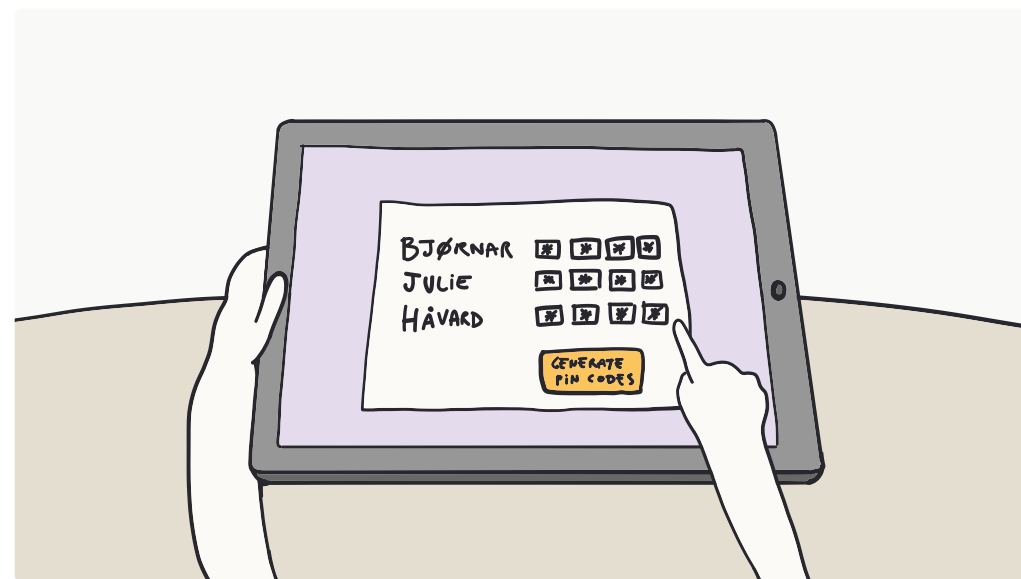
"... that show him what sort of content his students could learn. All this seems very interesting to Magnus: the content is relevant to what he needs to teach and helps students achieve competence goals."



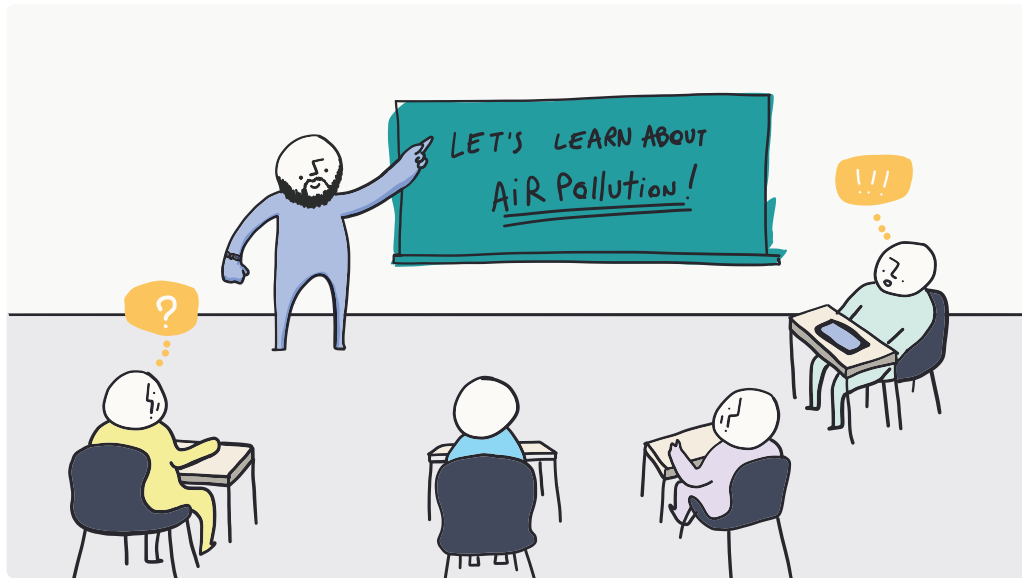
"He logs in using FEIDE, the identity system he already uses at school."



"Also, he finally has an aid to start talking about environmental issues with his students, like his principal is always asking him to. After discussing with the school's staff, he decides to give it a go: on his iPad, he goes into the app store and looks up for the Up & Around teacher's app."



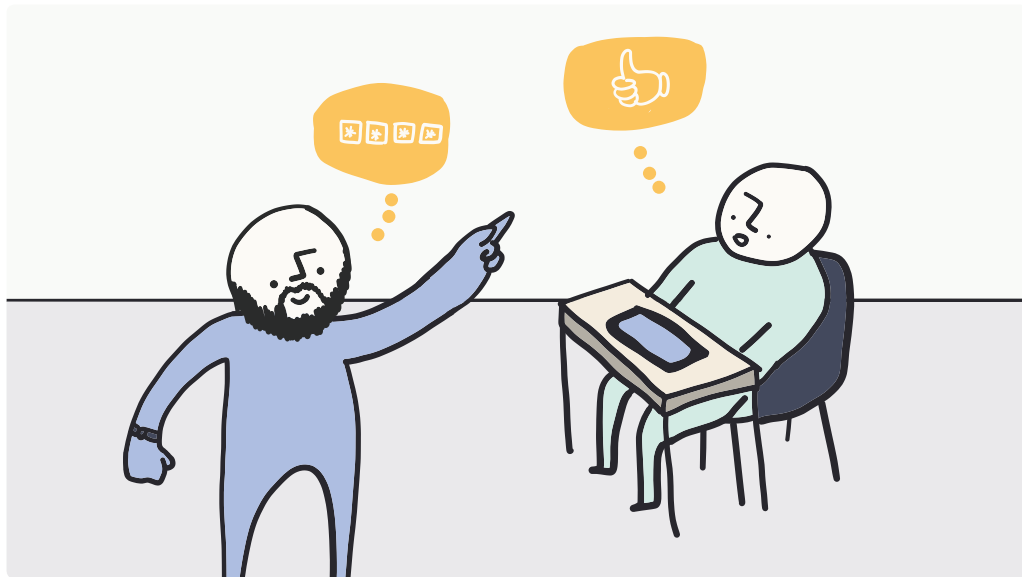
"He assign his students to a group and creates pin codes for each of them. After that, he selects some of the ready-made activities and adds them to the calendar, creating a study plan."



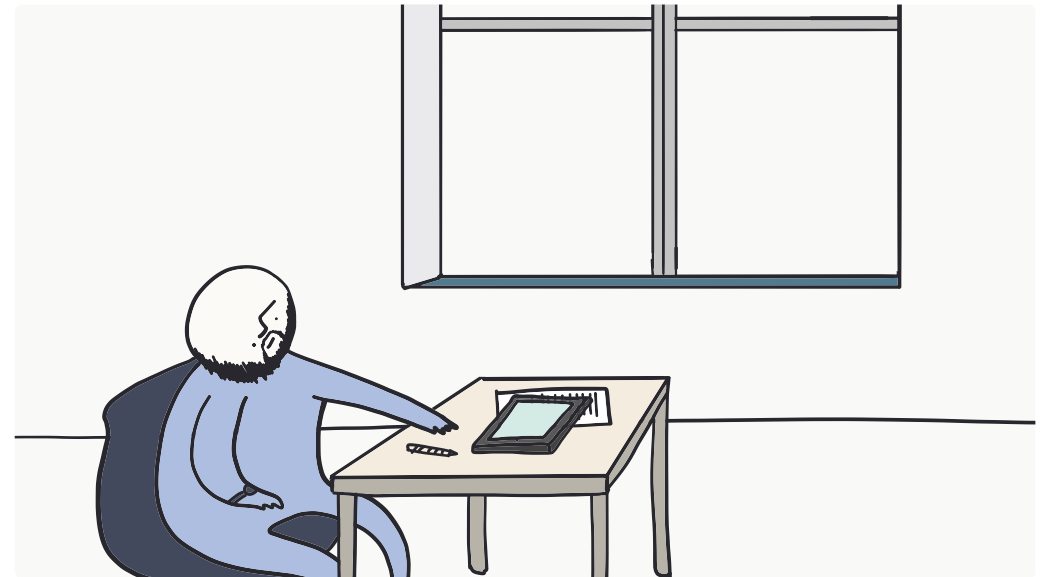
"On the next day, he arrives in class and tells about a new topic they will learn about: air pollution."



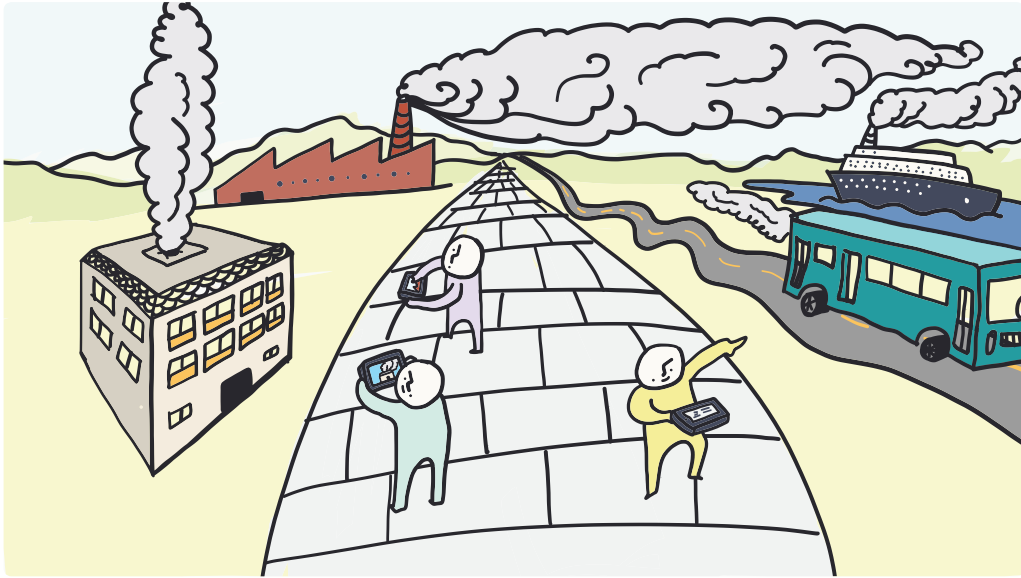
"Magnus has a little discussion with the students about one of the tasks and off they go."



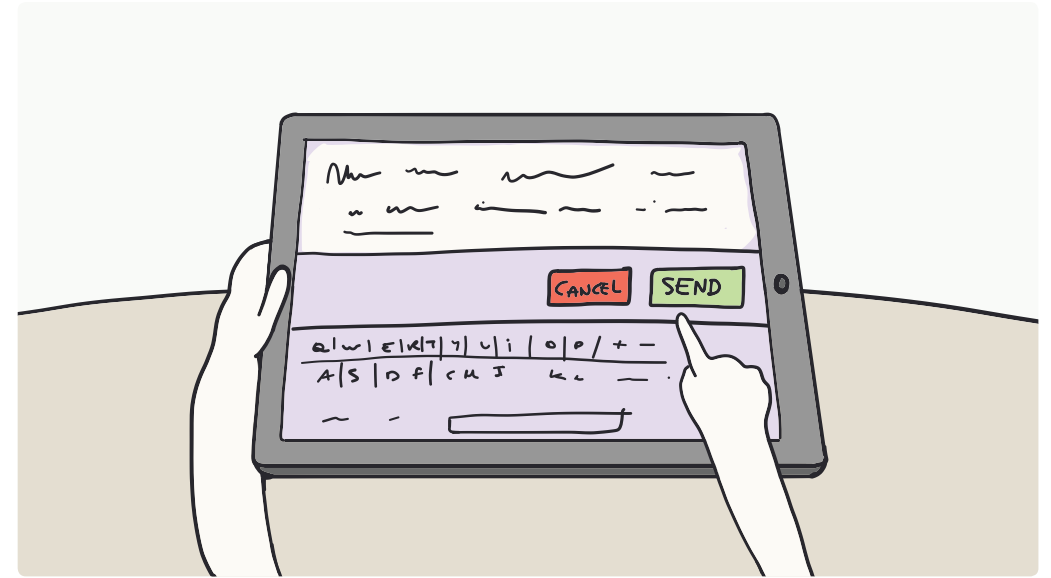
"He gives out the pincodes and helps the students login into the student's app."



"He can see them from the window..."



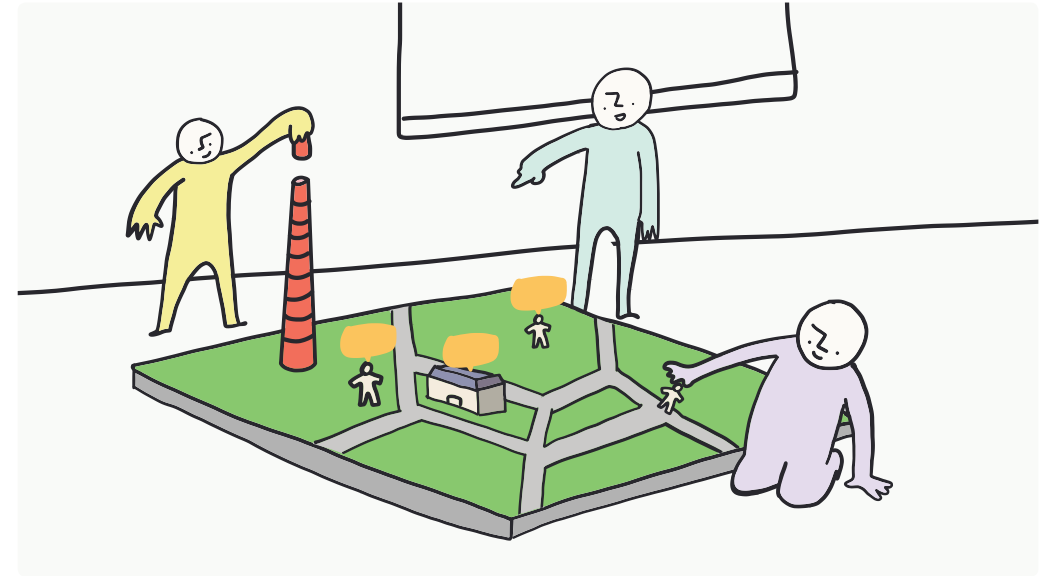
"...documenting the things around the school that emit air pollution."



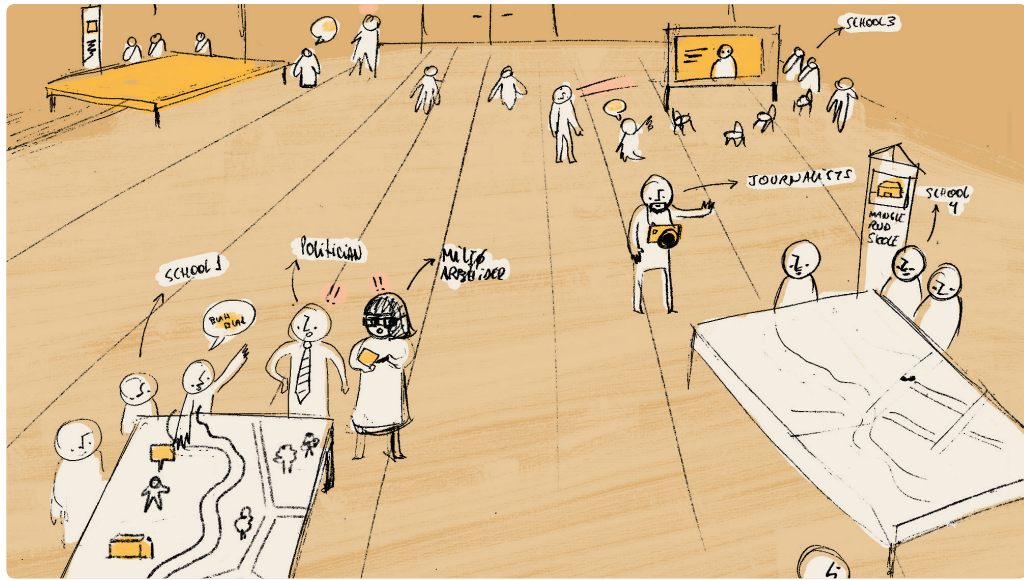
"He goes into one of the student's report and writes his feedback. Everyone is progressing!"



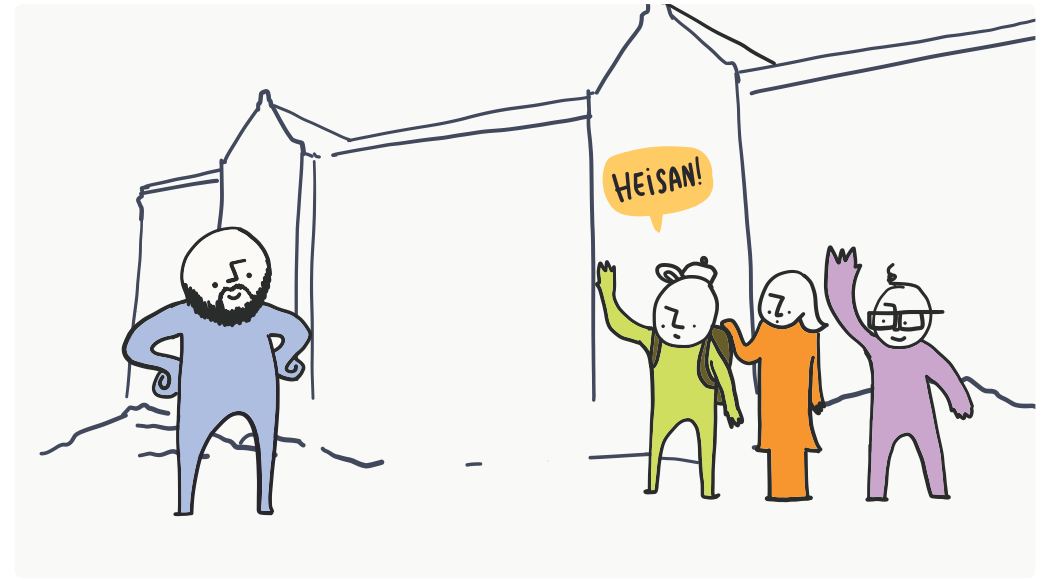
"Later, he sees that some of the students have already written some activity reports! How exciting!"



" Three months later, the campaign is coming to an end. Magnus and his students prepare a presentation of what the class tlearned in this period."



"They take the presentation to the Air Quality Gathering, where other schools that are also running Up & Around are also presenting."



"In the end, Magnus is excited to be able to do this again next year. His students are now experts in Air Quality, but soon there will be another class ready to embark on this journey."



"They invite parents, as well as local authorities and even the media. They share their experiences and everyone learns a lot."

Implementation strategy

The whole project should run in 12 months. The planning phase lasts 1 month and should be enough to decide targets with local authorities and communicate to schools.

The Campaign phase lasts for 9 months. Schools are free to start 'Up & Around' whenever they can, as long as

they are ready to get together on the end of the campaign phase to present in the 'Air Quality Gathering'!

The evaluation phase allows Miljødirektoratet to understand how the content performs, how schools interact with it and also output reports to relevant authorities. Then, they are

ready to plan for another campaign cycle, using the insight gathered to improve the apps and contents offered.

Some considerations before 'Up & Around' is ready to roll out:

Full development of the two apps

There needs to be more iterations of the two apps, and to develop it to a beta state. Maybe even do a pilot run with just one school, and use the feedback to release a final version.

Translation

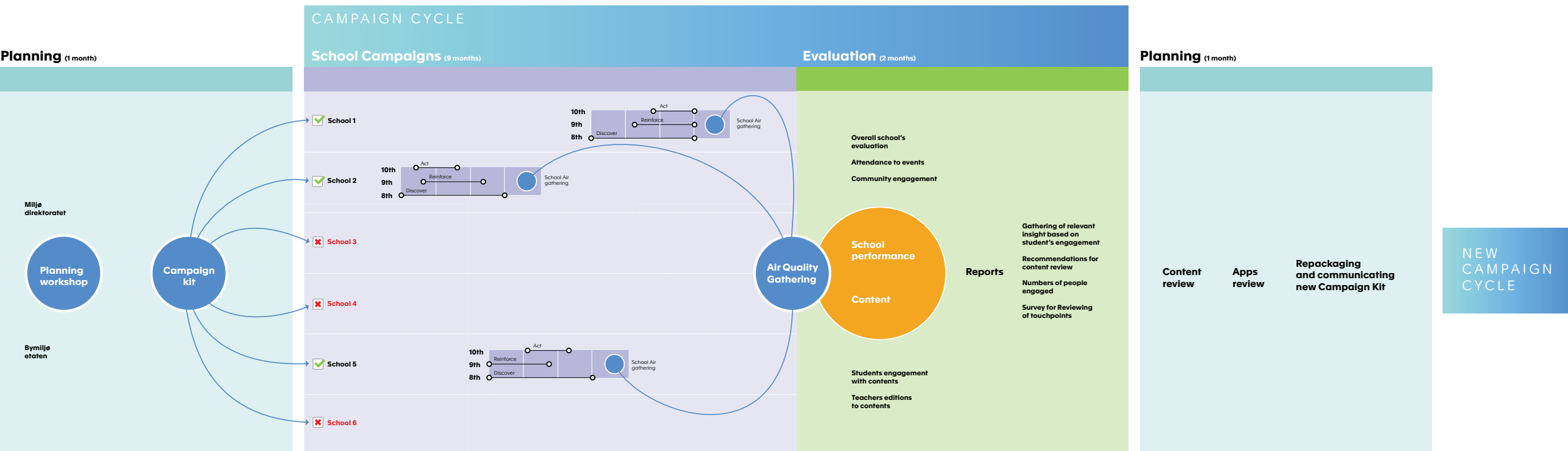
The content needs to be fully translated to Norwegian, using professional services.

Communicating the project

Miljødirektoratet can use some of the industry's forums to spread awareness of the project and get municipalities to partner up. We are already discussing how I can help in this process, making communication materials for these events or maybe even presenting it myself. Making a landing page for the project is also a good idea.

Defining responsibilities and training Miljødirektoratet's staff to support local actors

There needs to be an owner of this product inside Miljødirektoratet who is also able to delegate and oversee it's operation. The work will revolve mainly on setting up partnerships with local authorities and media, communicating with schools, offering support for participating schools, improving the products (the app and the content) and generating reports in the end of each project run.



Barriers for the adoption of service design in the public sector

I had two checkpoints with Miljødirektoratet throughout the project. The first one was after my 1st midterm presentation at AHO (in the first half of february), where I only had a hunch around local community action

Seeing the digital prototypes was very important to her, as it made tangible what I wanted to achieve in the first place. She told me about the desire of Miljødirektoratet to get closer to education, but there was never a

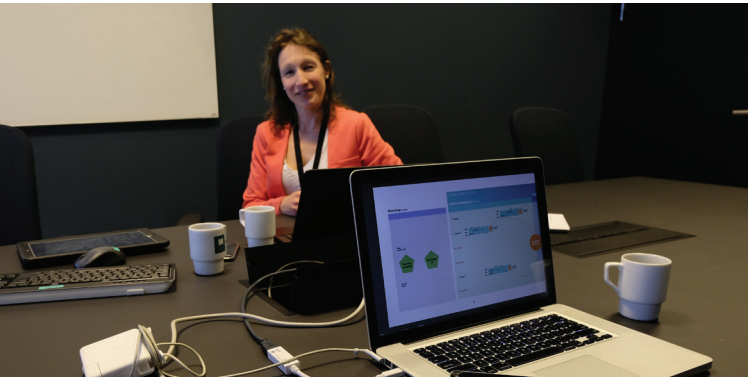
concrete proposal to do so. My project will be a tool for her to bring this discussion back to the table, and she think it has a big potential for implementation.

We discussed what sort of barriers this project might face. In her opinion, the biggest challenge is overcoming the political

and a handful of findings to support it. In this meeting, Miljødirektoratet perception was that the possibilities for acting locally were very reduced.

The second checkpoint happened in mid-april. I presented my concept to Isabella Kassin and she was very pleased to see a project that was so concrete and with many details.

overlaps between different government actors. My project for example crosses different instances of government: it comes from a national directorate straight to local communities. The 'Luftsamarbeider', the agreement between Miljødirektoratet, Statens Vegvesen and Metereologisk Institutt is not clear on how to handle these situations. When something like this



shows up, usually a lot of discussion happens and it's difficult to progress.

I also consulted with Difi after the concept was developed. Their diagnosis is similar. Across all the eight projects carried out in the 'Stimulation Scheme for the Adoption of Service Design in the Public Sector', the topic of roles and responsibilities was a constant.

My perception is that specific design tools for helping in organizing responsibilities should be developed by these central agencies like Difi to aid in solving this issues. These tools could be deployed during the problem setting phase of projects to bring decision makers together with the power to seal agreements on the spot.

Reflections on systemic impact

When analysing my project from the systemic impact standpoint, some things can be said.

The main systemic impact is a long-term change in habits in a population that will be economically active in 10 to 15 years. At this time, Norway's efforts to follow through with international emissions agreements will ramp up, demanding more from its citizens.

Generating understanding in the young population regarding Air Quality can be have a platform effect¹ towards more radical urban planning projects, that privilege collective intermodal transportation, decentralized city hubs and new arrangements in work modes.

'Up & Around' can also interact in positive synergy² with the new National Curricula for education, that will come into effect in 2020. The new curricula will focus on sustainable development as a thematic thread that connects disciplines. Air pollution can be used as a case to underline the dangers of unsustainable growth and carbon based economies.

A counter-effect³ of this project could be to generate resistance in the general population towards urban projects that don't take into account Air Quality as a central part of urban dweller's wellbeing. Oslo, for instance, has bold plans for growth. Land value is already very high, which lead to real-estate driven projects that move very fast from conceptualization to realization. This can have adverse implications for determined sectors of Norwegian political establishment.

But the 'trojan horse' of this project is, of course, the children: nobody is against a better future for children; it is its biggest strength and can be used to overcome implementation challenges.

My contribution as a designer

In this project, the main contribution I made as a designer was to challenge the original brief with a lot of enthusiasm.

There is a lot of value in looking for the inconsistencies in the original problem statement. I don't think that these inconsistencies happen due to lack of knowledge or competence from the brief's originators. What I do believe is that as a designer – and specially a student – I was allowed to spend more time considering what was the question that should be in fact answered. This was done through an attempt to understand the system and structure it again according to the relationships I could see. The designer's point of view is usually different from the stakeholders that are part of the system. One could argue that you change the system by simply observing it, and if that is so, I think I made a small nudge into it.

I'm also a strong believer that designers have a political role in the world: we materialize societal trends into objects, services and structures. The systemic design movement

implies that designers should consider the consequences of their designs as a means to account for them, in a turn towards a more ethical design practice.

This also implies that you should risk offering what was not asked by your client based on what you believe is the most favourable input you can have on the system. It is risky because that might mean losing an account for more marketable proposals, for instance. But since I'm not worried about generating income for a design business (for now) I had to exercise this possibility in this project.

Another contribution was making the results of my work as tangible as possible with the time I had; by employing visualization methods characteristic to designers in an effort to communicate complexity in a way that is accesible.

This made it really easy for stakeholders to understand the value of my proposal, which might help in implementing them in the future.

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- The banner and iPad mockups on pages 29, 107 and 110 are taken from the website behance.net/free-psd-templates

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