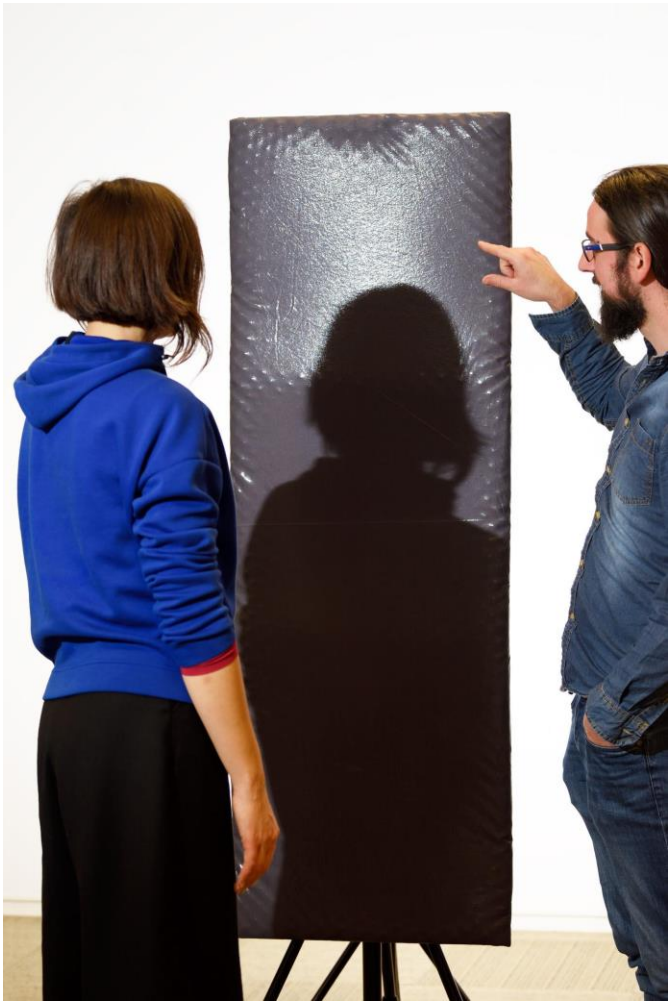


The Breathing Mirror

Juste Peciulyte, Vilnius Academy Of Art
Adrian Clear, Department of Computer and Information Sciences at Northumbria University

What if the air in our home could reveal its quality to us? The Breathing Mirror is part of a future where the invisible atmosphere in our homes that is critical for our health (particularly in a more polluted world) is measured and monitored with sensors. The Breathing Mirror makes this visible through light. LEDs around the edge of the mirror light up becoming brighter and dimmer in a way that suggests breathing. The rhythm of this change varies according to the level of pollution (for example, CO2 or particulate matter) that is measured in the home. The mirror not only interacts with this virtual data, but it also interacts with the physical environment. It is coated in a material that accumulates dust from the environment. This has a visible effect when the LEDs light up, but also when natural or artificial light from the environment is shone on it.

In a world where data is increasingly embedded in our daily lives, the mirror metaphor plays three roles. First, it prompts personal reflection by only displaying data when a shadow is cast on it by a passer-by or an observer looking in. Secondly, it embodies this embeddedness by being an integrated part of the home furnishings; an ambient display that only interacts with what is in its field of view, as a conventional reflective mirror would. And thirdly, it helps us interact with a potentially overwhelming amount of data by limiting what is displayed, and when.

Personal reflection is further prompted by the physical interaction with the environment when dust gathers on the mirror, and by the breathing metaphor, potentially sparking anxiety in the onlooker when the mirror's breathing rhythm speeds up with high levels of pollution, and prompting calmness

when it slows down with fresh air.

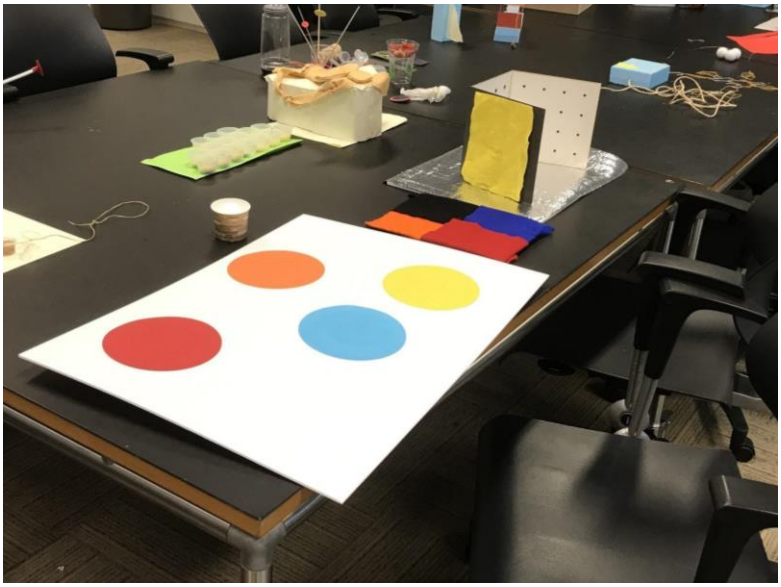
In this way, The Breathing Mirror asks, what does any of this data mean, and what does it tell us about ourselves and our everyday lives, and what we can (or cannot) do in order to improve our health and our environment?

Our making journey could be described throughout four major steps:

- COMMON THREAD;
- MATERIAL ENCOUNTERS ;
- PROVOKING EXPRESSIONS ;
- CONTEXT MATTERS .

COMMON THREAD

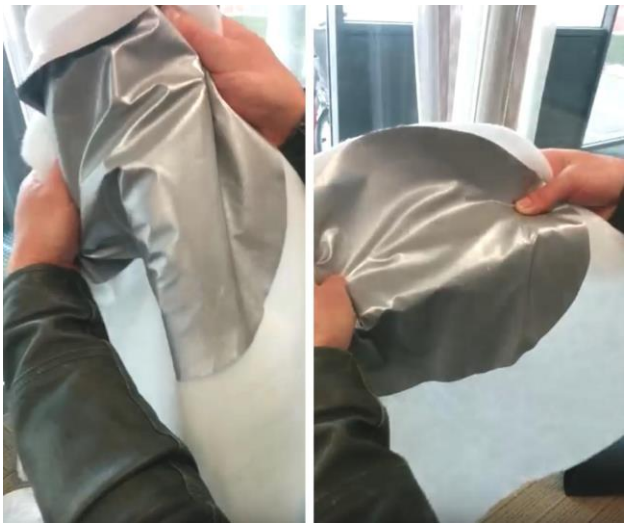
We both come from different disciplines (practice based design research and human-computer interaction) but we are interested in similar topics. We firstly discussed our shared interest in interactions in everyday life, which came out in the designs we individually produced as part of a warm up exercise. We found a particular common interest in interactions with invisible indoor climates - that arise for example with thermal comfort and ventilation practices - which have implications for health and energy use. Therefore we formulated the first 'what if' questions: 'what if people's expectations about environmental comfort were more dynamic?', 'what if indoor atmospheres were more visible and, as a result, more conspicuous?'



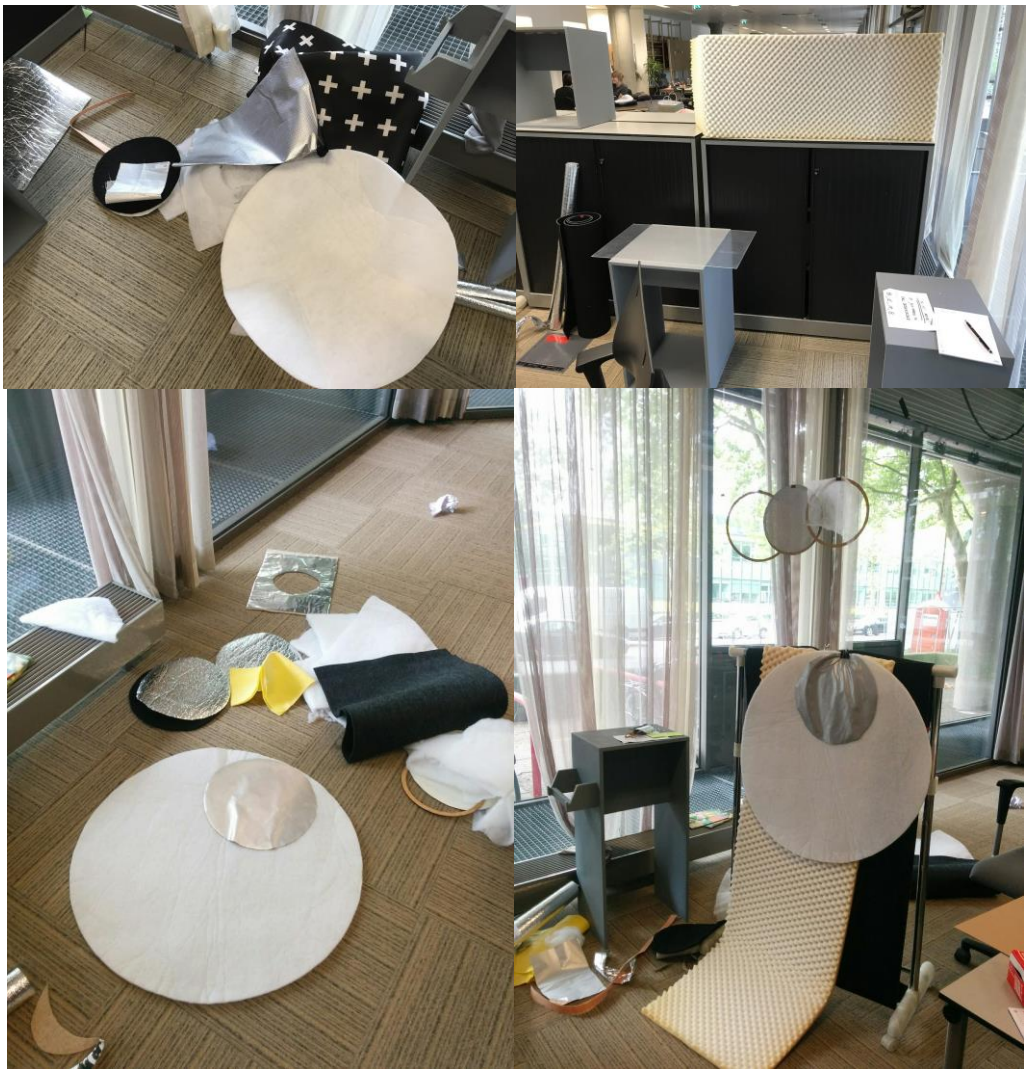
MATERIAL ENCOUNTERS

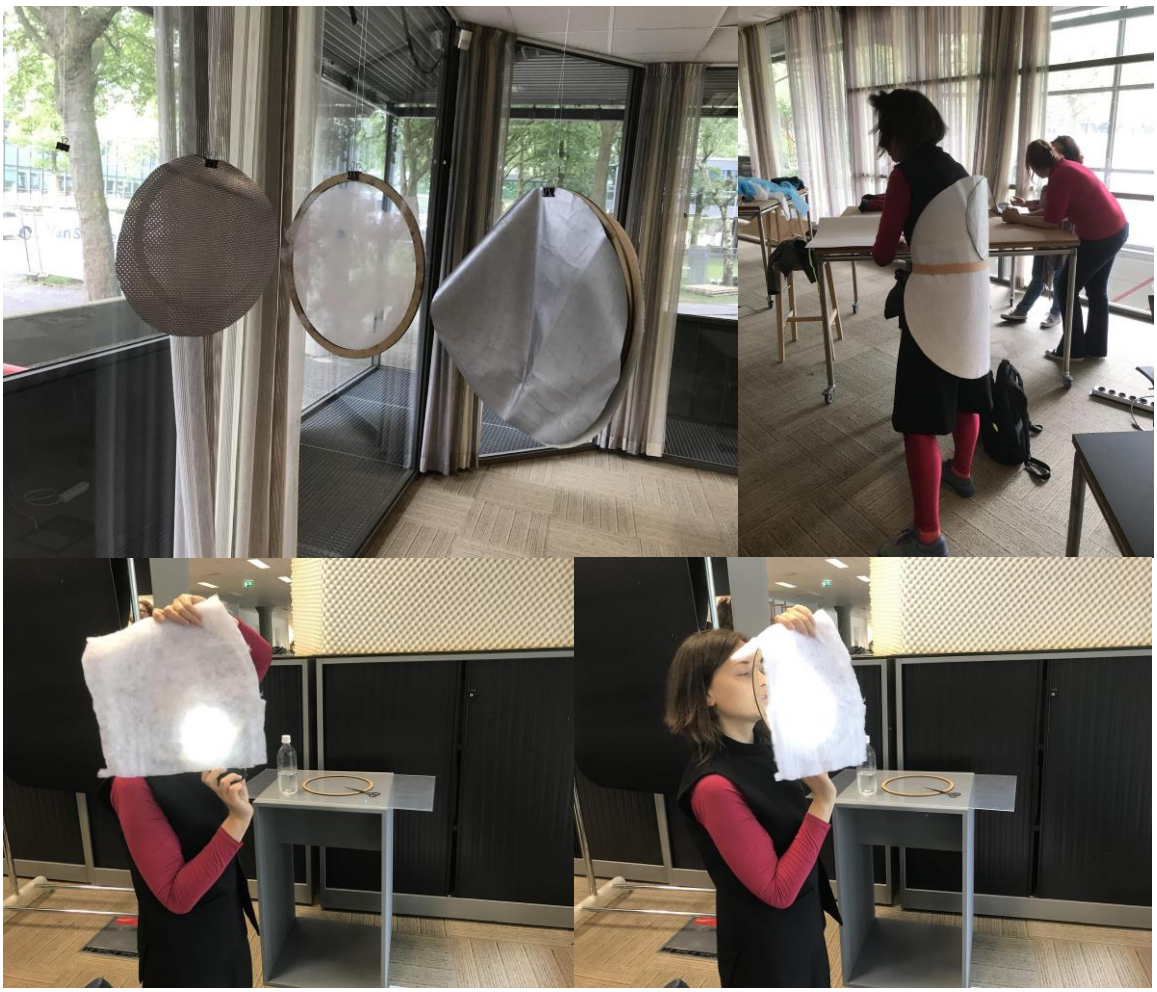
Then, we decided to look for inspiration from the materials that were made available to us, a method which Juste was much more at home with than Adrian. Our attention was caught by insulating, light reflective materials, screens, glossy fabrics. We explored material properties and expressional qualities through quick installations, shapes and interactions, namely by squeezing them, listening to them, shining light on them, combining them, and wearing them.

All the while, trying to reconcile them with our topic of the indoor climate by reflecting together upon the everyday rituals and behaviors of environmental comfort that the material might be part of and, most of all, its aesthetics.



Exploring material properties and expressional qualities

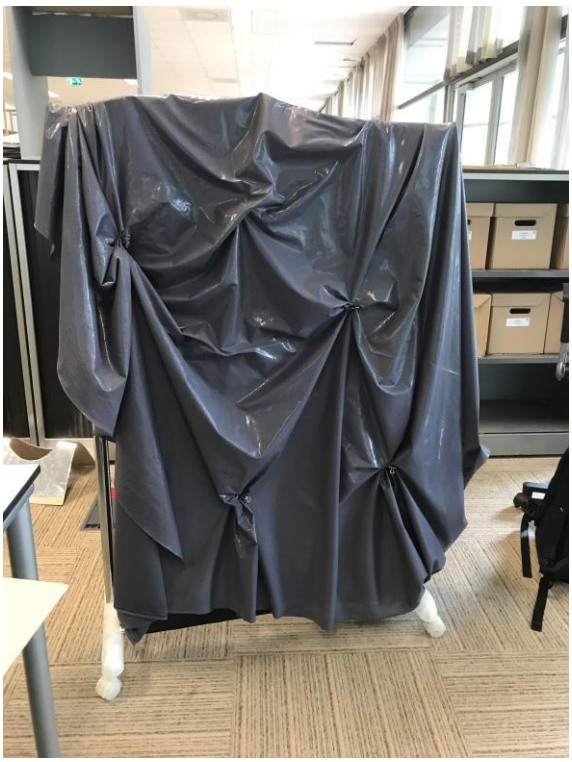




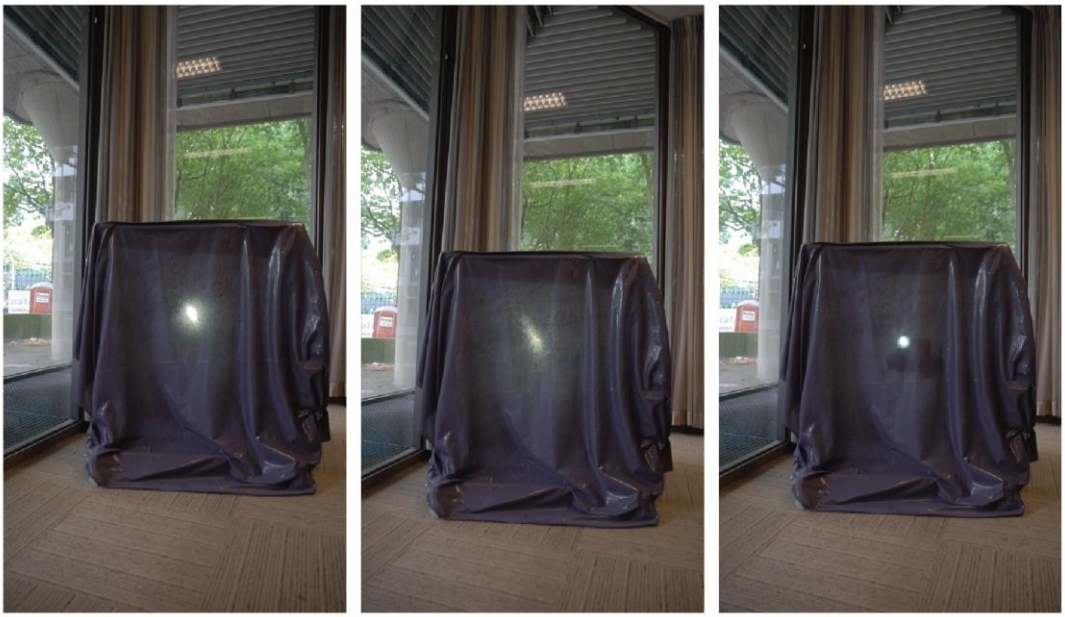
PROVOKING EXPRESSIONS

We settled on the challenge of using material properties to give more prominent aesthetics to the invisible indoor climate. To explore further material expressions that could provide a medium for representing environmental data, we chose a greyish, semi-translucent thin fabric.

We explored its sounds and textures as modalities to represent the data, and experimented with dynamic ways of changing the texture using a mechanical rod system that could be programmed to poke the material and disturb it in different ways. But, we found diffusing light effects to be the most convincing (we used flashlight of a smartphone to play with the intensity, rhythm, and distance of light). A screen-like object became our terrain for experimentation. We wanted to depict the indoor climate as a provocation, so we were looking for material aesthetics that could achieve this. How beautiful? How ugly? How effective? We realised, however, that to progress towards a meaningful artifact, we needed to narrow our focus in on a specific context.



Altering the surface to create sounds and different haptic expressions



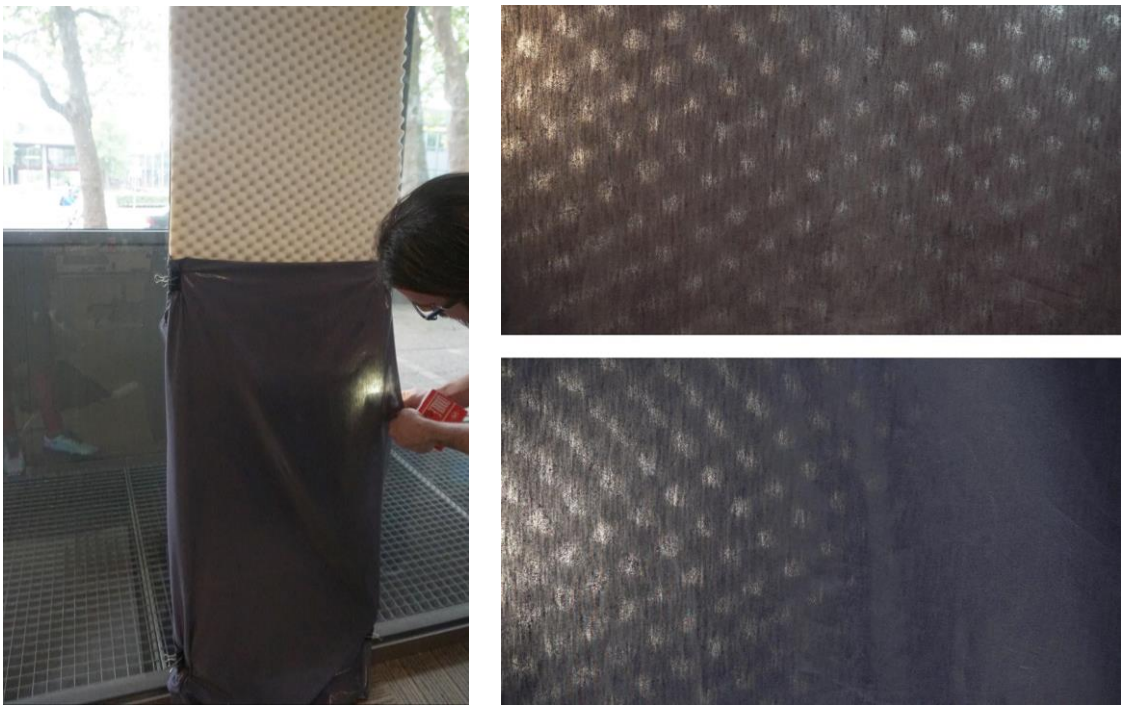
Interactions with a flashlight. Video stills

CONTEXT MATTERS

Finally we chose a free-standing mirror as a concrete object and metaphor to contextualize the environmental data within everyday rituals at home.

We started to speculate about dust, light, material and air quality relations. The greyish fabric was combined with another soft surface to create a weird aesthetics and narrative around a mirror like object. We particularly liked how the combination of these materials distributed light, and experimented with how we could leverage this to form an information display. In experimenting with different ways of projecting light across this surface, we found that we could produce an effect that looked like breathing. The connection between the lungs and the quality of air occurred to us and we

decided to integrate it into our design. Not only did this give us an effective metaphor, but it enhanced the personal reflection aspect of the mirror metaphor that we were already committed to, and it gave our artifact an anthropomorphic quality.



Exploring light effects on a mirror size research artifact.
Iterations with light variables (rhythm, intensity, colour temperature). Video stills

This way of doing research through making is rather close to the discipline of practice based design research where the act of making is inherent to the research process.

This is also highly relevant to human-computer interaction, although arguably less emphasis is placed on material qualities at the beginning of the process, as opposed to understandings of people and requirements, for example.

We worked to a tight schedule and framework for the artefact production. We found that putting the making and namely the material role at the forefront of cross-disciplinary, collaborative group work and discussions makes the research process more situated and tangible.

By turning the common mirror into an ambiguous everyday object we aim to depict a future where the domestic environment is a space for reflection and new aesthetics. This can be seen through our making journey in that it mostly focused on the more “edgy” expressions of materials.

Our experience demonstrated the importance of choosing a concrete everyday object or/and situation for artifact design. This is a critical stage of the making process that involves reconciling the materials and their qualities that inspire, with our chosen design domain. Exploring concrete objects and situations can help progress the ideation process, and by committing to one, more time and experiments can be dedicated to material explorations and staging future everyday situations through creative video and photography use.