SUB SEQUENCE



BUILDING A PARTICIPATORY INFRASTRUCTURE

Aaron Wright

SUB SEQUENCE

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SUB SEQUENCE

A thesis presented in partial fulfillment of the requirements for the degree Master of Industrial Design in the Department of Industrial Design of the Rhode Island School of Design, Providence, Rhode Island.

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This book is dedicated to my wife, Katelyn,
who has taught me the true value of support and a reality check.

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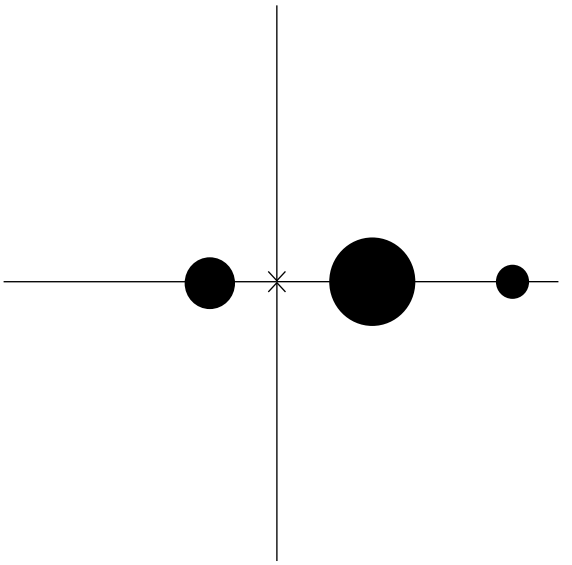
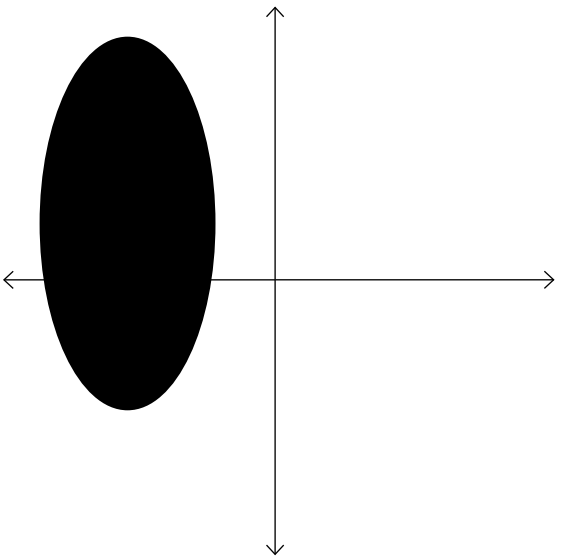


Scalar



AN ABSTRACT

The thesis sets out to investigate, question, and iterate upon the possibilities of collective environmental action and accessible information through an individual's sensing practice.
What are non-centralized, human-specific methods of sensing our immediate environment?
The work aims to redefine the sensing practice in daily routine and map the contamination zones of their community.

Simultaneously, the thesis is testing how making illegible ecosystems legible to the observer may result in a shift in one's perception about one's environment, generate participatory infrastructures, and, ultimately, cultivate a deeper connection to one's community.

a Whom to Engage?

The goal is to redefine the sensing practice in a daily routine and map the contamination zones of one's community.
Contamination zones? It's a lot, I know. So, simultaneously, the thesis testing how making illegible ecosystems legible, or visually communicating air quality with some context, may result in a shift in one's perception about their environment and, ultimately, cultivate a deeper connection to their community. The thesis is targeting those who are intrigued in the realm of citizen science, but may not know where to begin, how to engage, or what are meaningful ways to contribute information. I am defining the user in focus as **the dabbler.**

b Where to Engage?

There is a lack of infrastructure that has been constructed in response to the contaminates produce from the Port of Providence.
Air quality surrounding the Port is impacted by air pollution from these previously defined: legacy industrial sites - diesel trucks, marine vessels, oil and gas storage, and distribution, asphalt and cement processing, metals recycling, natural gas and utility services, and large heating plants.

c What's to Reasoning?

The primary motivations for conducting air-quality monitoring at the citizen science-level, are concerns for air pollution health risks, communities residing near polluting sources, living in 'unmonitored' areas, and a general understanding of air quality regarding decision making.

d Why to Engage?

Air pollution is one of the main causes of excess mortality and loss of life expectancy. Every year, it causes between 4.2 and 8.8 million premature deaths throughout the world, most of which are related to cardiovascular and respiratory diseases. Monitoring air pollution represents a long-standing issue for many communities that have been difficult to address due to the cost of equipment and lack of related expertise.

e How to Engage?

Providing a variety of actionable information related to an individual's sensing practice, will reduce disengagement due to feelings of powerlessness.
I want people to have the means to contribute information about their immediate environment. I want it to feel meaningful. And for them to be able to contribute rather effortlessly.
So in response, I'm feeling the urge to enhance feedback loops. Maximize the output to a minimal input in the interactions people are having.

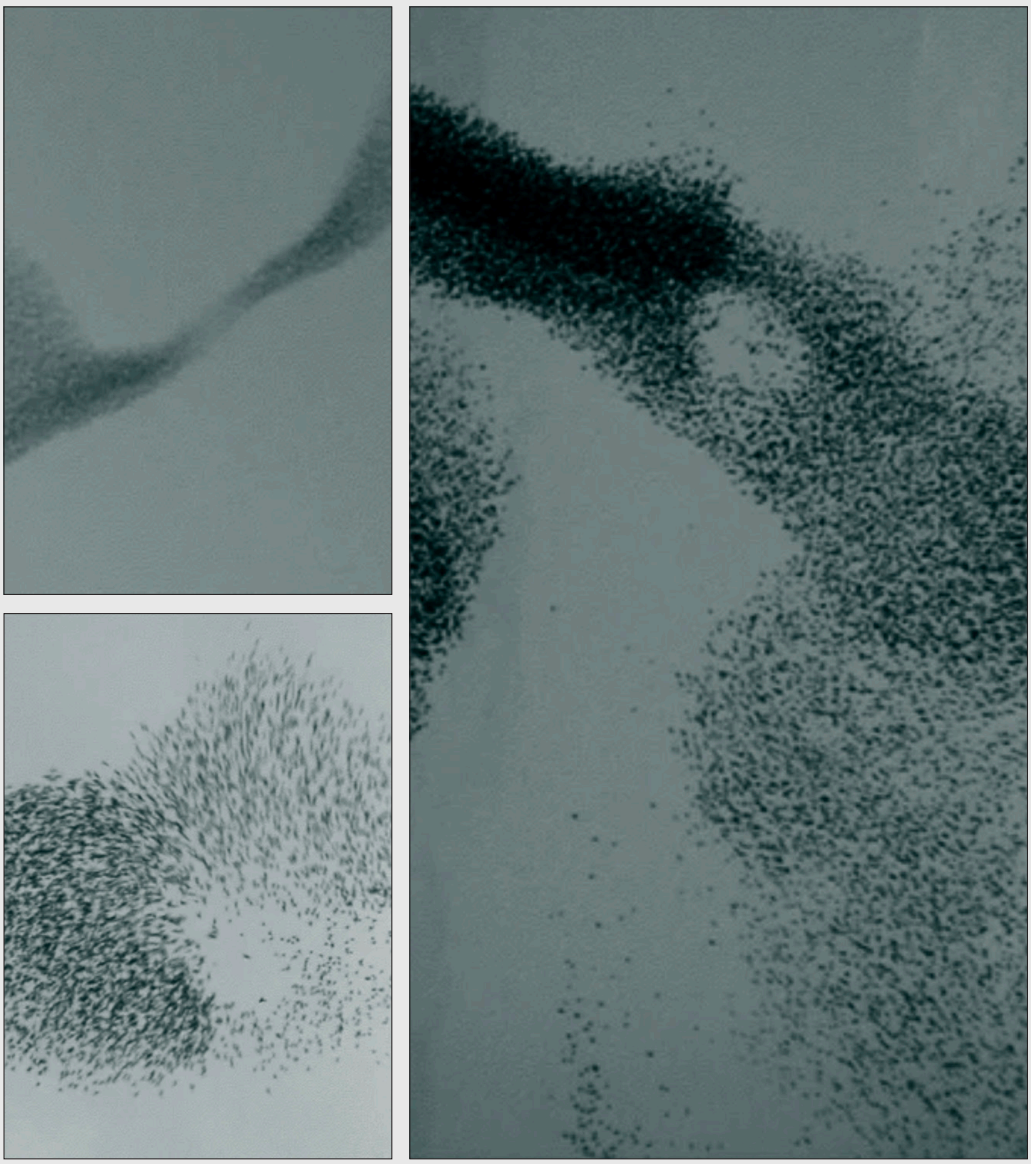
Partial, Incomplete List of Citizen Science Platforms

Aclima, Airbeam, Airbox, Aircasting, Air Quality Egg, AirSensa, Air Sensor Toolbox, AirVeda, AirVisual, Alphasense Sensors, Area Immediate Reading (AIR), Array of Things, Atmotube, Awair, Breathe Cam, Brizi, Cair Smart Air Quality Sensor, Citizen Sense Kit, CityAir App, Clarity, Clean Space Tag, Common Sense, DR1000 Flying Laboratory, Dustbox, DustDuino, Dylos, EarthSense Zephyr, Florat_Beijin, Flow, Plume Labs, Foobot, Grove Air Quality Sensor, hackAir, IGERESS, InfluencAir, iSPEX, LaserEgg 2, LifeBasis, LondonAir App, Luftdaten, MicroPEM, Netatmo, NOKLEAD, PANDA, Plantower, Plume Air Report, PuffTrones, PurpleAir, PUWP (Portable University of Washington Particle monitor), Safecast, SensorBox, Sensors in the Sky, Shinyei Particle Sensor, Sidepak Personal Aerosol Monitor, Smart Citizen Kit, Smoke Sense App, Soofa Benches, Speck, Tree Wi-fi, Tzoa (Enviro-tracker), WeatherCube, Wynd

Imagine, it's Monday morning, you are walking briskly. It's quiet.
You have a few minutes to get your thoughts together before the 'everyday' siphons your attention.
You cross through the public forum, noticing the dew on the grass, dogs barking, people together in one place, existing without any other perceptible reason than to exist with one another. You're a part of it, even if it's just for your commute.
You walk to prepare for the week ahead.
Suddenly, your least favorite part of the experience - an overpass.
It's dark, a bit cold, feels like dankness, you continue to walk. Hurrying to get back to the sun.
Before you breach the shadow, this dye-cast aluminum pedestal catches your eye, precariously wedged between two abandoned storefronts.
On it, displays a map, an unfamiliar one. It has new colors, pathways, redefining the city boundaries.
You stand there bemused - between two 'for-lease' signs, trying to decipher the information in front of you. You see visual cues, species of animals, vegetation, traffic patterns of cars, all displayed as symbols.
The map prompts you to look up, to the background.
An alley comes into focus.
What's the point of the narrow, empty space beyond the pedestal? Besides the air-conditioning unit and trash, does this space get used? Have purpose?
Is this a public space? There must be hundreds of these spaces in this city alone.
Along with the AC unit, and under the trash you see a bed of mushrooms, spores, or as the sign says, filters spread across the city.
You remember seeing these filters latched onto trees in the park - in the median between the sidewalk and the street.
These filters are in the bed of soil before you?
They're small, but you're being told they're powerful.
Capturing methane, carbon dioxide. They visually show the health of the city.
Something that looks like a parasite on a tree?
Yellow, brown, pancake-like. Also regenerative?
Behind you, you hear a clamor of people - a group examining species listed on the map, what it is?
You think to yourself, this is a peculiar place to see such a thing. The species of plant seems unfamiliar, something out of the ordinary.
A friendly face is calling you over. Offering you an instrument to help document with the group.
You walk over to join their existence.



01 A simulation of the flocking pattern of birds, animation done in Grasshopper + Rhino.

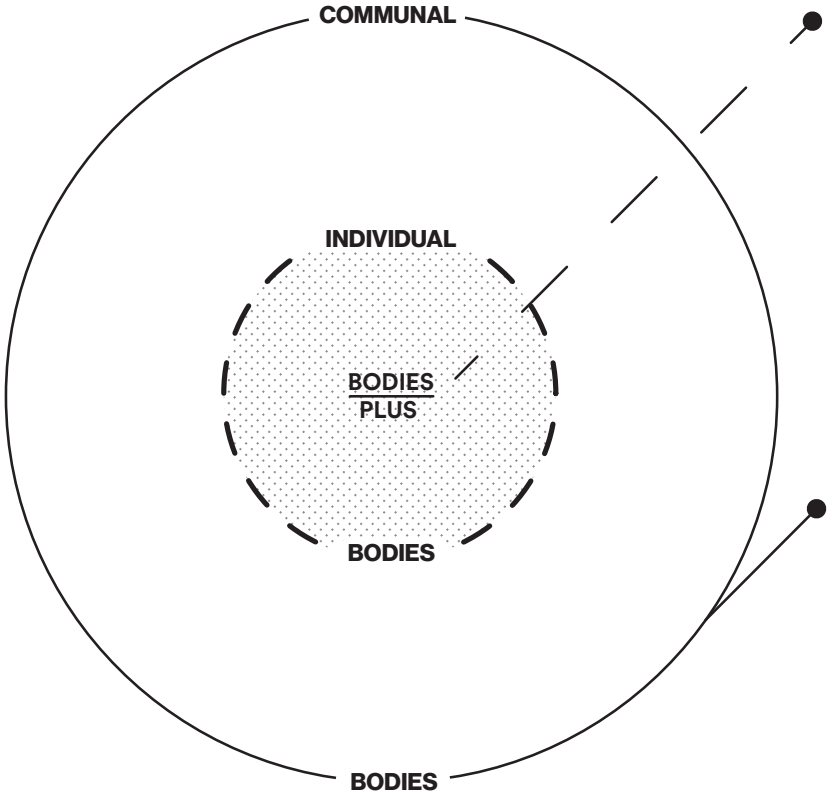


Who's Engaged?

a 1

Alliances
The Realm of Citizen Science

WHAT MAKES US CITIZENS OF OUR ENVIRONMENT?



WHAT SCALE DOES CITIZENSHIP IMPACT OUR BODY/BODIES?

Through the design practice of walking, noticing, and a variety of insights from sporadic research, I've glommed onto the idea of pattern-finding. Pattern-finding and pattern making are a fundamental part of people's sensing practice and how they participate in the world around them. I'm wanting to understand the patterns of the individual and design ways to strategically intersect the individual with those of these new worlds, and show that these worlds, or species, are, too, attempting to find their way in the Anthropocene.

Acadia State Park possesses qualities of a synthetic environment, not dissimilar to a variety of areas in Rhode Island, including the Port of Providence. The Port is typically teeming with groups of people on runs, bikes, having picnics, but the place is oddly surrounded by legacy industrial sites, a dichotomy that seems to persist because it maintains energy and economic significance.

Air quality surrounding the Port is impacted by air pollution from these previously defined: legacy industrial sites - diesel trucks, marine vessels, oil and gas storage, and distribution, asphalt and cement processing, metals recycling, natural gas and utility services, and large heating plants.

The primary motivations for conducting air-quality monitoring at the citizen science-level, are concerns for air pollution health risks, communities residing near polluting sources, living in 'unmonitored' areas, and a general understanding of air quality regarding decision making. Air pollution is one of the main causes of excess mortality and loss of life expectancy. Every year, it causes between 4.2 and 8.8 million premature deaths throughout the world, most of which are related to cardiovascular and respiratory diseases. Monitoring air pollution represents a long-standing issue for many communities that have been difficult to address due to the cost of equipment and lack of related expertise.

Again, I want people to have the means to contribute information about their immediate environment. I want it to feel meaningful. And for them to be able to contribute rather effortlessly.

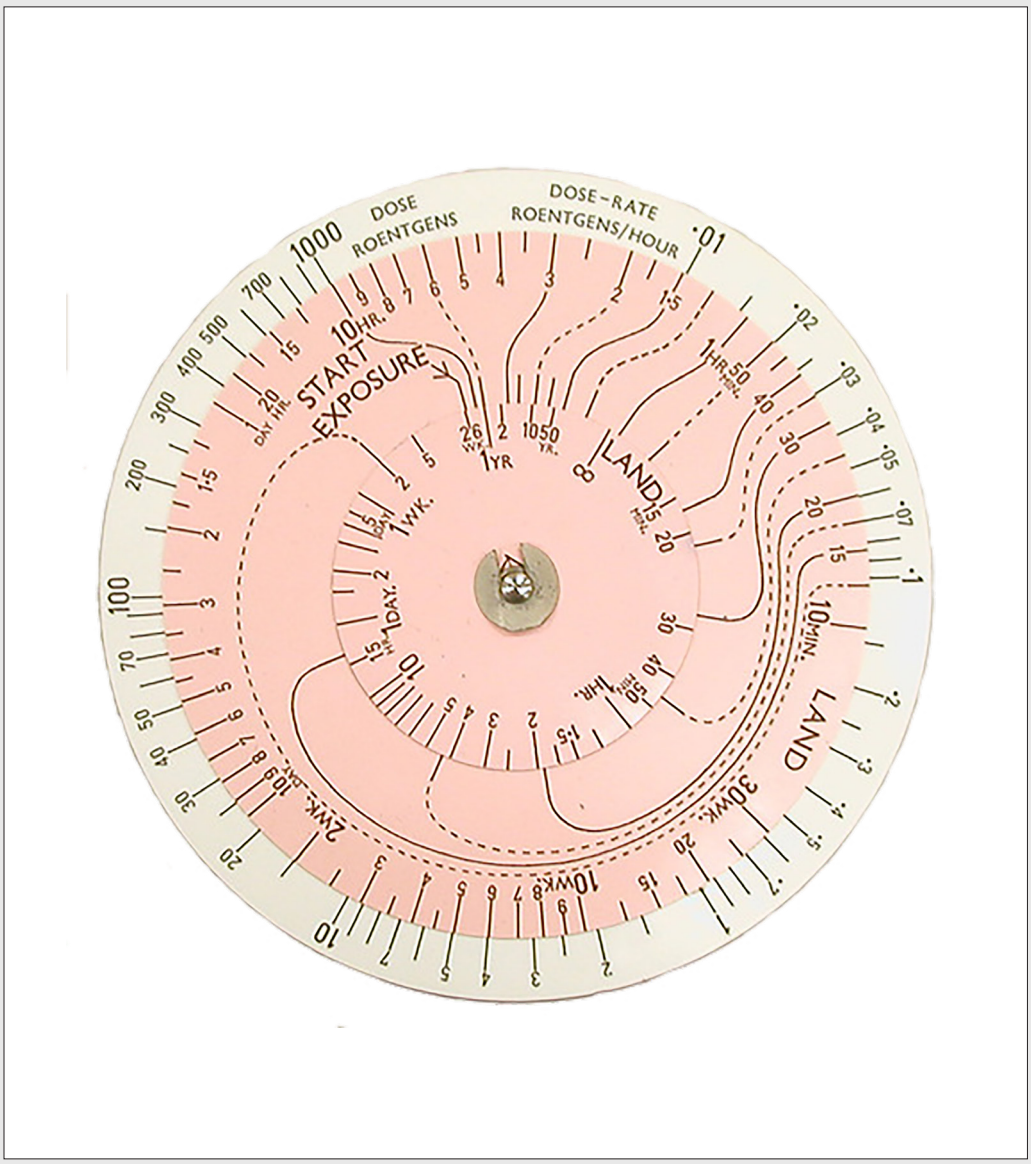
In my current state of being, lost in this maze of trails, thinking about causes and effects, wondering where In my current state of being, lost in this maze of trails, thinking about causes and effects, wondering where the dogs have run off to, I'm feeling an impending workload nudging me back. I look down at my watch, and memories rush in. Why is this thing still in mountain time? It gives me a glimpse into a past life, a life of an architect - lots of long nights in a studio, diagrams, wall sections, client workshops, deadlines. Deadlines. It was a life that reminds me of excess, a time when I was in excess. I was designing stuff; stuff for stuff's sake. Is that a mode of operation that co-creates synthetics environments like these?

The mechanism inside the watch seems to be perpetually slowing, a little further behind some correct time, day-by-day. More than the last meaningful artifact of my architect's uniform, the watch is a vestige of a childhood memory given to me by my dad on one of our regular weekend trips to the San Juan National Forest. A gift that was, honestly, a means to coordinate the 5 am wake-up call, triggering the two of us to pile into the car and head out, past the Front Range, taking that two-lane highway with too many elk, Pink Moon playing low. The watch is meant to be a reminder to never stop creating.

If it only told time.

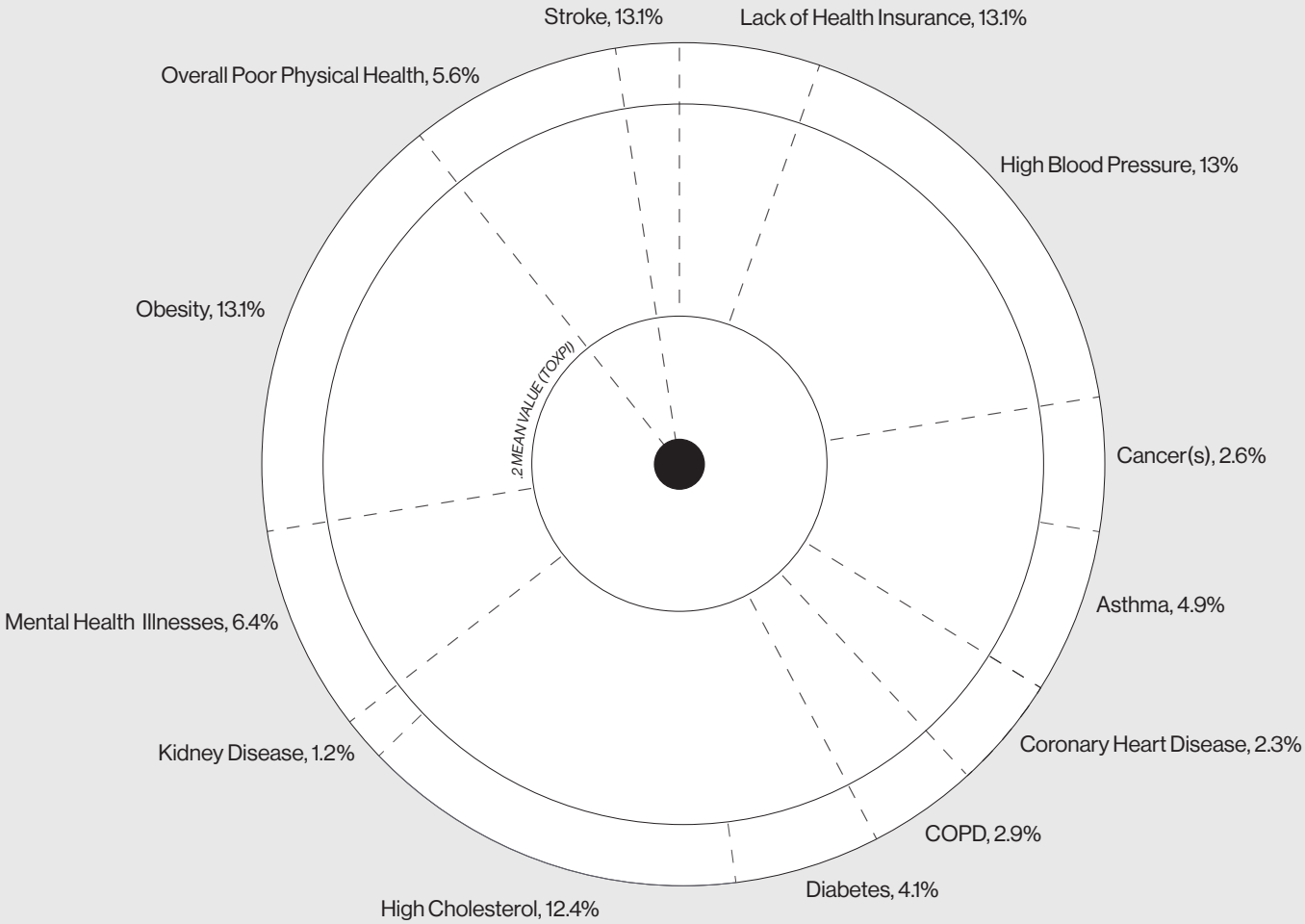
01 Information can be given, or implied in multiple ways. Signage and word choice


HELL IS
REAL


DOSE
ROENTGENS
DOSE-RATE
ROENTGENS/HOUR
START
EXPOSURE
LAND
LAND



01 A model defining the zones across Providence that have a defined toxilogical priority index (ToxPI). The number is a dimensionless index score that enables multiple sources of evidence on exposure and safety to be integrated and transformed into visual rankings that are transparent and facilitate decision making at the urban-scale, and planning level.



02 The ToxPI score also integrates health effects from local communities. These are numbers that are given to the local governing body from health-care providers, census information, insurance agency to paint a more detailed picture on the ramifications of highly polluted environments, and to prioritize what communities need to be addressed and with what level of immediacy.

Where to Engage?

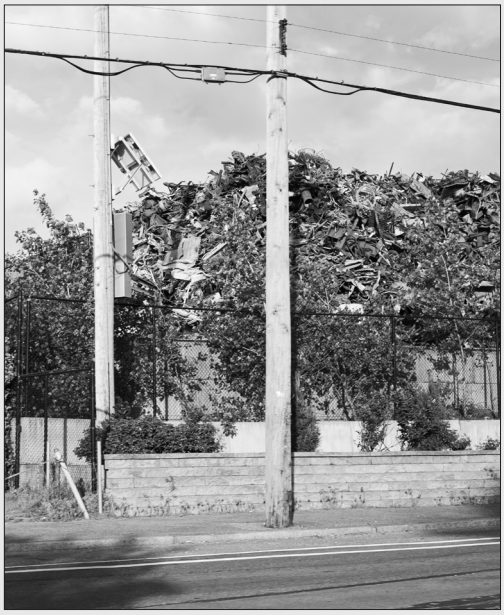
b 1

Territory

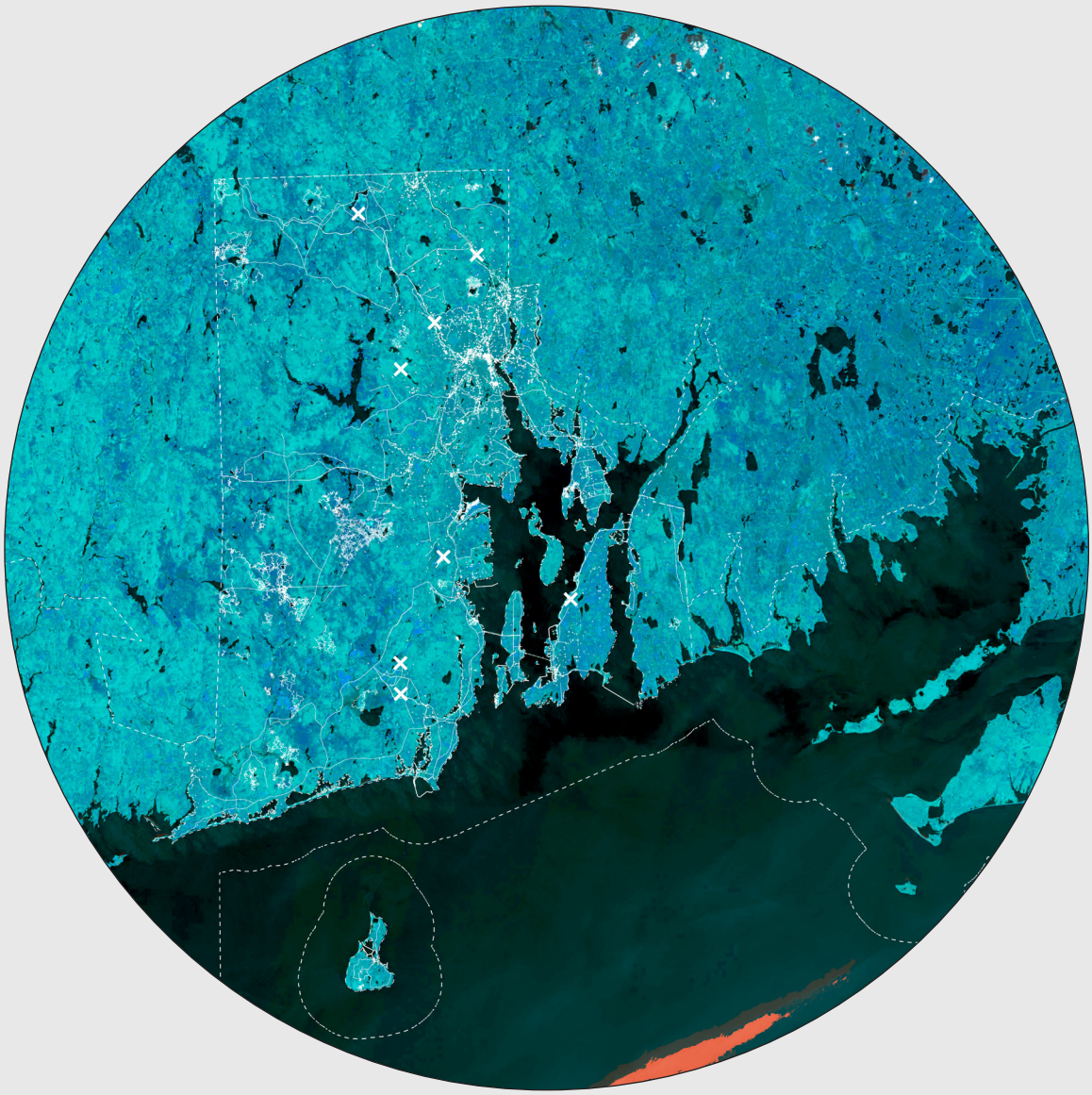
Port of Providence











Misfit Conditions
The Spaces In-between

Human existence happens in proximity, at multiple scales - in multiple relationships; existence is as intimate as our relationship with our individual bodies, the connection we have with one another, or the voice we have as a collective community.
Bracketing these relationships are external forces. Some are more turbulent than others - impacting our existences, affecting the multiple bodies.
Forces merge, permeate, create overlaps, dictate desire, create shadows, spaces in-between - the misfit conditions.
How might we create fully integrated methods of knowing :: resulting in illumination of these misfit conditions - shifting perception to cultivate a deeper connection to those affected by external forces?
Shifts that happen in the overlaps, our spaces in-between, the misfit conditions.

Placing the turbulence on a map.
The Port of Providence lies at the periphery of downtown Providence, and at the intersection of a longstanding industry corridor, major transportation arteries, and oddly enough, public-access trails, teeming with people, unknowingly being affected by particulate matter in the air, off-gassing from the legacy industrial site - the turbulence of these external forces.
There are tools for understanding, methods for knowing, tools that seem to be just out of reach - given to our multiple bodies in a centralized manner.
What are non-centralized, human-specific methods of sensing the contaminates in our immediate environment?
We must break our given misfit condition to tame it.

←

01 LIDAR image of Rhode Island, showing major arterial highways, population density, and primary industrial hubs.


WELCOME TO
PROVPORT
Managed By:
Waterson Terminal Services
SEA 3 PROVIDENCE
McINNIS
Schnitzer
UnivarSolutions
LEHIGH CEMENT COMPANY, LLC
Orsted | EVERSOURCE
WASHINGTON MILLS
NEW ENGLAND PETROLEUM TERMINAL
HUDSON TERMINAL
LafargeHolcim










PROVIDEN
ANIMAL SHEL
Thinking of adoptin
Think of us!



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SEAPLANE DINER
BREAKFAST LUNCH
OPEN 7 DAYS
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Residual Waste


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Metals
CA$H 4 SCRAP
EFECTIVO POR CHATARRA
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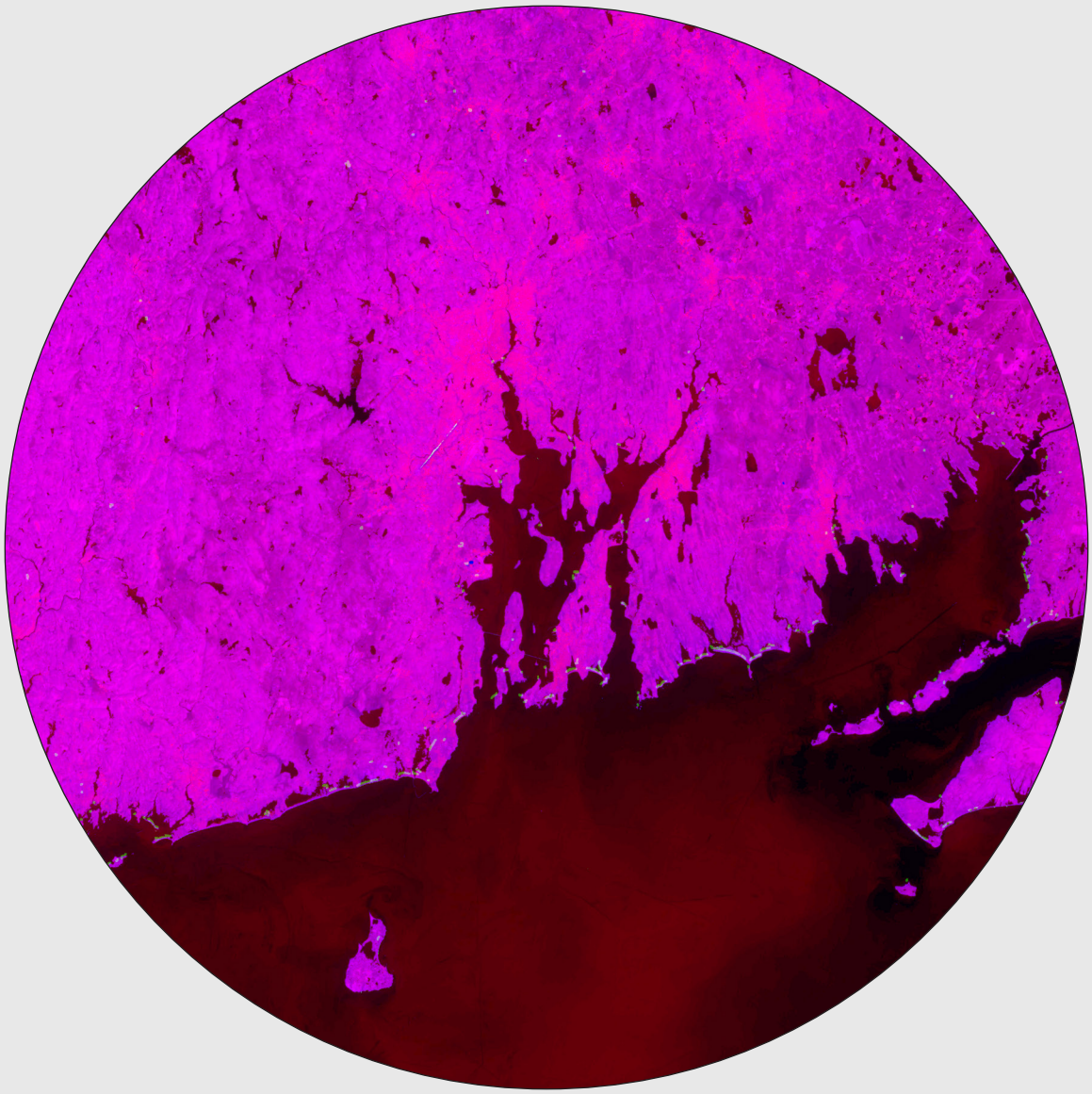
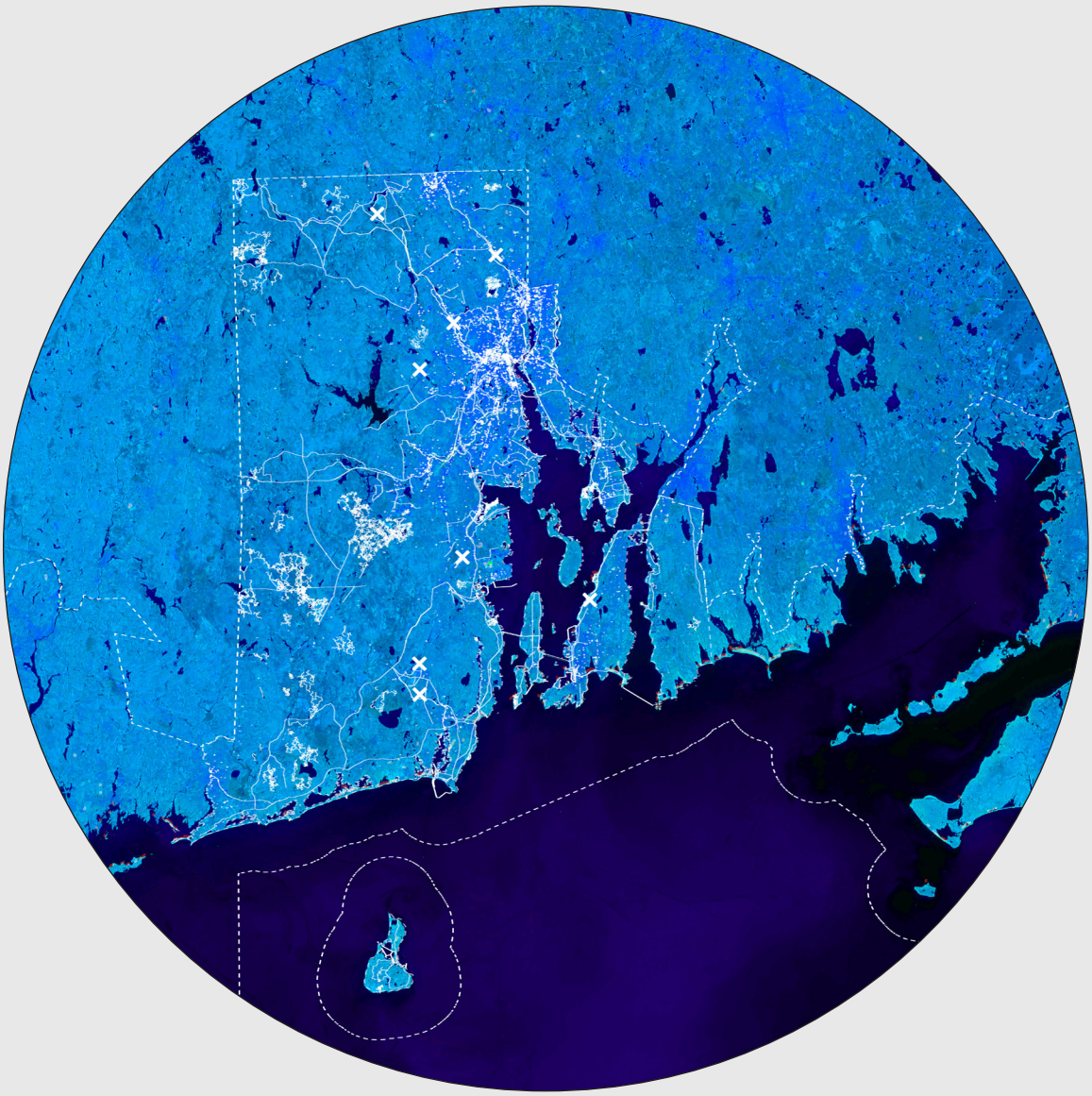
"HIGHEST PRICES PAID"





02 LIDAR image of Rhode Island in 1983, showing state of development.

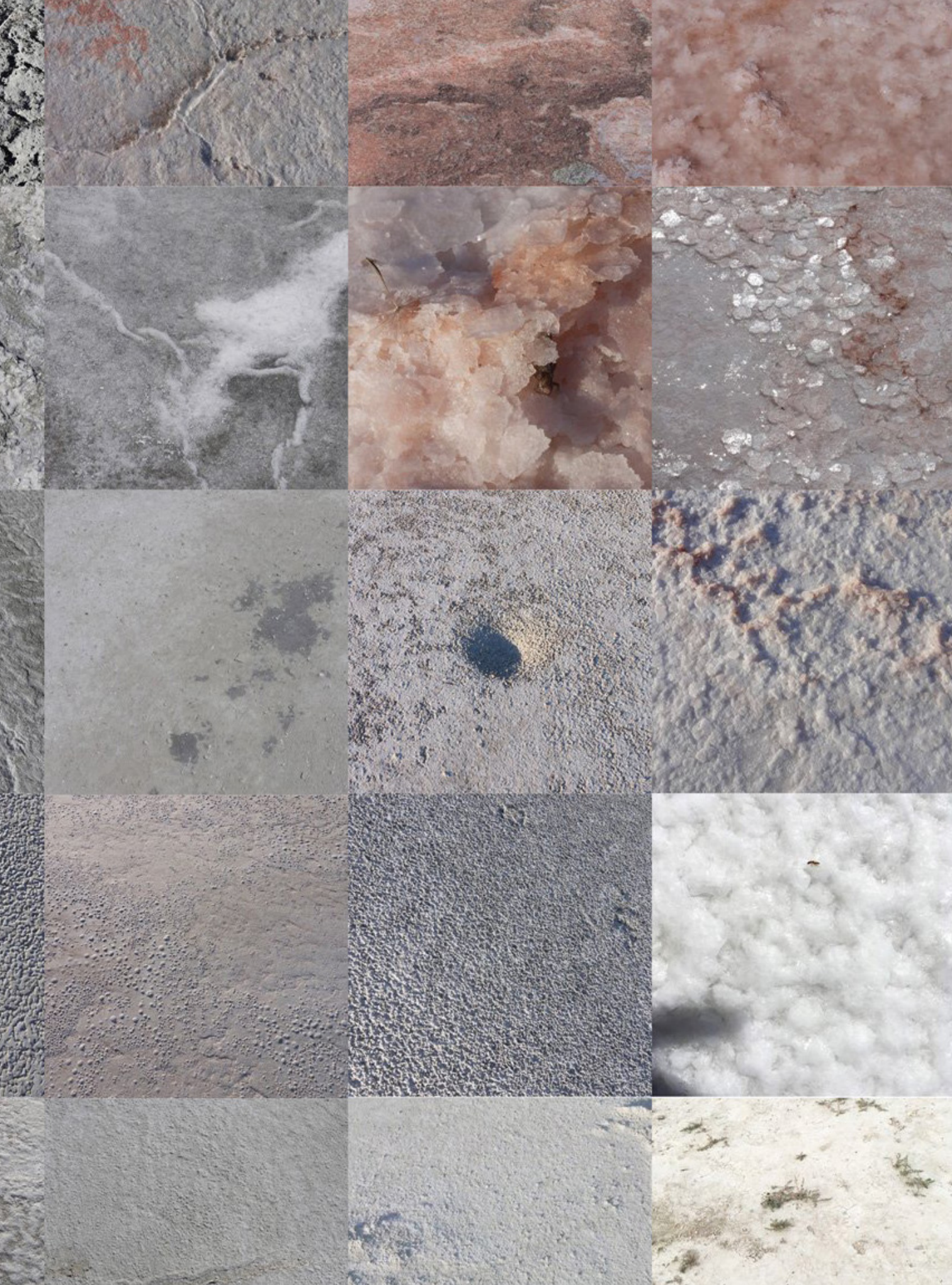


03 LIDAR image of Rhode Island in 1921, showing changed state of development.

A Vacant Lot:
The window is open. Open to a vacant lot. Everything is petrochemically colored - varying blues and greys.
The wind is blowing inside from the city, generating smells. Smells of oil, of exhaust.
There is a human walking beneath the tree in the vacant lot; this gives a scale, a context. There are multiple perspectives for the character of that tree. One of persistence, one of perseverance, one of providing, the other of adapting.
The window is open. Open to persistence, dullness, the stark contrast of the built environment paired with plants, weeds, things that 'don't belong' in man-defined nature.
Things looking to be eradicated. The window is open. Open to a vacant lot. There is a human, converging with the edge of the shade of the lone tree that is surrounded by asphalt. They sit, they utilize the shade. Take advantage of that lone tree that is surrounded by asphalt.
These moments don't exist without human interaction - abiotic factors aren't producing abiotic experiences. They're both alive. Communing.
They leave, the tree is once again, alone. The window is open.

Open to a vacant lot.













Within my thesis research, I've been investigating, questioning, and iterating upon the possibilities of collective environmental action and accessible information through an individual's sensing practice. My goal is to redefine the sensing practice in a daily routine and map the contamination zones of one's community. Contamination zones? It's a lot, I know. So, simultaneously, I'm testing how making illegible ecosystems legible, or visually communicating air quality with some context, may result in a shift in one's perception about their environment and, ultimately, cultivate a deeper connection to their community.

So, instead of just telling each other that the sky is falling, I'm curious about generating participatory infrastructures and discovering how the act of participation can be meaningful.

And yeah, getting people to participate is hard.

I have been hesitant on where to engage, how to engage, whom to engage, and what I should engage with. Finding the right 'altitude'.

A working hypothesis of mine: Providing a variety of actionable information related to an individual's sensing practice, will reduce disengagement due to feelings of powerlessness. I want people to have the means to contribute information about their immediate environment. I want it to feel meaningful. And for them to be able to contribute rather effortlessly. So in response, I'm feeling the urge to enhance feedback loops. Maximize the output to a minimal input in the interactions people are having.

I don't know, It seems like I have a one-track mind, I keep on asking myself this question.

Scrutinizing the threads of my research.

And so, I'm continually anxious. Anxious about how I will fit it all in, tie a nice bow on this messy process of discovery. Make the next move. Out of necessity, I have allotted time and space for me to develop the next hair-brained research probe I'm turning over in my head.

I go on a ritualistic walk, with my dogs; i.e.: the sounding boards.

It's no secret I love my dogs. I have two. They keep me honest. In different ways - they tell me to stop working, talk me into taking them on runs, get me through emotional times, meanwhile, subversively, allowing me to exercise myself, humanize myself, mull over that newest idea. They're both planners, and they've got a spot, a favorite trail in Rhode Island - Acadia State Park.

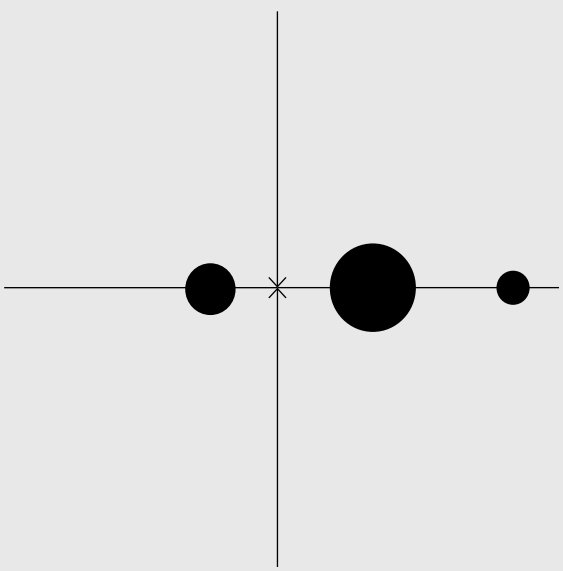
After a long day filled with anticipation, I tend to acquiesce to their demand to go on an evening hike. And upon arrival, with excitement, they take off with their own agenda. It's typical. I'm by myself, walking - crunching leaves under my feet. I like this place, not particularly for its beauty. There are a lot of beautiful places. That attribute attracts a lot of people. This place is diverse. It sits next to a highway: noisy, fast, obnoxious, but I don't mind. I'm on a hike - next to this highway. In a system of trails that are spaghetti-like, designed for you to get lost in. It reminds me of Dolly Parton's east Tennessee. Chaotic. A place where I did a lot of growing but can't seem to call my own. Similar to this state park, it distinctly shows humans shoe-horning themselves into an unfit nature. There's no respect for boundaries, no clear definition of territory. It doesn't apologize or mask itself or try to be something it's not. I like this place for its variety, the variety of life - plant life - fungus, too. Mushrooms everywhere I turn, I feel like I'm an explorer, discovering new worlds: oblong shapes, vibrant colors, weird smells, natural patterns - a wisdom bestowed on those willing to notice.

You can hear eighteen-wheel trucks passing by, airplanes overhead, but also deer in the prairie. It's a strange happening, I feel guilty like I put them there. My dogs go chasing, jaunting in the tall grass.



Typical *Scalar* Environmental Monitoring

01 Defining Scalar Environmental Monitoring: There are five labs across the state of Rhode Island that monitor air, water, and soil quality. These labs are concentrated in areas of contamination concerns with historically hi-levels of pollutants, examining the output levels from the major polluting industries in these areas.





An Opportunity for *Vector* Environmental Monitoring

02 Defining the opportunity for Vector Environmental Monitoring: Giving willing participants the opportunity to contribute valuable information about air, water, and soil quality back to the RI DEM would generate a better

Scoping the Problem

"Pollution is nebulous. Hard to define, hard to pin down. Currently, benzene, black carbon, 1,3 butadiene, and ammonia are not being actively monitored by the Rhode Island Department of Environmental Management, and have no federal air quality standard. Meaning, no limit on emissions, or consequences for emitters."

Facts from Clarity.io, an environmental monitoring company employed by the Rhode Island Department of Environmental Management:

What's currently being monitored, how, where, and when?
There are five data collection sites across the state of Rhode Island. There are **not** any community organizations that are working with the DEM to monitor air, water, or soil quality.

Recording:
PM 2.5 and NO2; monitored 24/7 with readings every 15 minutes
Air Toxics/VOCs; 24-hr samples will be collected once every six days using Summa Cannisters and EPA Method TO-15A/TO-15
Meteorology; monitored 24/7 at Providence Community Health Center, Providence Animal Shelter, and Suez Pump Station using Rainwise MK4-C equipment.

Common pollutants in the Port of Providence:
PM2.5;
Traffic, burning of heating fuels, dust from activities like waste handling, asphalt paving production.
Changes in the cardiovascular system, adverse effects in the respiratory and nervous systems. People with breathing and heart problems, children and the elderly may be particularly sensitive.

Black Carbon;
Diesel-powered vehicles and equipment, industrial processes, burning of petroleum-based heating fuels and wood.
Health effects include negative effects on respiratory and cardiovascular health, a positive correlation with all-cause hospitalizations, and an increase in all-cause mortality from long-term exposure.

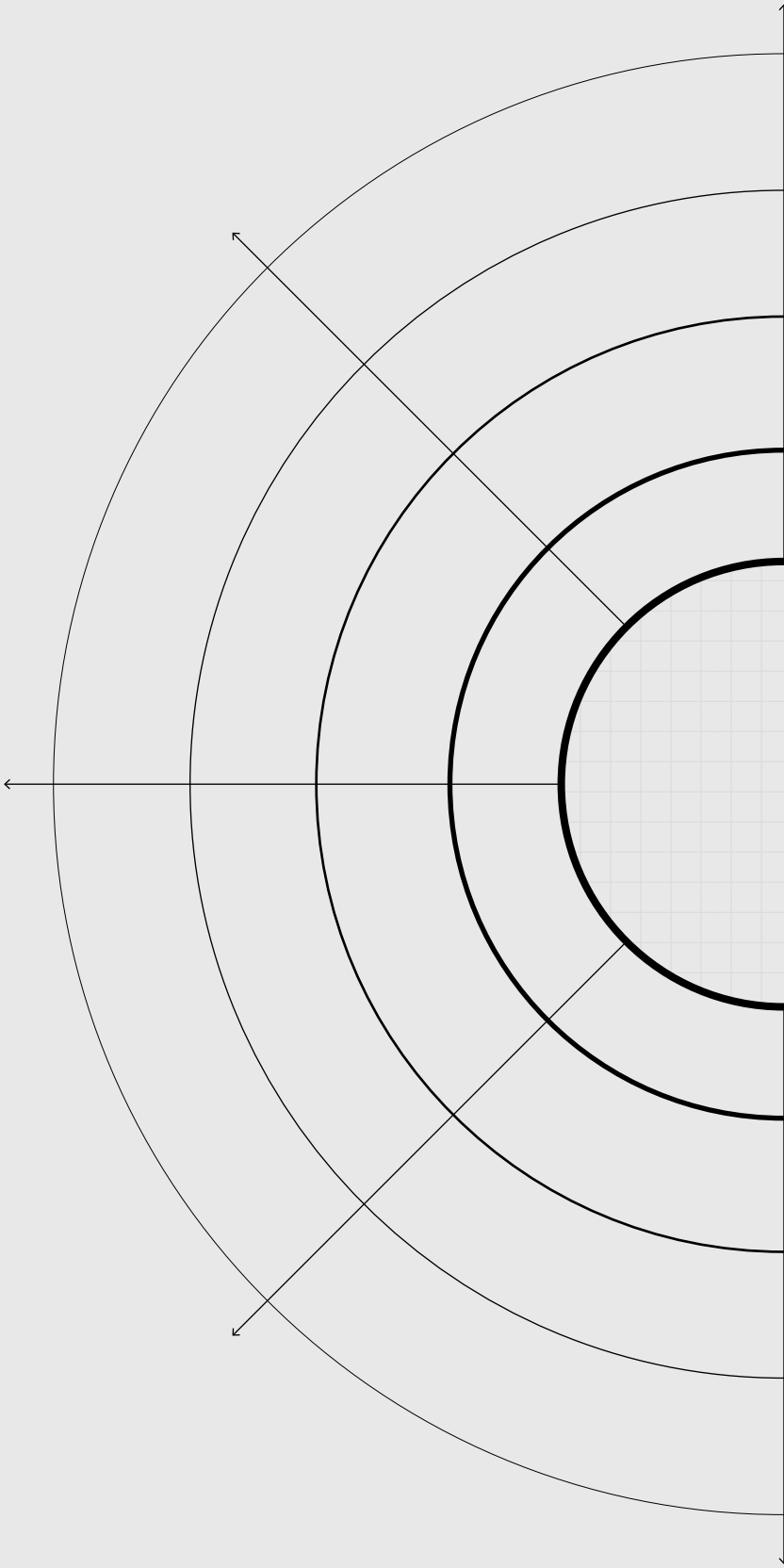
Nitrogen oxides (NOx)/ Nitrogen dioxide (NO2);
Produced when petroleum-based fuels are burned.
Motor vehicles are large sources of nitrogen oxides.
Irritation of the airways in the respiratory system, aggravation of respiratory diseases like asthma, causes asthma in children, longer exposure may contribute to the development of asthma and potentially increase susceptibility to respiratory infections.

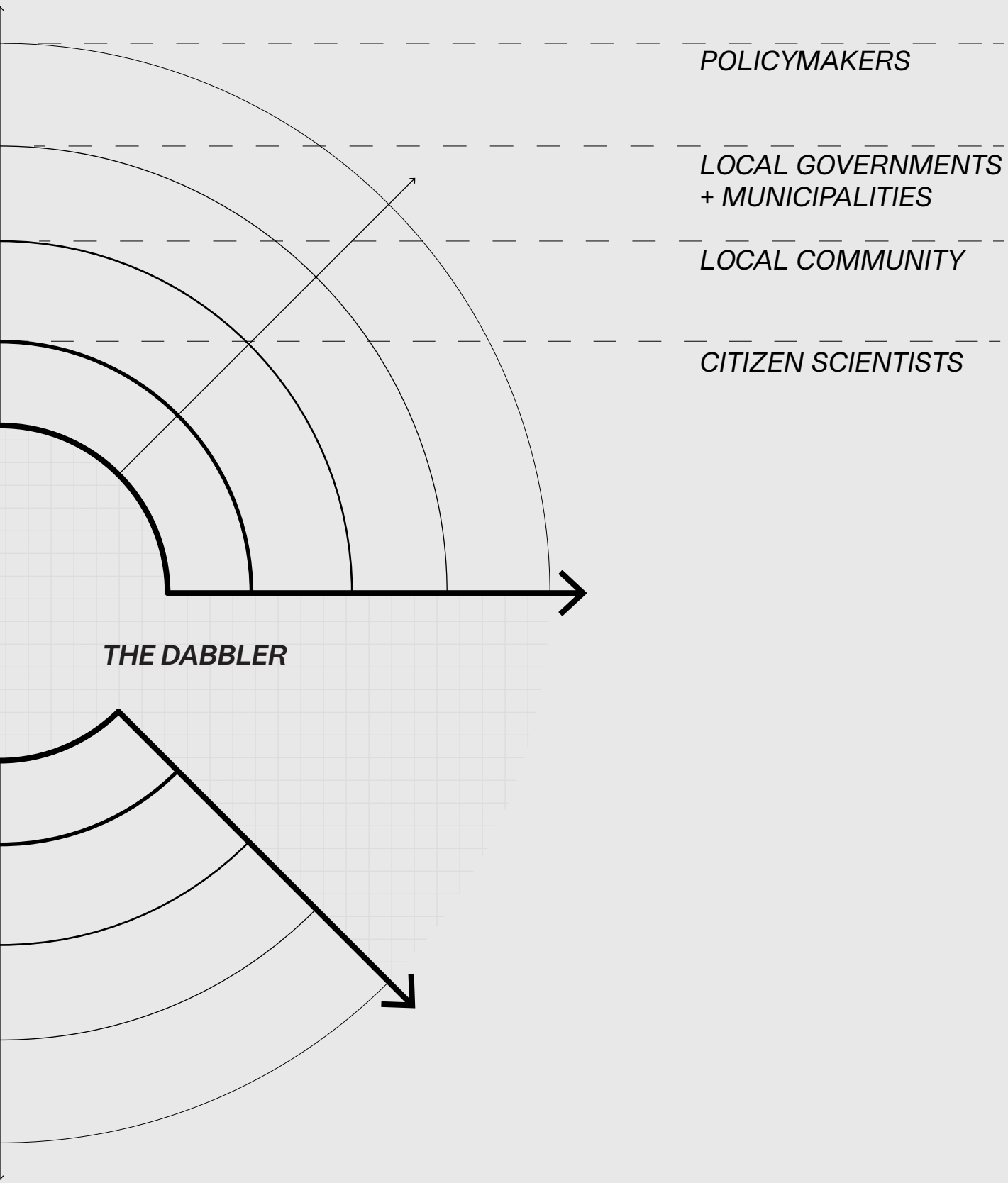
Benzene;
In gasoline and also produced during the combustion of gasoline.
Released from asphalt paving production, crude oil handling, and movement of gasoline from terminal storage vessels to trucks.
Short-term inhalation exposure to benzene may cause drowsiness, dizziness headaches as well as eye, skin, and respiratory irritation. Long-term inhalation exposures have caused blood disorders and increased the incidence of leukemia (cancer affecting the blood and bone marrow). USEPA has classified benzene as a known human carcinogen.

1,3 Butadiene & Ammonia;
Motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke:
Acute effects may include irritation of the eyes, nasal passages, throat, and lungs.



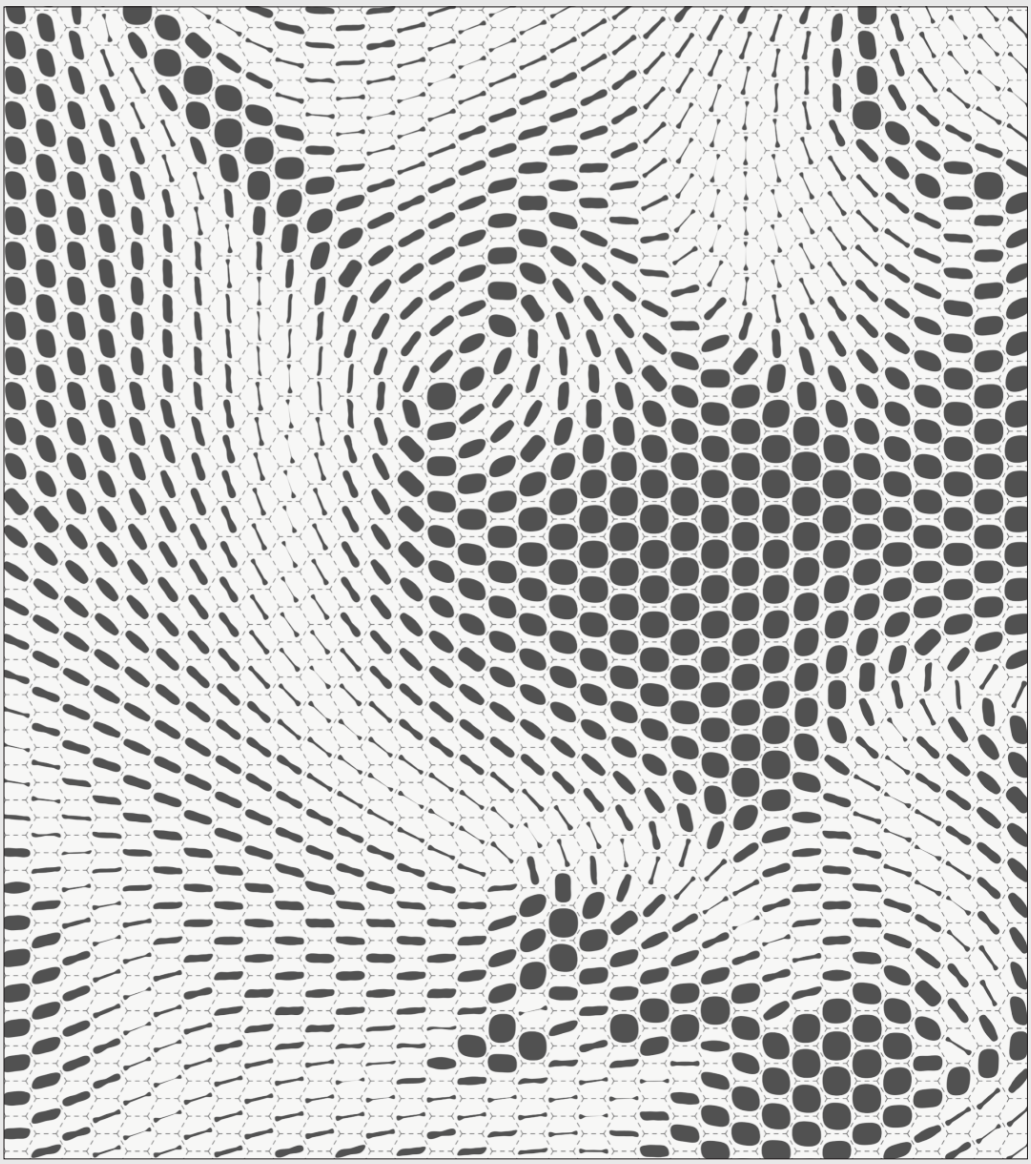
As a part of the research, I have been concentrating on decoupling and redefining terms, one being citizen. This is a loaded term that has an affiliation with place, governance, policy. A citizen science is traditionally defined as the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.
In the vertical of decision making as it pertains to data collection and decision making, I am purposefully not involving influences of groups such as policymakers, local governments + municipalities, or current citizen scientists. I am focusing on the archetype defined as the dabbler, or one of their current environment; interested in contributing to a collective body of environmental information, but confused on how. Inherently, starting at the general level of the dabbler, influencing this archetype will create a ripple effect through groups higher in the vertical.




POLICYMAKERS
LOCAL GOVERNMENTS
+ MUNICIPALITIES
LOCAL COMMUNITY
CITIZEN SCIENTISTS
THE DABBLER

What's the Reasoning? C 1

Scalar Shifts
On Information Sharing



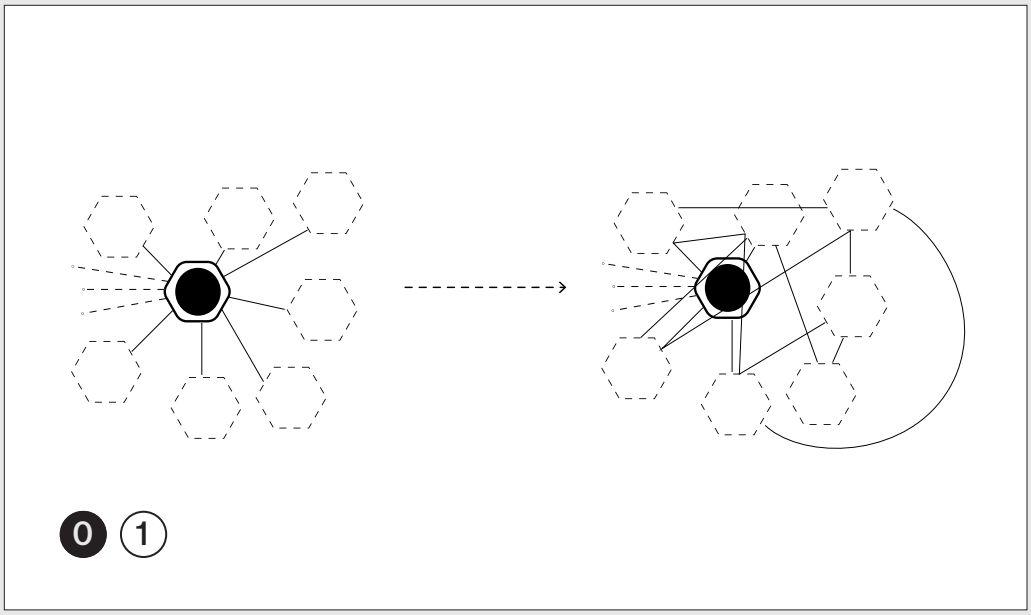
Improbable Happenings:
The incessant clicking of the screw-driver and the ski-binding is competing for my attention
as the shop manager reminisces about his
life, spent as a ski bum. I think to myself, it is
all too common to find this character, in this environment - a charismatic, boisterous man - eager to help, happy to voice their point of view - always at ski shops. I find this curious - why do these two attract each other?
I continue to think to myself - the thinking is comfortable.
But, I feel stuck - I'm here early - the lone customer in a product-sparse store, starring at the clock mounted on a wood-paneled wall. I'm cold - the oscillating fan is in the corner, pushing stale air, starring at me. I'm trying to recalculate the time needed for my errands for the rest of the day, adjusting for each minute this experience goes over its allotted time - everything echoes. My thoughts continue to stream:
I left my dogs outside. Are they ok? Did they run away? Why weren't they allowed to come into the store? Do I have enough time to work this evening? How much work is too much work?
Chromatic colors and the metallic clacking of skis snaps me back. Muffled psychedelic rock is playing in the back of the warehouse,
I recognize the 'boisterous man' is still talking to me, but now, instead of rehashing his past, it's about the changing of seasons, about this winter. I catch that he says - "this is going to be a deep snow year!" - stating the oak trees in his backyard are producing more acorns than in years past. It's is a common trope, I know, but I still ask - "how can you be so certain?". And he responds - " I don't have to be certain,
I just observe the tree. The tree has been there, knowing, preparing, collecting, dispersing - and it will continue to do so. I put my trust in that knowing." He looks down, continues to fix the skis. Calmly, I go check on the dogs.
Talk to Me About Knowing

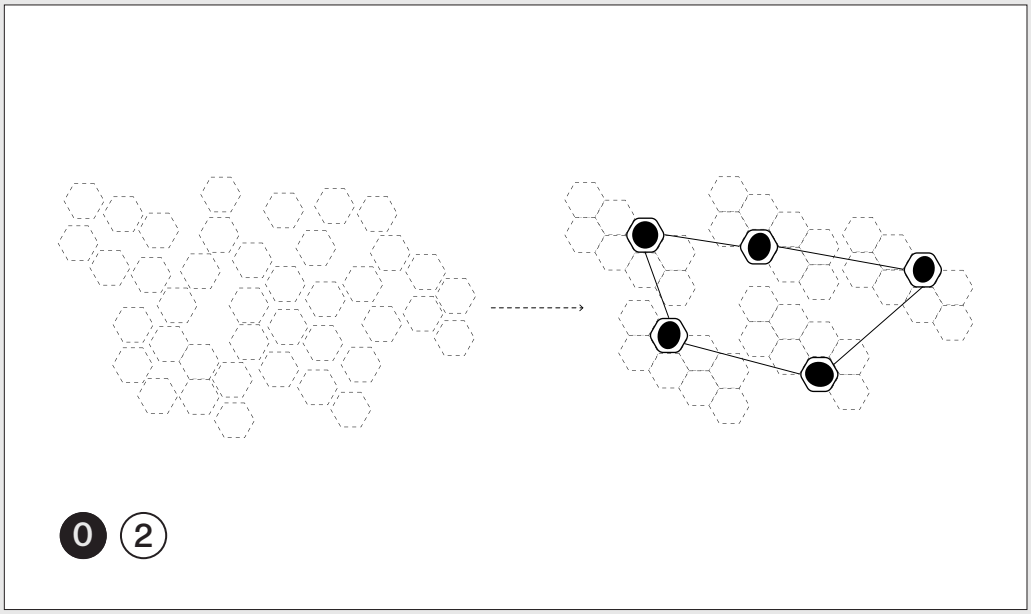
A SMALL WORLD PROPOSITION

Sam Milgrim

"There are two views when it comes to how people arrange themselves. One: Any two people in the world, no matter how remote from each other, can be linked in terms of intermediate acquaintances, and that the number of such intermediate links is relatively small. This view sees acquaintances in terms of an infinitely intersecting arrangement that permits movement from any social group to another through a series of connecting links. The second view holds that there are unbridgeable gaps between various groups and that therefore, given any two people in the world, the will never link up because people have circles of acquaintances which do not necessarily intersect. A message will circulate in a particular group of acquaintances, but may never e able to make the jump to another circle. This view sees the world in terms of concentric circles of acquaintances, each within its own orbit."

01 **01:** the view that there are infinite connection for information sharing. After the first person is informed, the network grows exponentially. I am viewing this as the model for a theory of change.
02: the view that there are concentric circles of like-minded people that information share within those circles, but only limited conversations with adjacent concentric circles.
How might we design experiences to intersect these concentric circles?



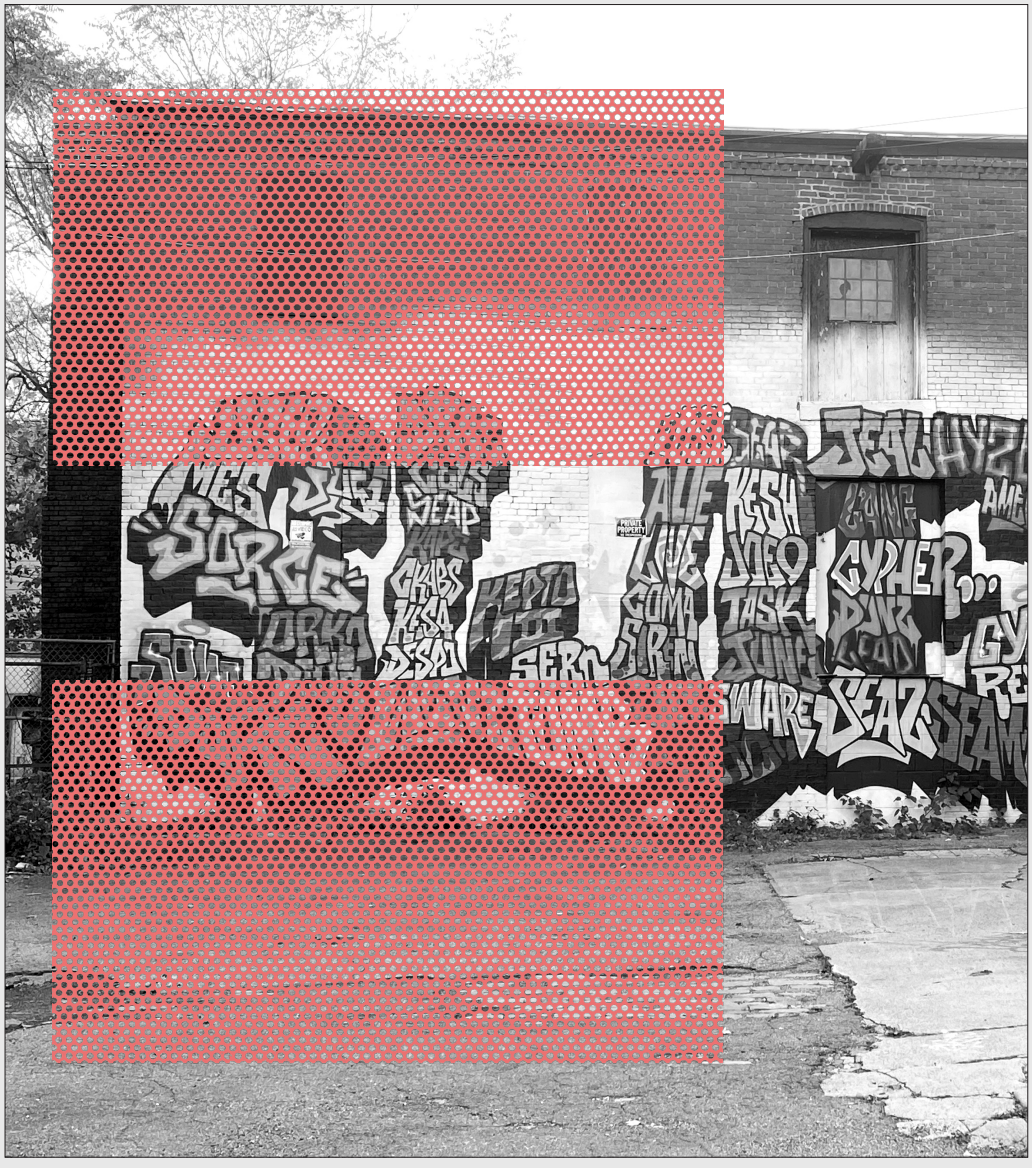


Why Engage?

d 1

Data Stories

Humans Aren't Computers



SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.

RETURN TO AARON'S DESK WHEN FINISHED

Use this space to record your observations about vegetation growing in the area. Where are plants currently growing?
How can you tell what the air quality is in this area?
What measures could you add to improve air pollution levels?
Who uses the space?
Is it active?

JOHNSON AND WALES QUAD, ACROSS THE STREET FROM CIT

NAME:



01 A free-write co-creation workshop that allowed participants to go out to predetermined environments and answer the questions prompted above. This crowd-sourcing exercise helped build a taxonomy of information, where sensors could be applied in public-spaces, what is activated, what is not. Human observation offers an additional dimension of information that is non-existent in non-human methods of information logging.

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
SOUNDS? ATMOSPHERE?

ON WEYBOSSET ST. IN FRONT OF THE CLOCK TOWER ON JOHNSON & WALES CAMPUS

NAME: [redacted]



i have been the clock tower so much. it looks so climbable. megan says i can climb it if i wanted to. maybe i will 😳

otherwise, the points + the top balls look fun to touch. i feel like if you licked them in the winter, your tongue would get stuck. i remember commenting on it once maybe five years ago when i went to visit a middle school friend @ JWU.

so i feel some nostalgia, but also complete ambivalence lol. i like seeing the dogs that run wild on the JWU green. sometimes i don't like the JWU students bc they can be a bouncy lol. i also find it interesting they have a specific bus to transport them to their waterside campus. just a fun quirky thing. i bet it's bc property rates in downtown are too high for the school... which like, valid!

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
SOUNDS? ATMOSPHERE?

PARKING LOT NEXT TO THE EDDY

NAME: [redacted]



There are construction sites nearby.
Mostly what you can hear is the vacuuming sound coming from the corner.
Distance sound of the fire trucks roaring downtown.
The parking lot is rather spacious. and no one really passed through here.
There's this rather hidden pathway behind the red building.
and I would rather stay away from walking in the space.
The place isn't too hard to find. it's just someplace that I know of but never got a chance to walk by (or unconsciously walking pass but don't remember.
People are curious of my behavior. standing in a corner writing.
It's pretty quiet and the whether is also decent to be in the space.
leaves piled up in the back of the parking lot. I guess they just careless about the tidiness compared to the rest of the parking lot.

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
Mostly Paved

THE GRAVEL PARKING LOT ACROSS FROM SERENDIPITY

NAME: [redacted]



I feel out of place here
these are designated spots for cars and I am human.
It is nice hearing the leaves and watch a shower pass of people go by.
I'm sitting on designated side table.
Something once new and wanted has escaped what is expected of it and now serves as a refuge / resting.
The sun is low on the horizon - at an angle which keeps my gaze down to avoid it.
(to the head lights + pavement)

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
SOUNDS? ATMOSPHERE?

FREEMAN PARK - THE COURTYARD ON WESTMINSTER ST. ACROSS FROM THE EPISCOPAL CHURCH WITH THE GREEN ROOF

NAME: [redacted]





wet, quiet, unfamiliar

when I arrived here, I'm not sure if I can enter. Why are these fences around park? Feeling of unwelcomed, wondering if it's a public or personal space.

A lady sitted near the entrance took a glance at me. Am I a invader for her?

Now I'm sitting near the center of the park, on one of the pink benches, leaves falling on me. It's real quiet, but kind of comforting. The sound of water is covered by ambient noise. I trying to focus on the sound of water and myself in from the surroundings. I'm in a different space now, isolated from anything else outside this yard.



I like the pink benches

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?

ON THE STAIRS OF THE EPISCOPAL CHURCH WITH THE GREEN ROOF

NAME: [redacted]



Christian propaganda ?
- the bells! → have to let everyone know that the church is there
↳ are very loud and over bearing
- felt slightly uncomfortable sitting on the steps since I'm not religious
- cars drive down Westminster + a few people walk on foot to the restaurant/shops further down the street
↳ I'm getting weird looks from people. probably just wondering what I'm doing
- the steps are cold and wet and not very inviting
↳ the door behind me is closed... is it open for people to come inside?
↳ looks kind of deserted, but well kept all at the same time

I didn't want to stay too long because it was cold and uninviting. Let almost got attacked by water coming out of the side of the building testing the sprinklers

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?

OUTDOOR SEATING @ SMALL POINT

NAME: [redacted]



Walking over here I enjoyed the way the sunlight was melting down the buildings - I walked out of the back door of CIT so I turned left to the West. Coming around the corner the sunlight was warm on my back but when I turned right to come up Westminster St. the shadows made the space cool. This entire section of the street is covered by cold shadows. I am sitting at a table outdoors and immediately to my right is the curb of the street, so cars pass by at speeds and distances that are too high and close for comfort. Whistling and truck clattering and loose bike wheels echo through the corridor of this thin street with tall buildings. There are more cars than people walking around.

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
SOUNDS? ATMOSPHERE?

OUTDOOR SEATING @ LITTLE CITY

NAME: [redacted]



the breeze, the air smells slightly sweet.
Sounds of cars, carts, belly. Car cars.
Things are fixed built on the earth. Concrete Stone & Brick
No Children
Pleasantly Quiet
I love sitting with little to do by myself. So that feels so pleasant
The atmosphere is pleasant but I feel uneasy.
Like I'm underperforming regardless of effort for what.
The slightly brisk yet ideal temp shaped the mood of the passerbys
Again quiet - beyond the ambient noise of an A.C unit.
Suddenly
- An elephant Noise
- yellow water out a sprinkler valve
- then black - the water increasing
- the clear as it slowly decreases
- A concerned worker of the coffee shop suggesting I move.
- I don't.
- it's over.
→ the wet pavement now another part of the city ignored by all.

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
SOUNDS? ATMOSPHERE?

ALLEYWAY ON CLEMENT ST.; PAST THE GRAVEL PARKING LOT, ON THE WAY TO LITTLE CITY

NAME: [redacted]



Leaving the studio, I hear the squeek of the elevator.
Why won't they fix it?
Outside feels hazy. It's loud even though there aren't many people around. Sounds of construction and lawn care. Church bells and machinery. But also sounds of wind blowing leaves and birds chirping.
I found a sunny spot on the curb to sit on. The alley is just a shortcut, passing through lots for cars. A wind funnel. I like the bare brick buildings and the sound of dirt and gravel under my feet.
I know there is construction nearby so I can't help to think about how the air and wind blowing around me is contaminated. I look up and notice a cage full on canisters of flammable materials. Why are flammable materials being stored in a parking lot where human surrounded by cars. Next to the flammable materials is a dumpster. Maybe this is a wasteland

SENSING YOUR SURROUNDINGS

FREE WRITE; 7-10 MINS.
RETURN TO AARON'S DESK WHEN FINISHED

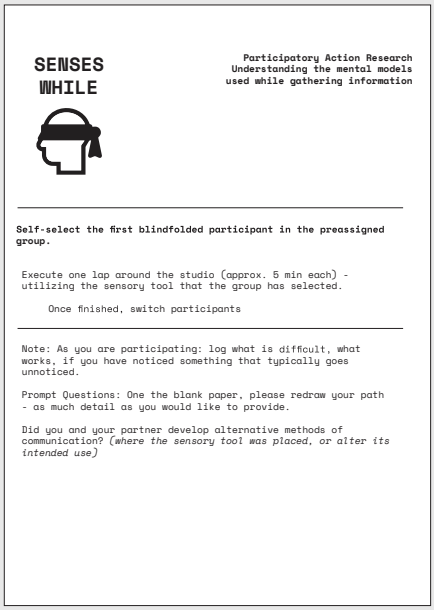
SUGGESTIONS - HOW DOES THIS PLACE MAKE YOU FEEL?
WHAT DO YOU NOTICE? ARE PEOPLE AROUND YOU?
SOUNDS? ATMOSPHERE?

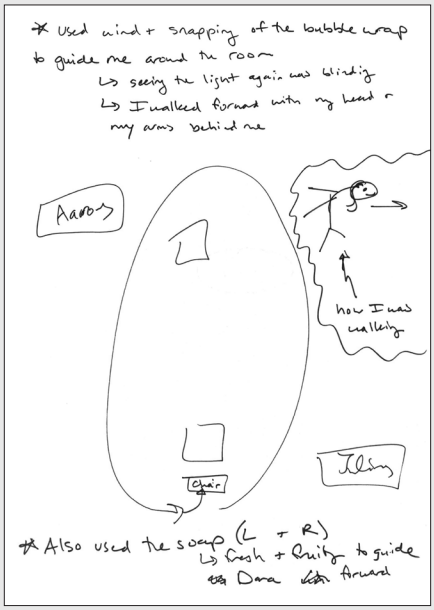
JOHNSON AND WALES QUAD, ACROSS THE STREET FROM CIT

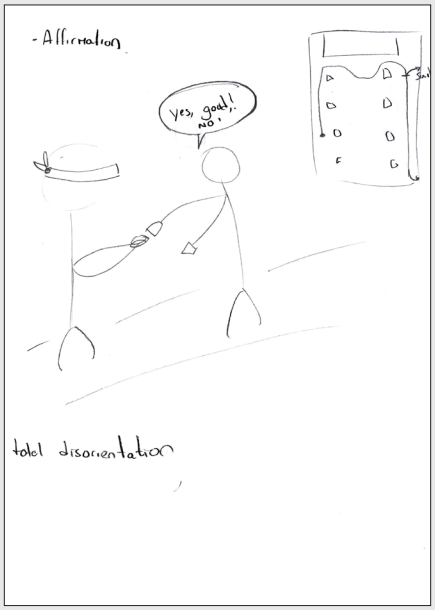
NAME: [redacted]



Think it rained a few stone benches are too wet to sit on. Generally, I enjoy that its a green space and it smells green too. Aesthetically its so overly manicured & organized that it doesn't really feel as nice & therapeutic as it could. There aren't too many people around right now which is nice.
When something organic happens it feels so calming. Like when there's a gust of wind and a bunch of browned leaves fall to the ground. I keep wishing for more trees. The openness of the grass feels unnatural.
Many street noises, cars driving by, distant beeping, trucks rumbling.
Smells of fried food & concrete overcome the 'green' smells for the most part.
Nice place to get some rest.
It still always feels better, calming grounding to be outside near trees & greenery.







01 As a part of the co-creation workshop the participants generated drawings of their mental models. Describing the overall image of the obstacle course, and what was perceived at inflection points along the path. A primary insight: secondary methods of communication were implemented immediately by each team - i.e.: sound coupled with touch.

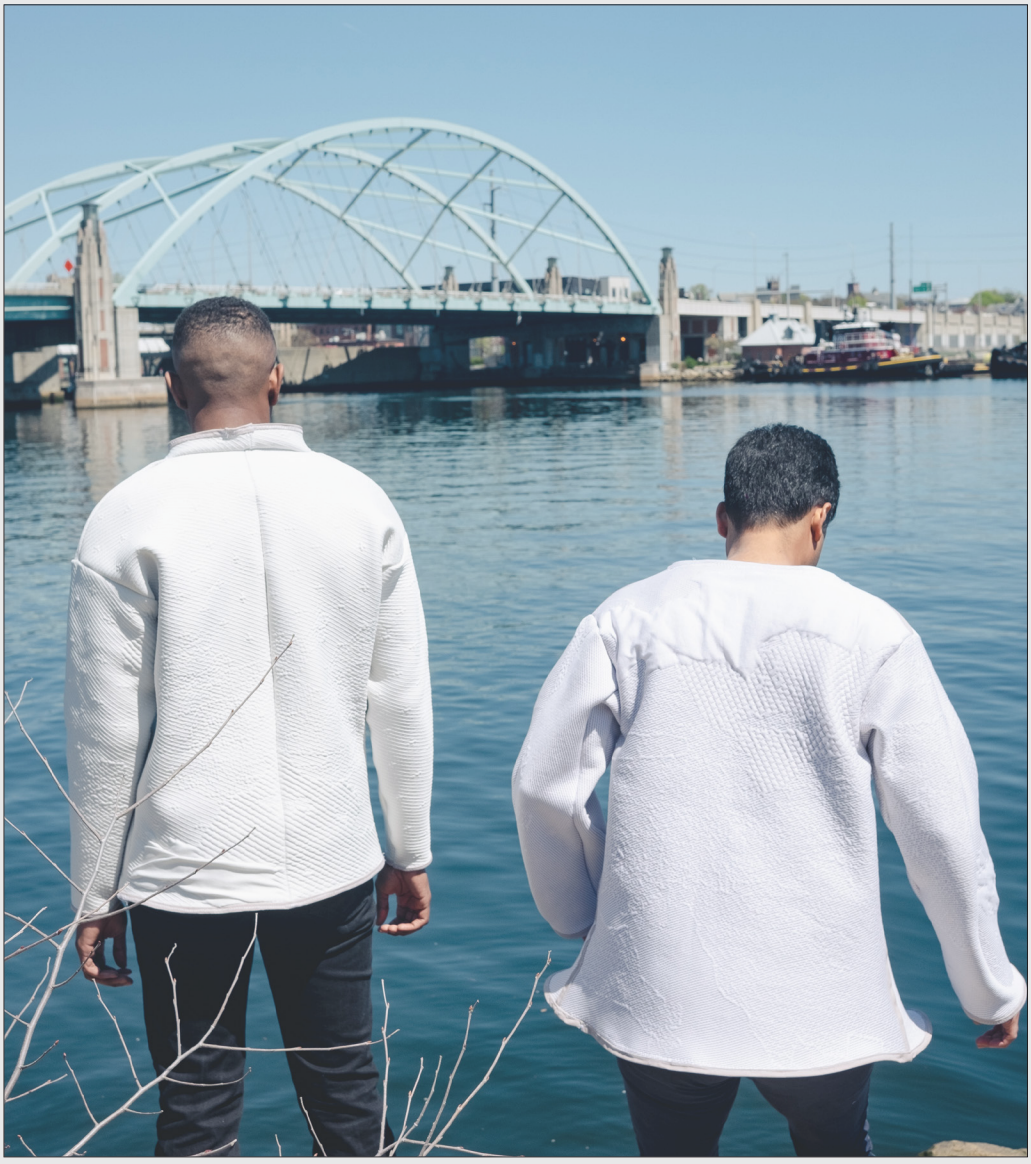
02 Participants using smells, auditory cues, and touch devoid of sight to help one another navigate through an obstacle course.





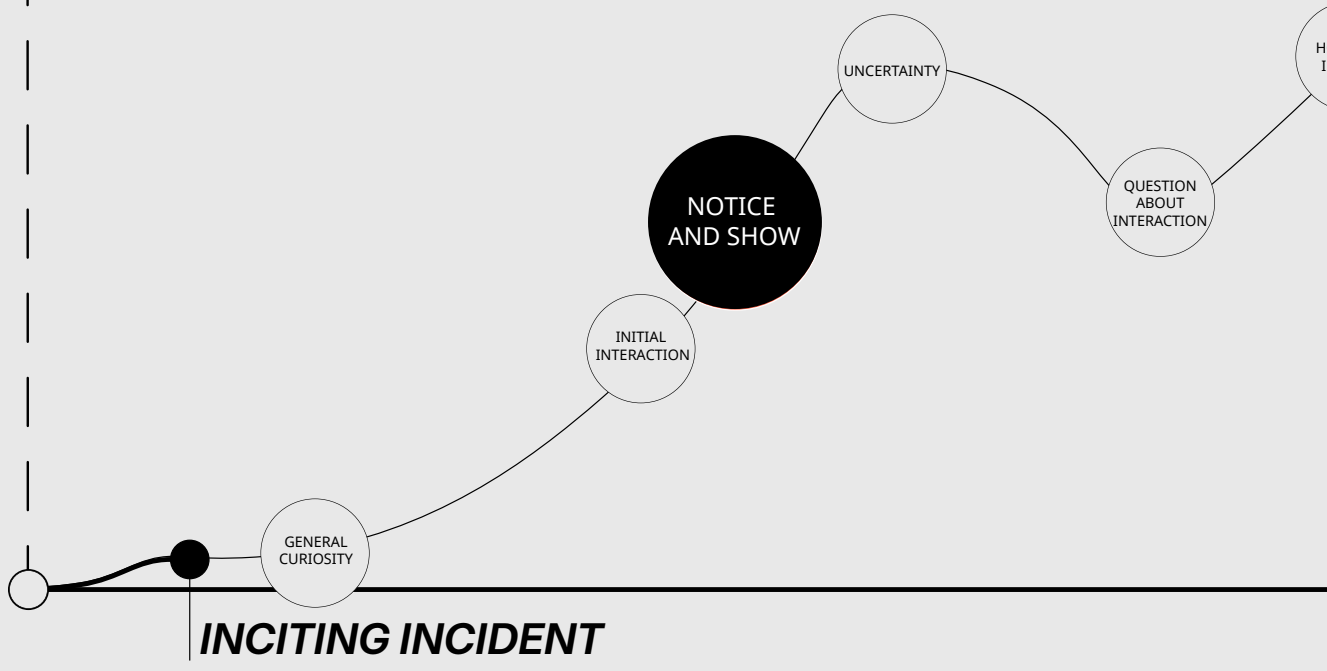






↑ THE STEADY;
A CITIZEN SCIENTIST

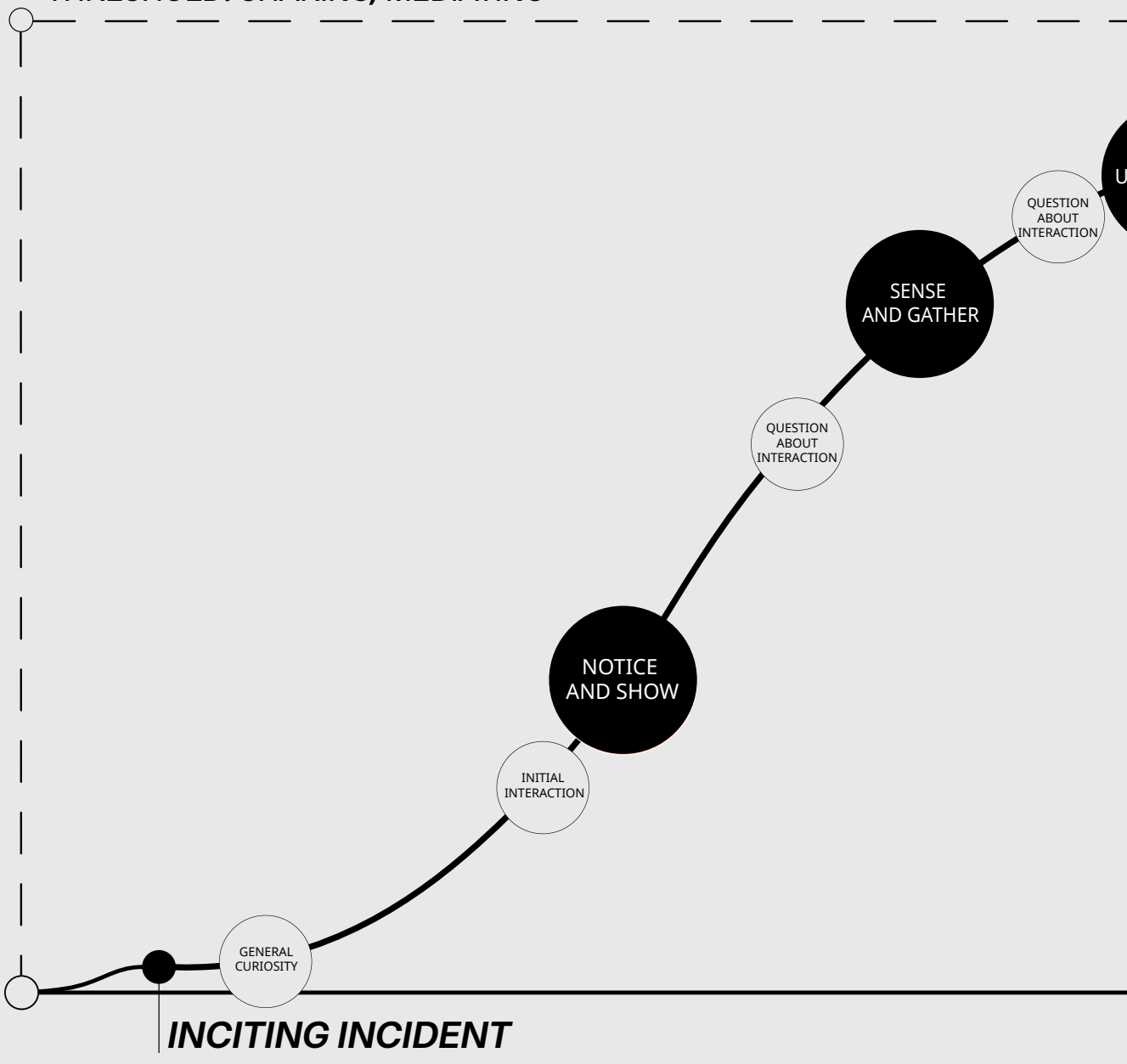
THRESHOLD: SHARING; MEDIATING

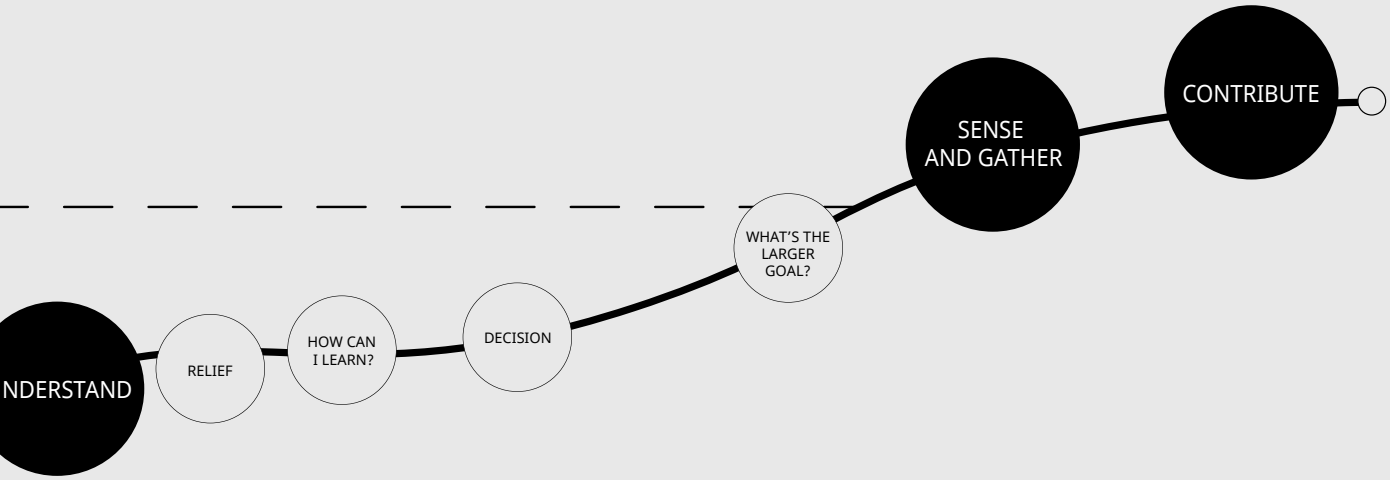


OW CAN
LEARN?
DECISION
THE PASSIVE PARTICIPANT;
A DISINTERESTED PARTY

↑ THE STEADY;
A CITIZEN SCIENTIST

THRESHOLD: SHARING; MEDIATING



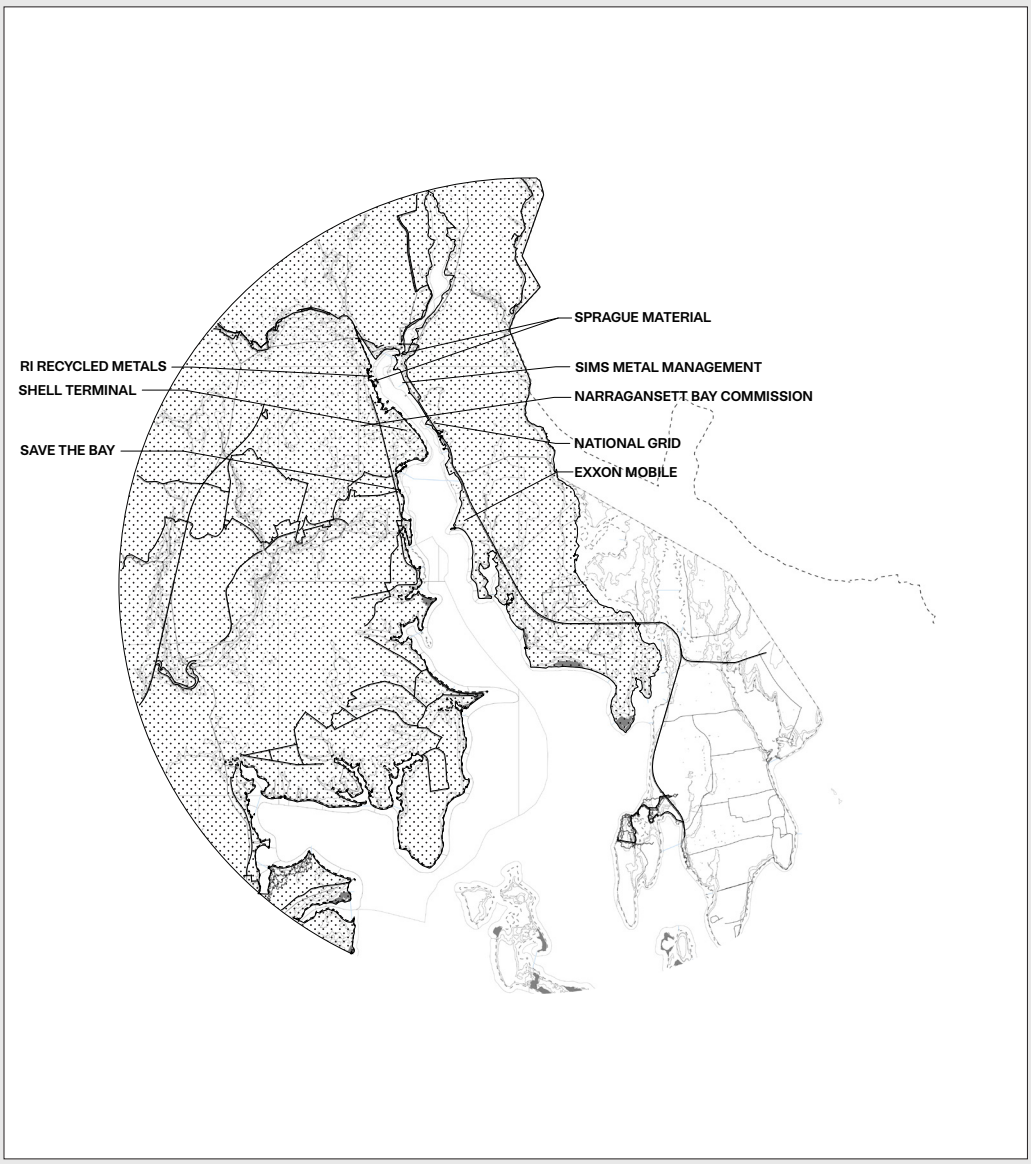


USER JOURNEY OF *THE DABBLER*

How to Engage?

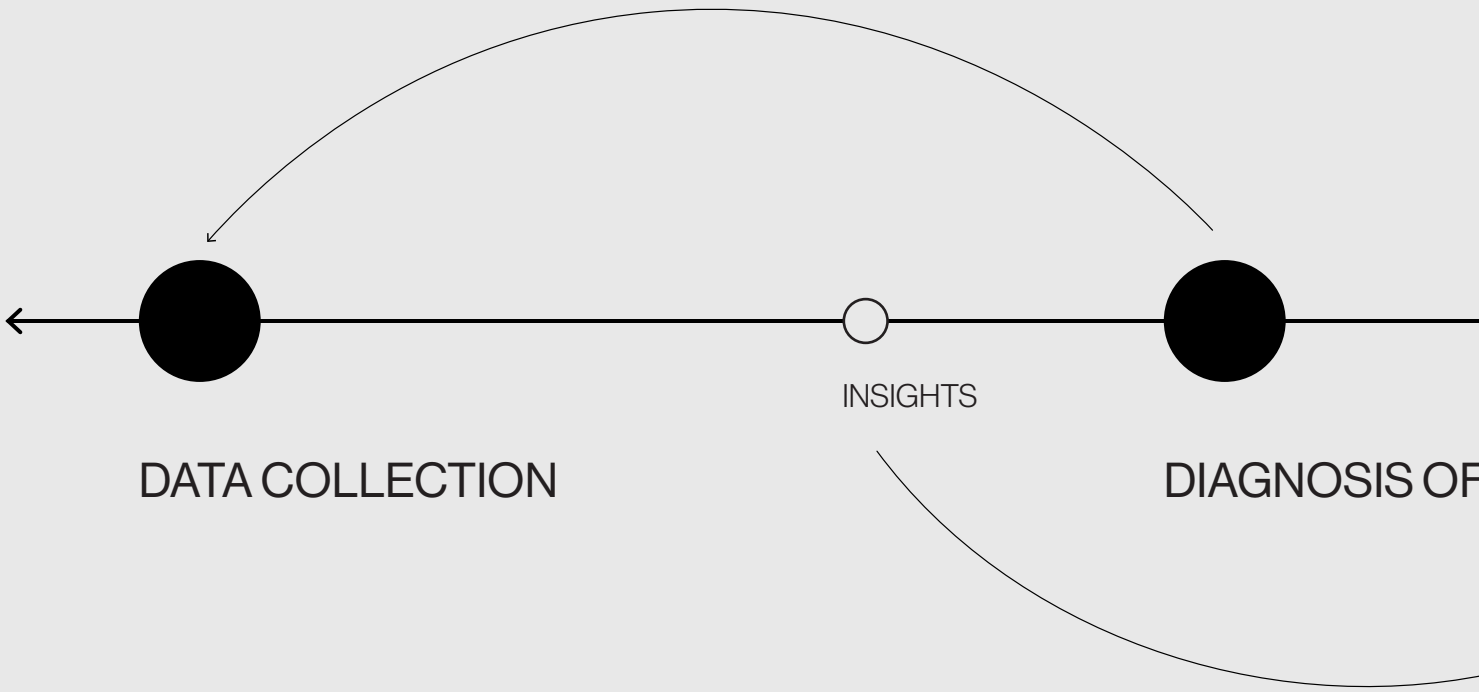
e 1

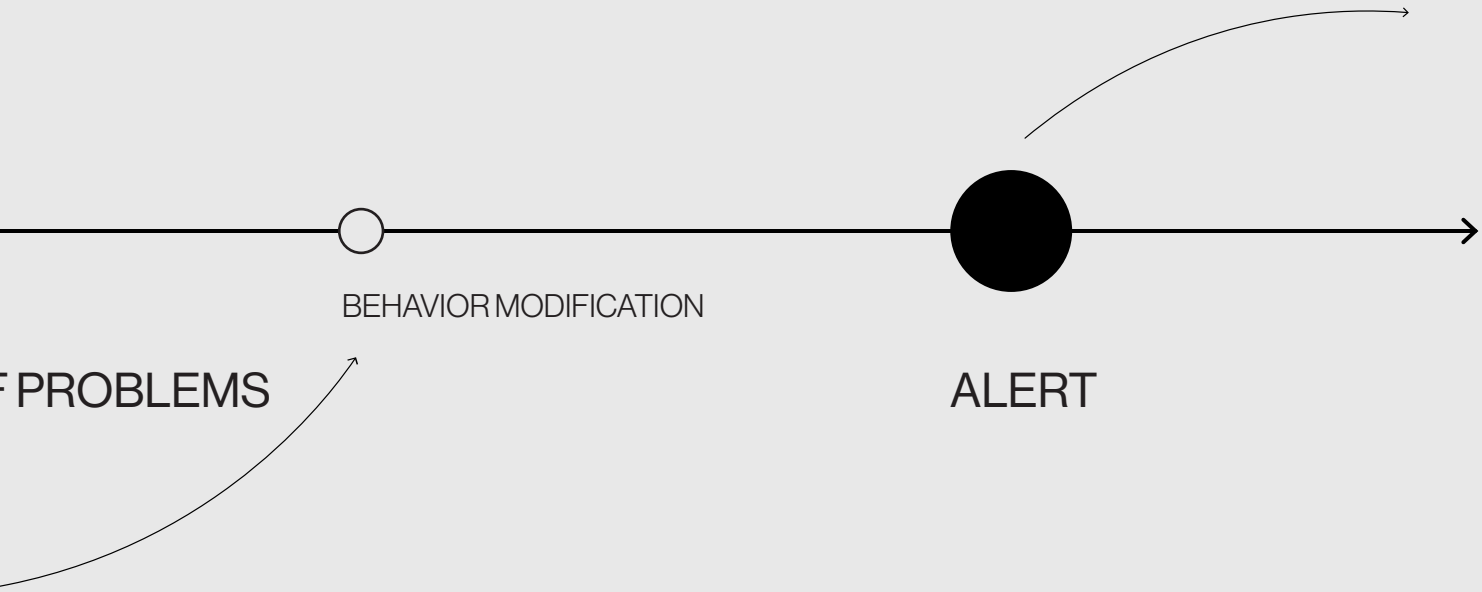
The Data Pipeline
Navigation and Pattern Finding



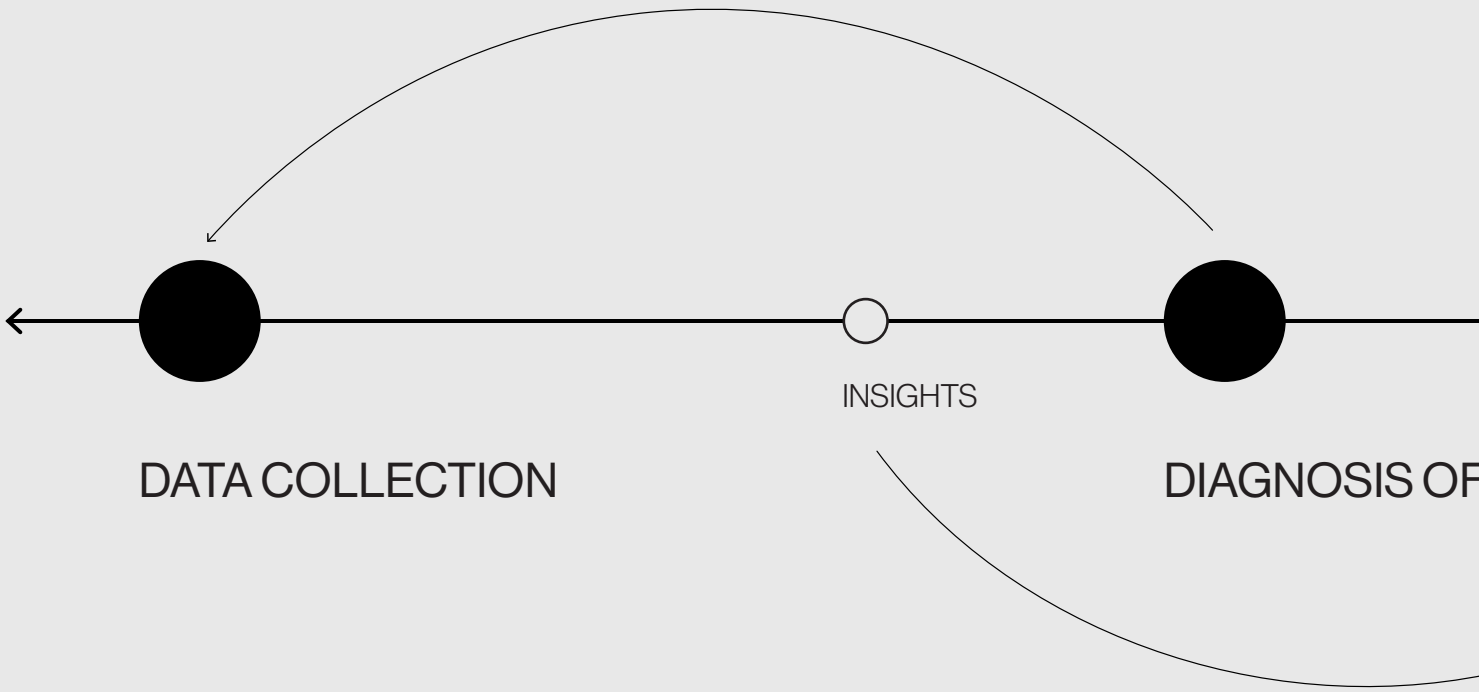
ACTION SETTINGS

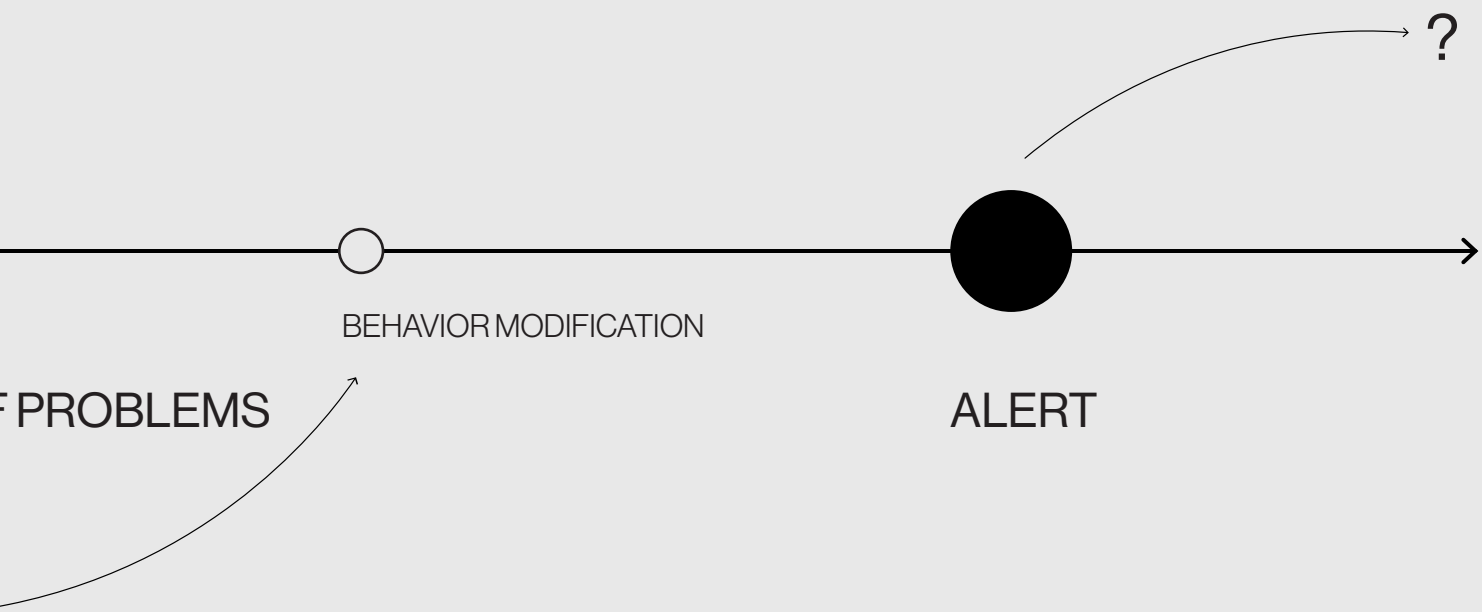
Providing a variety of actionable information related to an individual's sensing practice, will reduce disengagement due to feelings of powerlessness.




BEHAVIOR MODIFICATION
F PROBLEMS
ALERT

Currently, there is not a community organization responsible for monitoring air quality local to Providence, Rhode Island.




?
BEHAVIOR MODIFICATION
F PROBLEMS
ALERT

DATA PIPELINE

To scrutinize how providing actionable information about nebulous pollutants in one's environment corresponds with people's willingness to participate, a data pipeline framework is implemented - highlighting environmental data collection, labeling, and how the first two can be used in training scenarios to forecast information in the future.



COLLECTION FILTERING LABELING


CLEANING
TRAINING

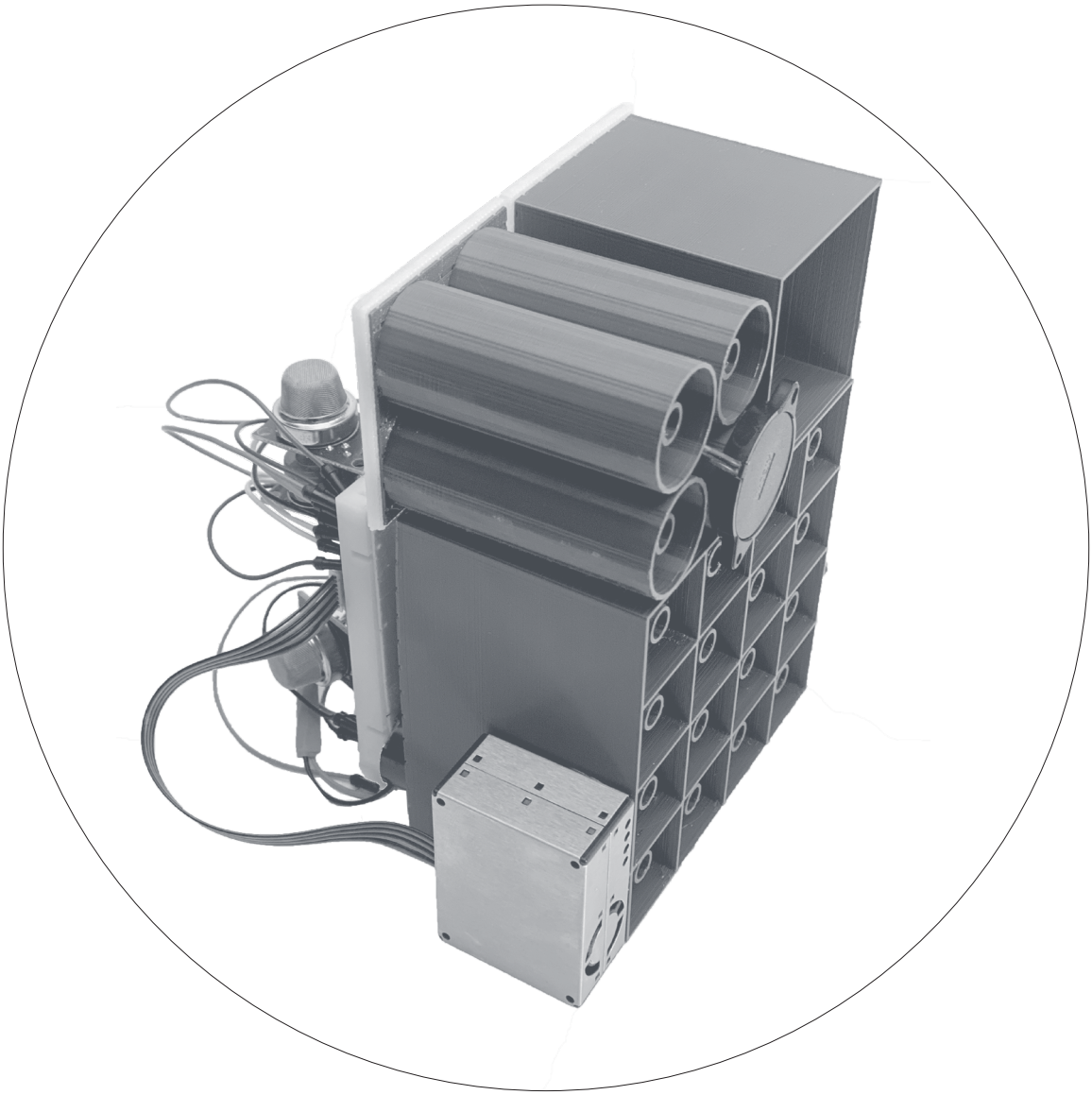


COLLECTION

FILTERING

LABELING


CLEANING
TRAINING



Daily Routes

Pattern finding. Pattern finding and pattern making are a fundamental part of people's sensing practice and how they participate in the world around them. Like flocking behaviors in birds, the shoaling of fish, or the swarming of insects, there are predetermined measures of separation, alignment, and cohesion that allow citizens to live with the existing work around them.

To explore pattern-finding as it relates to a person's sensing practice, I have experimented with adapters: or an extended connection between two protocols, to create a diversity of use between two fixed points.

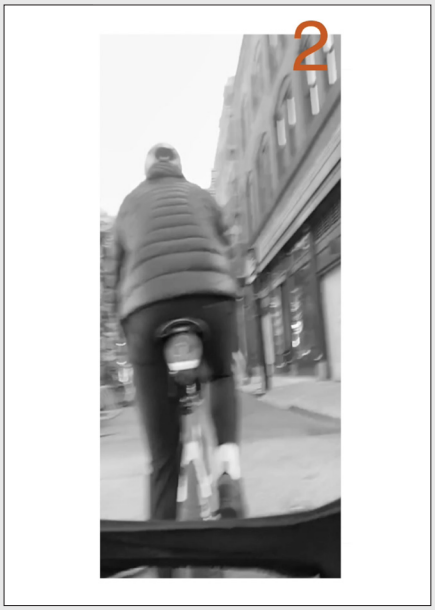
There are adapters for collections, diagnosis, alerts - they modify people's existence.

Initially, I had the question, is there an adapter for crisis, or for prediction?

To explore it, I created a social adapter probe, I set out to augment one of the predetermined measures, or senses, listed above. I'm interested in sensory substitution, a method of circumventing a non-perceived channel sense by feeding its

01 **Waiting in Line:**
I'm inundated with noise; visual, auditory, visceral. Noise. I'm waiting in a line, with all this noise. This line gives me a chance to be in one place for a while - noticing. There are prosthetics on the building to my left - random appliqué. The prosthetic looks like a sensor, a parasite attached to a host - taking its pulse, listening to its breath, how its affecting the people permeating its walls, its envelope. Tell us about its health.

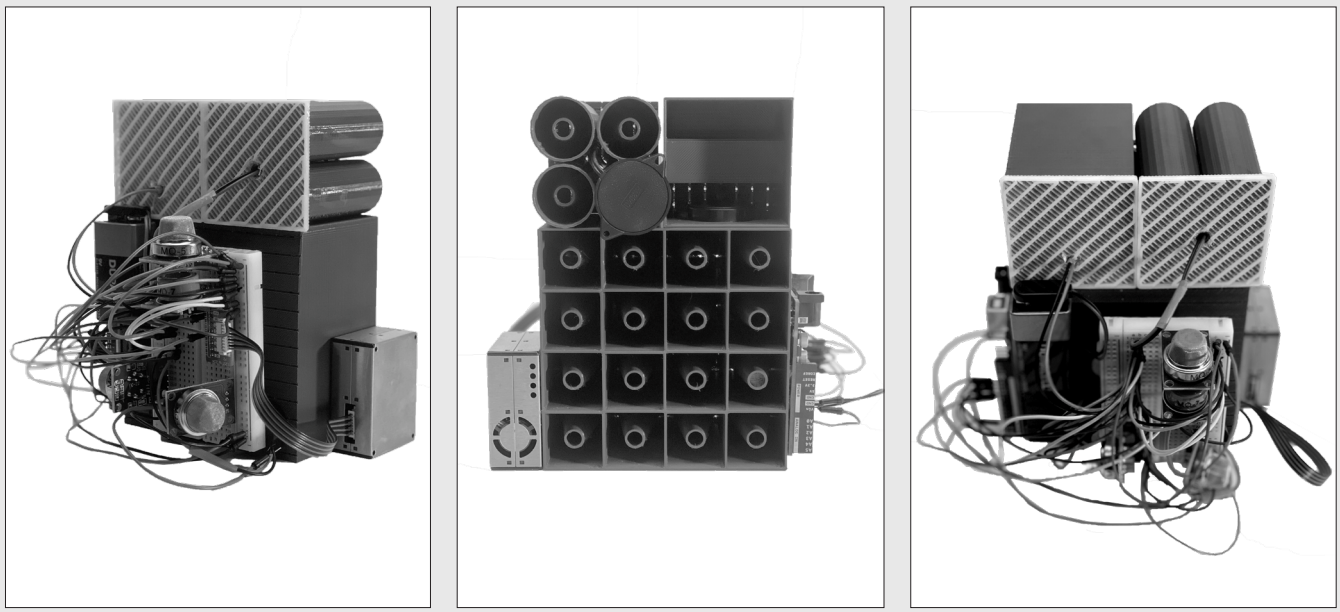






information through another, more familiar channel. In this case, an auditory one. Information was rallied via vibrations on a series of piezo-buzzers that were placed on a frame to create an instrument - utilizing shapes to form an amplifier, a suppressor, and a resonance chamber. The instrument streamed information captured by the Rhode Island Department of Environmental Management's sensor stations and converted the values, documenting the levels of black carbon, carbon monoxide, carbon dioxide, and converted these values to patterns of vibrations legible to the observer's ear.

The overarching goal of the probe was to better understand how opaque sensory streams can be packaged into atypical channels for social interaction and engagement.



02 Front, side, and back views of an air quality instrument made with a particulate matter sensor, piezo-buzzers and sound modulators.

03 Paired with the air-quality instrument, I developed the idea of a community 'free'dge. A tow-behind pantry of items that was attached to my bike. I would ride around where the levels on the PM sensor where loudest (highest) and converse with those willing to talk about the instrument, with one stipulation, they take something from the 'free'dge.









Making the Invisible, Visible

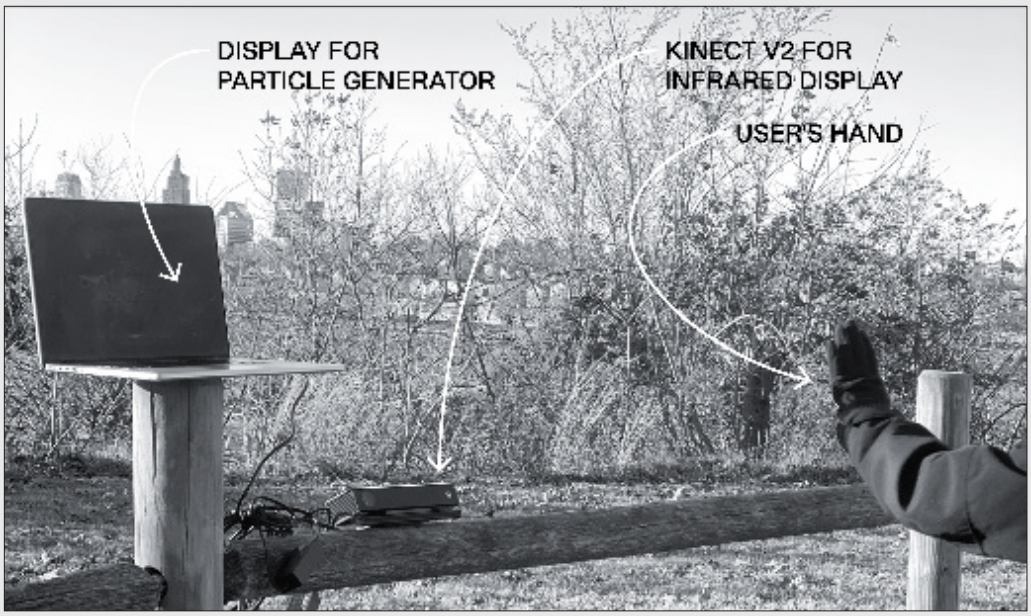
Is there an interactive prototype to investigate the environments which people use on a daily basis? A prototype that displays the larger systems that are impacting one's body? A prototype that is responsive enough to also show how one can manipulate the system.

I imagined this metabolically, have a varied input with a varied output.

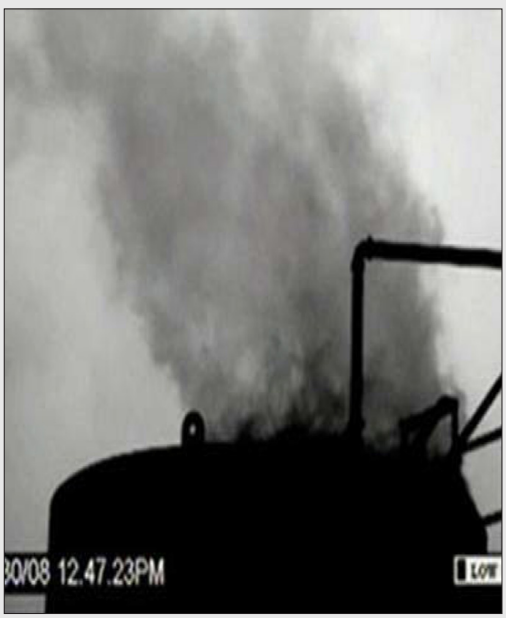
To explore it, I created a user interface, one that extended the existing conditions of the Port of Providence to a user on the East Bay bike path.

Using touch designer (a node-based visual programming language for real-time interactive multimedia content), and collating real-time air quality information published by the Rhode Island Department of Environmental Management, I set out to extend the interface of air quality information present at the port and make it legible to a user, a passerby. I targeted a user that frequents the bike path.

04 The series of images below show the user interaction with the particle generator as well as the a pair of images that are the driving force of this probe. On the bottom left, an image that shows the perceived reality of a section of an industrial plant, to the right is the same image with an infrared filter applied to it, revealing the off-gasing the plant is participating in.







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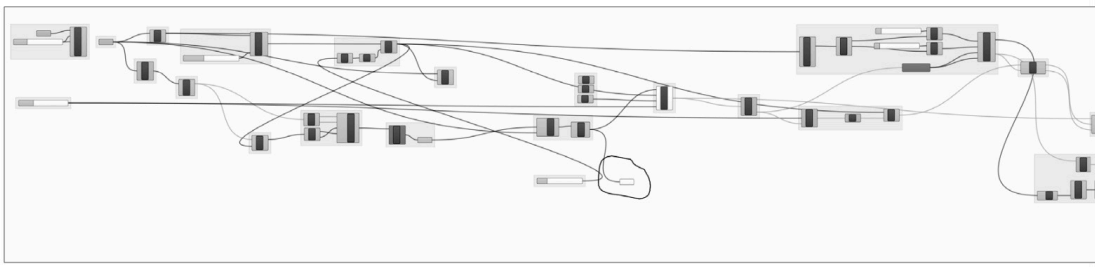
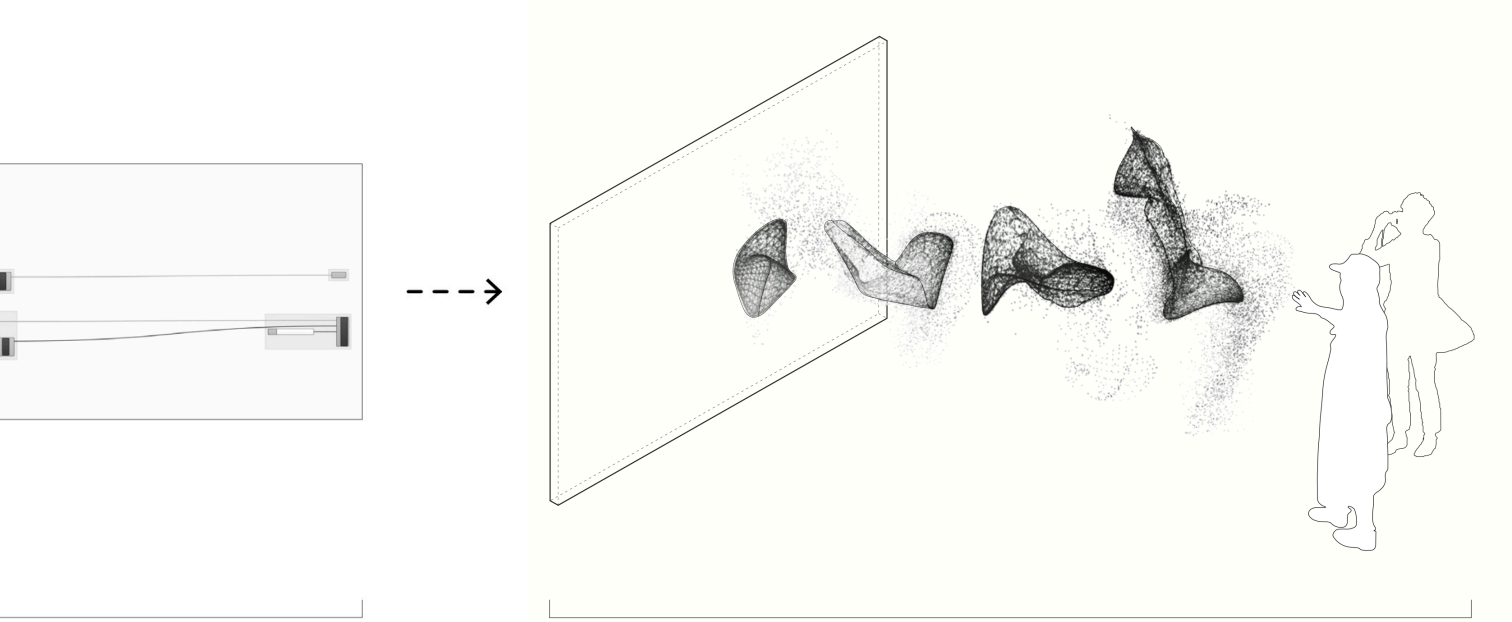


01 **Air Quality Values from the RI DEM**

02 **TouchDesigner Script: Streaming Air Quality Values to Generate Particle Visualization**

Talk to Me About Knowing

In this case, I'm interested in manipulation, using the extended interface as a method of circumventing a non-perceived measure by feeding the Port's information through another, hyper-visual channel. Information, parsed from .csv files, is streamed into a particle generation 'node' in TouchDesigner. This node creates a threshold for numbers it reads, maximums, and minimums. So I utilize the node as a filter, displaying particles from the .csv files that are bigger than PM2.5. As the information is being streamed, a black canvas is being populated with hundreds of particles, globs, orbs, digital 'snow'. This being an 'awareness' prototype, focused on manipulation, I needed to create a means for the particle generator to become distorted. I linked an Xbox Kinect V2 to TouchDesigner, this allowed me to map a human body to the black canvas where the particles were being generated. Simultaneously, a user is immersed in this particle-generating, digital environment, as well as being able to push the particles around, feel the weight, the quantity, the absurdity.



0 3

Particle Generator Based on Air Quality Values and Human Interaction

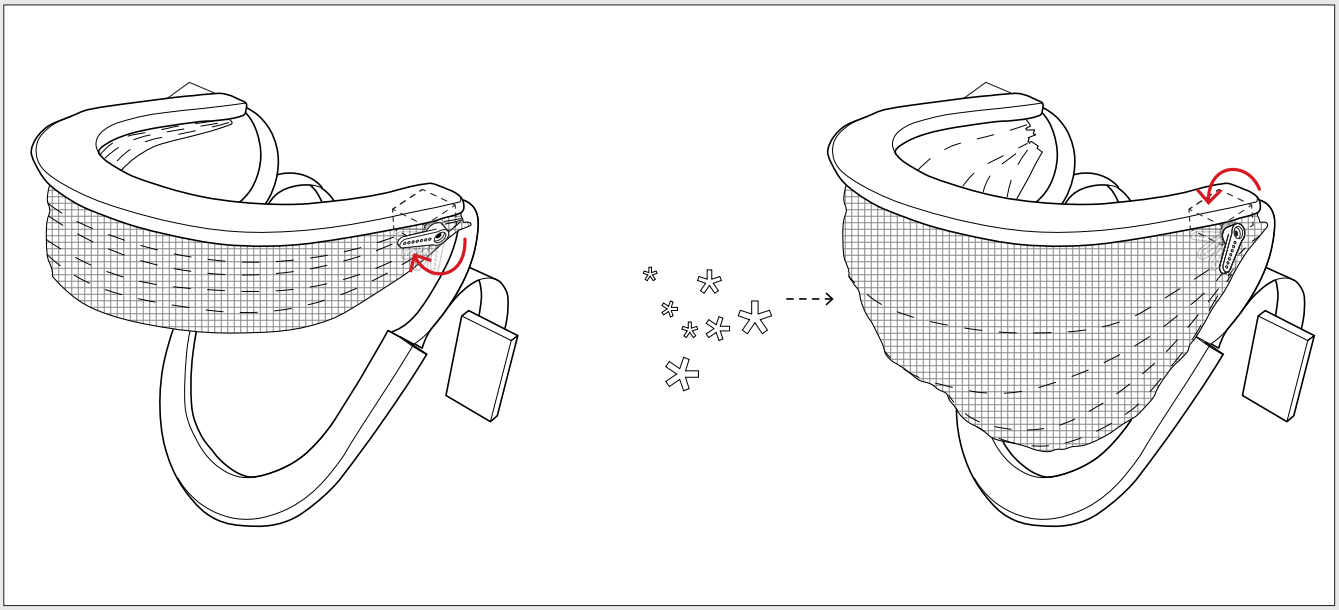
05 A systems diagram showing the physical computing scheme from a probe of interaction. Communication between air quality data that has been taken from the Rhode Island DEM (**01**), connected to a script in TouchDesigner - generating particles based on numeric-values given from data above (**02**), that is serially communicating with a Xbox Kinect V2 (**03**), that is using the infrared sensor of the Kinect to identify the potential user's movement.



COLLECTION FILTERING LABELING


CLEANING
TRAINING


CAUTION



01 A reluctant prototype, a helmet that is worn in areas with a high particulate-matter concentration. It is open when levels are low, but when it comes into contact with an inordinate amount, the helmet closes, shielding the user.



02 For the 'helmet' it was important for the user to maintain sight; closed or open. The front panel is made with a bio-plastic that has been heat-sealed to a wire-frame and attached to the main 'helmet' frame.



03 A physical computing pack, disclosed on the back of the 'helmet'. The system depends on serial communication between the air-quality sensor and two servo motors acting as the arm that opens and closes the shield. Boolean logic is used to assign values to the air-quality to tell the servo motors to stay 'open', or 'close'.





COLLECTION

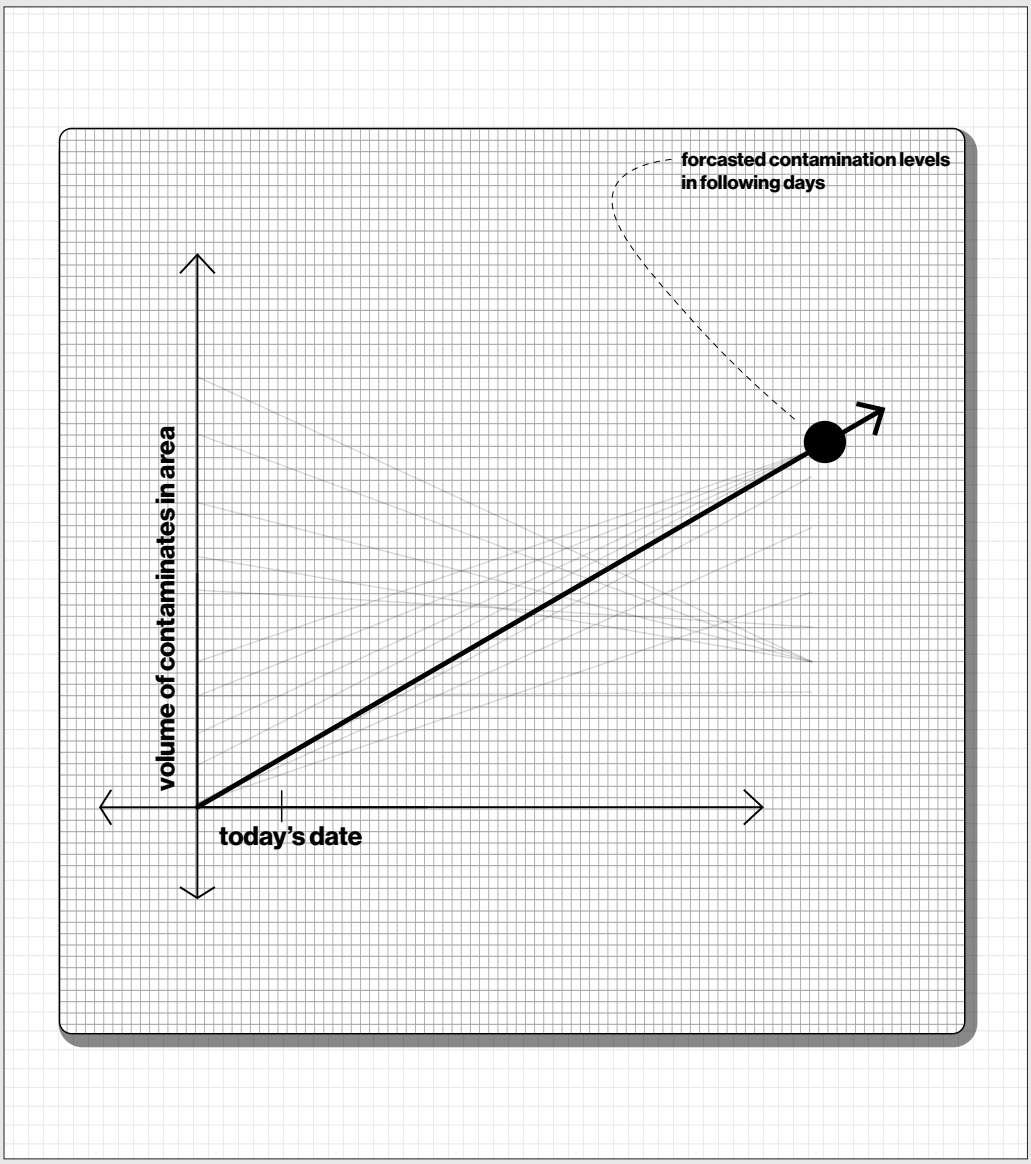
FILTERING

LABELING



CLEANING

TRAINING


forcasted contamination levels
in following days
volume of contaminates in area
today's date

PARSING DATA FROM THE RI DEM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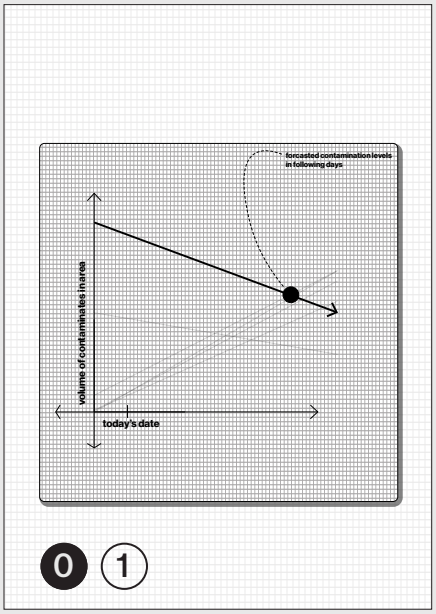
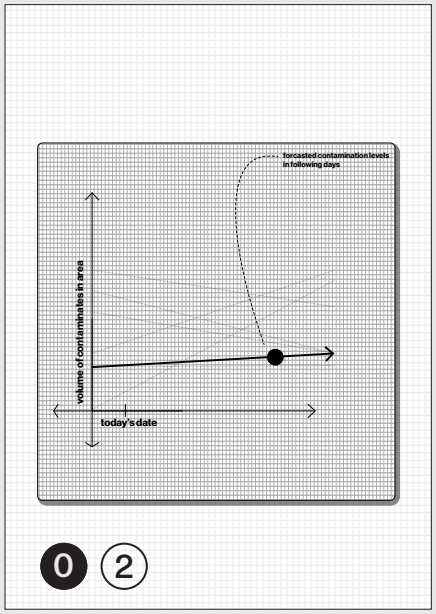
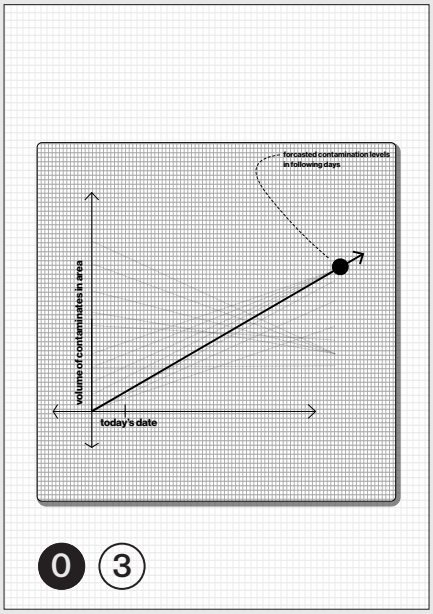
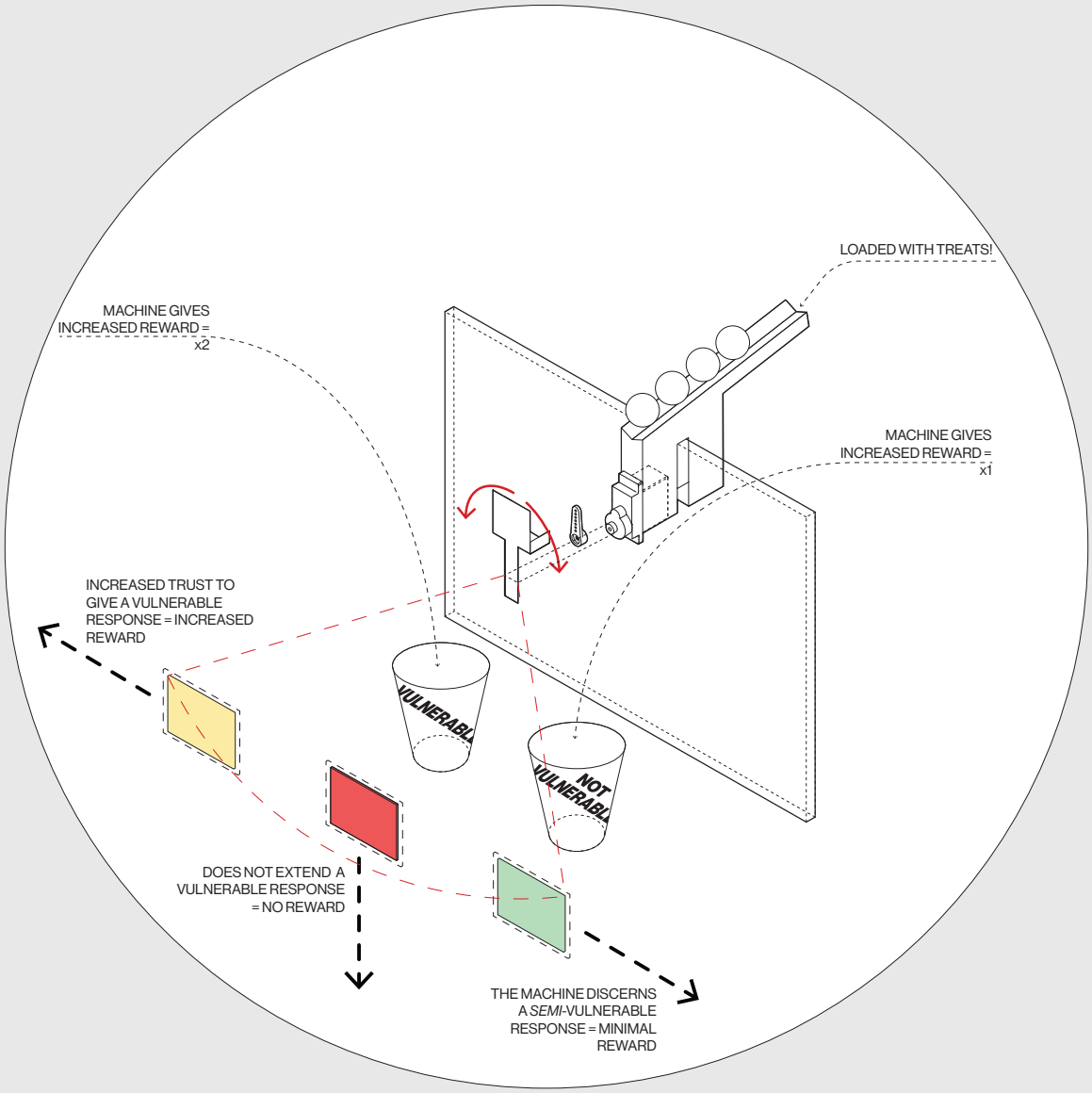




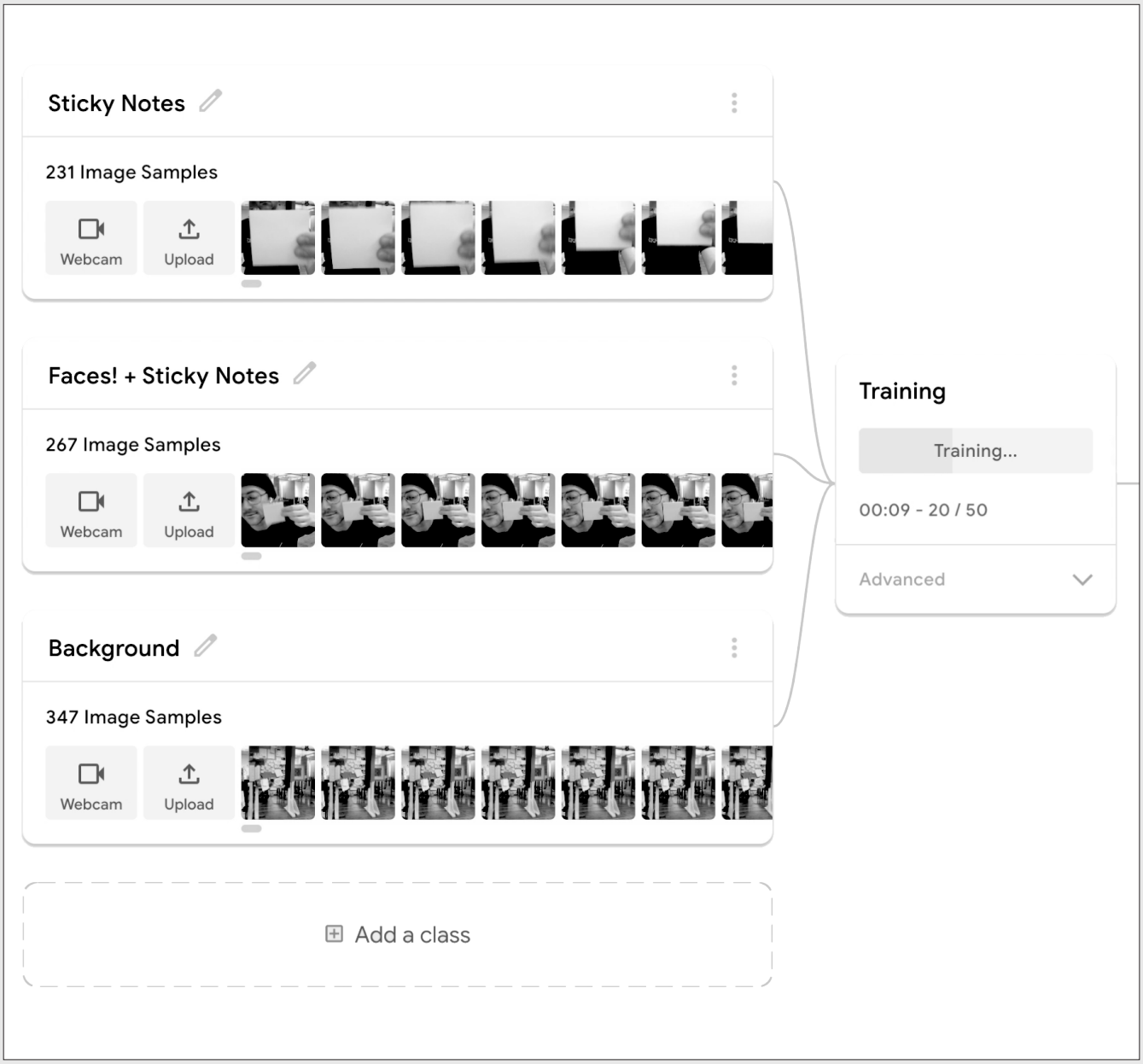


A Forecasting Air Quality Tool

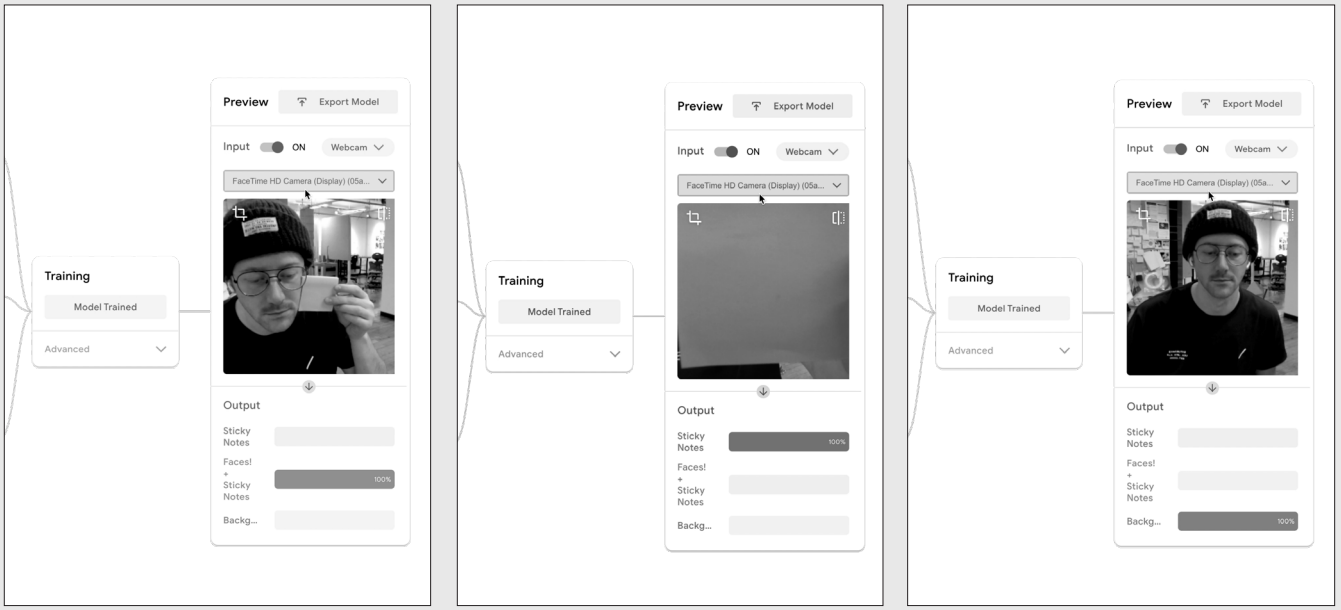
What does it mean to work creatively with a machine learning systems?
This was a question that reverberated as I talked to Alexi Mangili of the Rhode Island Department of Environmental Management, an air quality analyst focusing on the Port of Providence.
For him, there is a clear path to capture environmental data about nebulous pollution, tools that offer 'real' information, ambiguous and maybe erroneous to the layman.
I was given access to some of this information, taken from one of the five laboratories across the state of Rhode Island. As seen on the left page, I began to parse through **AQI** values, **PPB** units, **Daily OBS** counts, and with using Python (a coding language), mapped a simple linear regression (or line of best fit) model that visualized the data from the RI DEM. In diagram **01, 02,** and **03,** I have simulated three different scenarios that predict air-quality, taken from past dates, for the near future.
Can we imagine and realize creative future relationships with the machines?



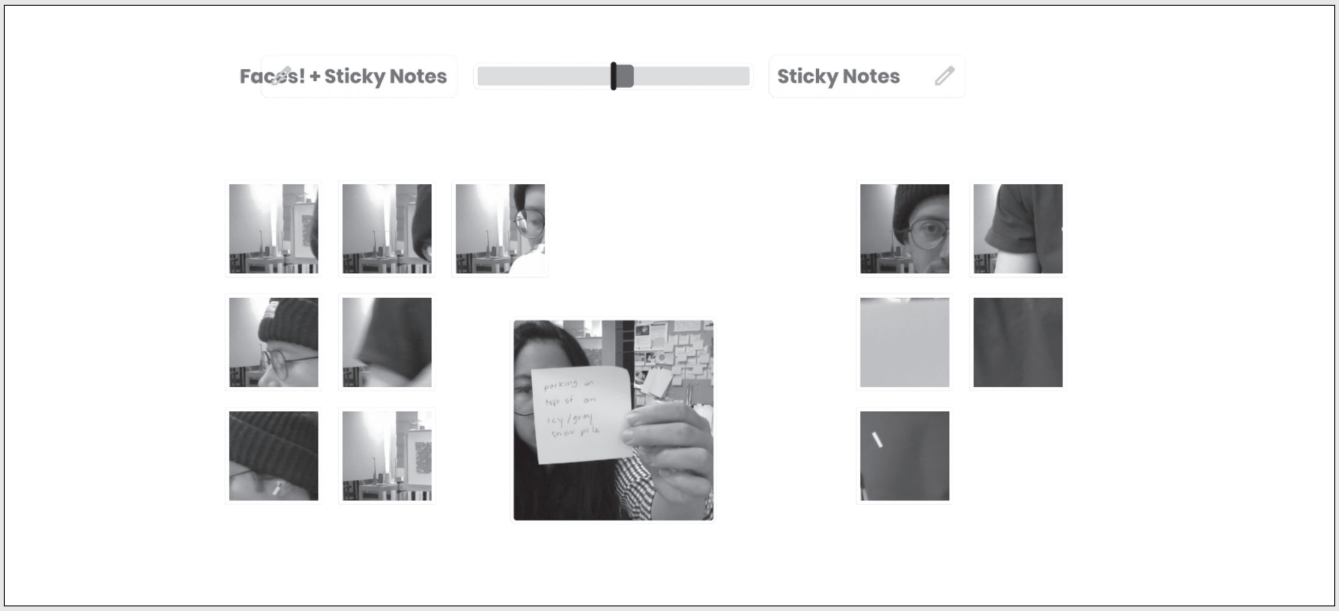
01 A systems diagram showing the physical computing scheme from a probe of human, machine interaction.
The probe was designed to give a participant questions that prompted a response, a response that increased in vulnerability after each questions. Depending on the response, the machine would discern if it was a vulnerable response and give a reward, if so. This was a first iteration in designing a feed-back loop.

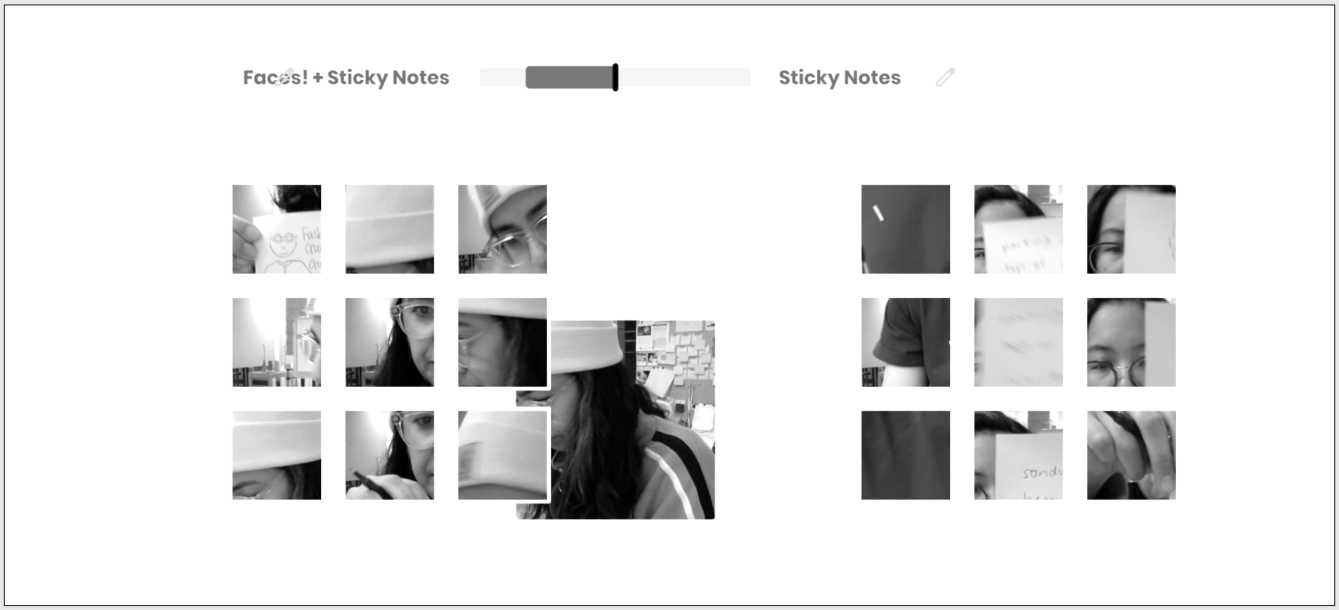


02 The design preparation showing a participant training a machine learning model. Training it on questions like: What is a face? What is a vulnerable response? What is not?



03 The active participation of the Machine Learning Trust Fall, users are sharing information with the machine, the machine is registering the responses based on the learned model, and deciding on whether or not to reward.


Faces! + Sticky Notes
Sticky Notes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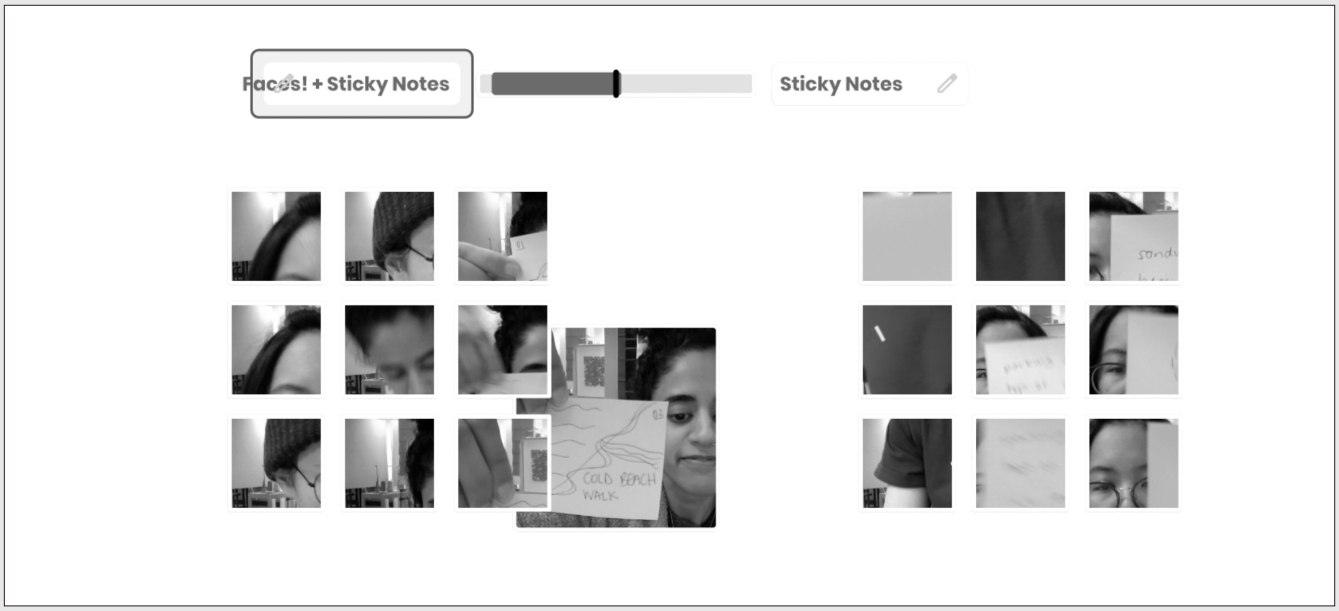
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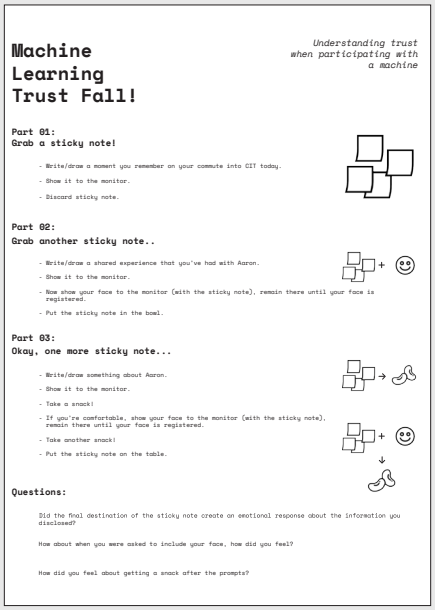
Sticky Notes



04 The Machine Learning Trust Fall in action.



Machine Learning Trust Fall!

Understanding trust when participating with a machine

Part 01:
Grab a sticky note!

- Write/draw a moment you remember on your commute into CIT today.
- Show it to the monitor.
- Discard sticky note.

Part 02:
Grab another sticky note..

- Write/draw a shared experience that you've had with Aaron.
- Show it to the monitor.
- Now show your face to the monitor (with the sticky note), remain there until your face is registered.
- Put the sticky note in the bowl.

Part 03:
Okay, one more sticky note...

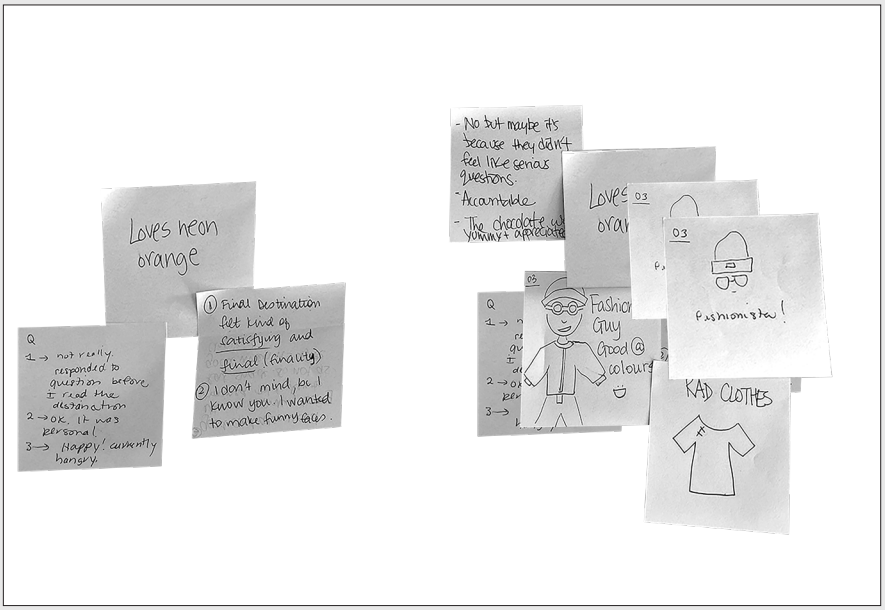
- Write/draw something about Aaron.
- Show it to the monitor.
- Take a snack!
- If you're comfortable, show your face to the monitor (with the sticky note), remain there until your face is registered.
- Take another snack!
- Put the sticky note on the table.

Questions:

Did the final destination of the sticky note create an emotional response about the information you disclosed?

How about when you were asked to include your face, how did you feel?

How did you feel about getting a snack after the prompts?



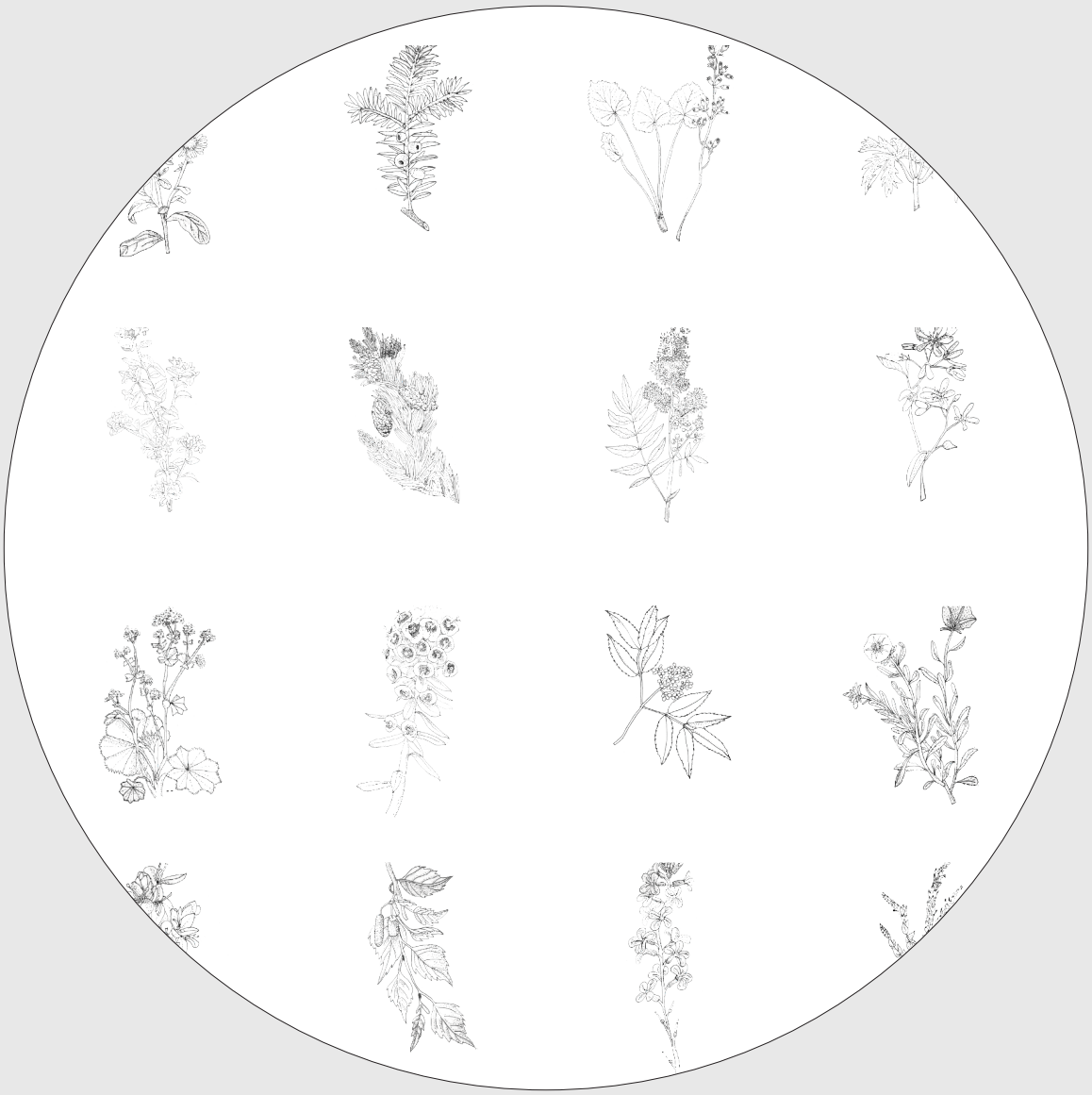
Designing for Operant Conditioning

I hoped to establish a network of relationships between the user, the information they were providing, and the machine learning software. Relationships that looked like trust, confidence, reliability.

As I watched the machine develop some kind of understanding about the images it was being shown, and getting progressively more accurate about which answers were more vulnerable, or not, I became aware that instead of trusting that they machine will give you something in return for an answer you offer, operant conditioning - the relationship needs to be about confidence building. How might an answer given to you by a computer help you build confidence about the place you inhabit?

Coupled with the linear regression tool that forecasts air-quality, is there an opportunity to register a change in one's environment that can be cataloged and mapped into a collective model of prediction? Can image-based machine learning assist?





01 Plants that act as $PM_{2.5}/NO_2$ Sinks:
Achillea millefolium (Yarrow)
Alchemilla mollis (Lady's Mantle)
Aster spp. (Aster)
Convolvulus cneorum (Silverbush)
Erysimum (Wallflower)
Geranium maculatum (Cranesbill Geranium)
Hebe spp. (Shrubby Veronica)
Heuchera (Coral Bells)
Hydrangea arborescens (Hydrangea)
Lavandula spp. (Lavender)
Osmanthus delavayi (Delavay Osmanthus)
Pinus mugo (Creeping Pine)
Salvia spp. (Sage)
Stachys byzantine (Lamb's Ear)
Verbena bonariensis (Verbena)



Human is Nature, Nature is Human

Persistence; Dullness, and the stark contrast of the built environment paired with plants, weeds, things that 'don't belong' in man-defined nature.
Everything is petro-chemically colored. Varying blues and greys.
There is a human walking beneath the tree, to give scale, but also context.
These things don't exist without human interaction and abiotic factors aren't producing abiotic experiences. They're both lively.
A point in an environment's life-cycle is layered: distorted, wrong. It shows an alteration of reality.
It also shows there are multiple perspective of the tree. One as nuisance, one as shade, one as persistence / perseverance, and the other as adaptability.
Depending on the environments grandeur, the viewer is 'farther and farther removed from the scene - its context.
They are viewing perceived reality though a scene.

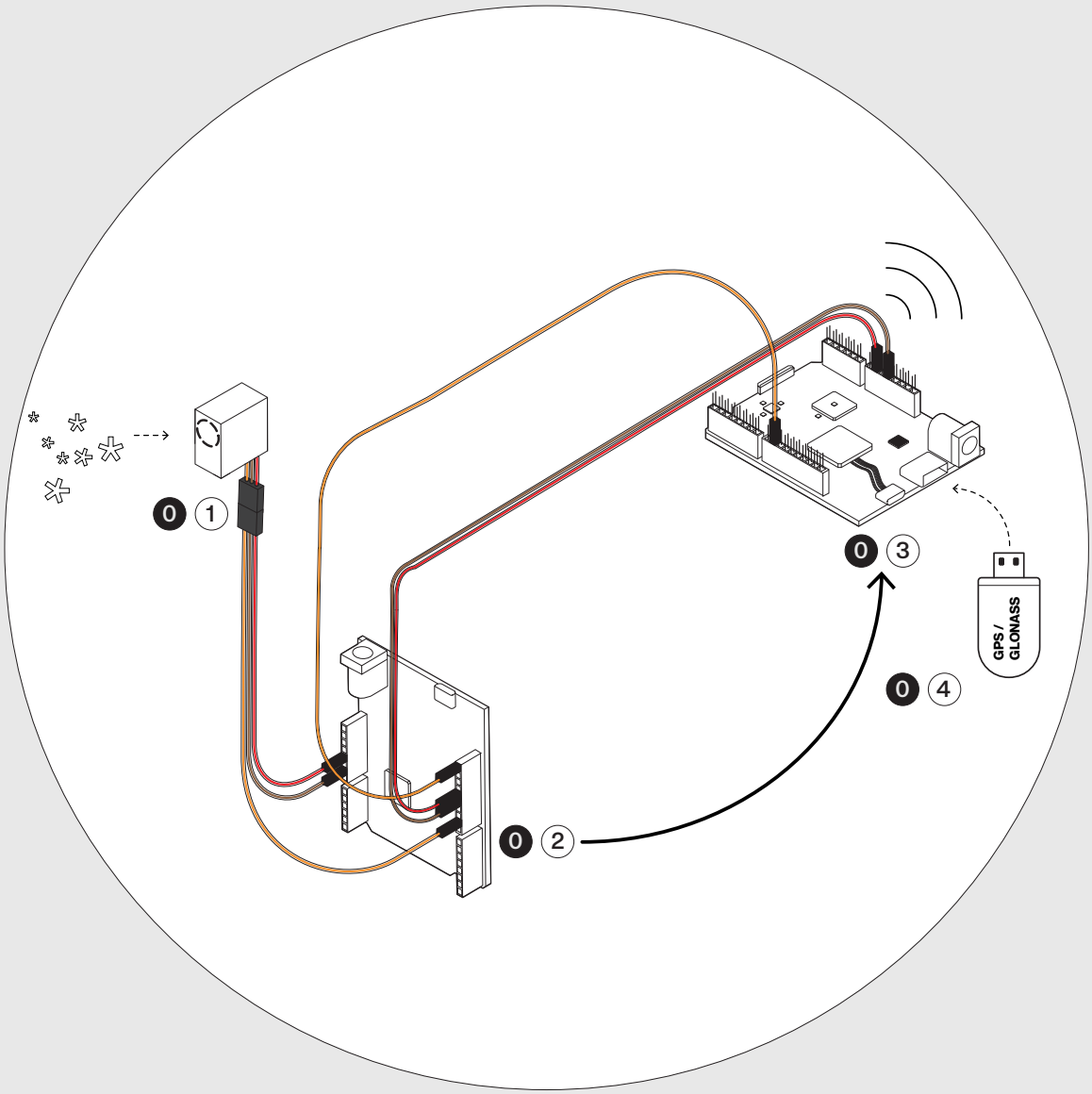


02 @roamingplantbot uses Geranium maculatum (Cranesbill Geranium) as a carbon sequestering plant.



The Plantbot

The **Plantbot** is an effort to understand the nebulous state of pollutants in our air, in real-time. There is a physical component to the bot being a carbon sequestering plant, the Geranium maculatum, that continuously scrubs the air. The bot has been made a dynamic sensor by being designed as a portable item that can be carried by the user in a recycled Dyneema carrying bag, where the plant and physical computing scheme are held. The goal is to have the user walk around, go about their day, while to **Plantbot** is streaming air quality data, looking for spikes, or irregularities from a given normal. When a spike is recognized, it sends a notification via Twitter, telling the user to stop and allow the plant to scrub the air in a given area. There is an amount of trust that has to be extended to the **Plantbot** by the user, but in any case, this in primarily an exercise in gaining trust in one's immediate environment.



03 A systems diagram showing the physical computing scheme. Communication between a particulate-matter sensor (**01**), connected to an Arduino Leonardo (**02**), that is serially communicating with a Raspberry Pi Computer (**03**), that was coupling GPS information, denoting the location of the particulate matter spikes, via USB (**04**).



```
console.log("Bot is starting");

var Twit = require('twit');

var T = new Twit({
    consumer_key:         'eoopnA9inEbsQ4fh1yHc6Mmth'
  , consumer_secret:      'WLPg9muXnvRfgRd564r9JtNrhUEXSnFiy2ffzJYyfUjqiXUnYk'
  , access_token:         '1480921040910004225-l2f96HtXe2Htd6E1K54uBUSwwyK7k2'
  , access_token_secret:  'LqbEGH3yNjNE8GhxGyfNeviyaHXBG3KlkFe5BVoifNPgz'
});


tweetIt();

setInterval(tweetIt, 1000*20)

function tweetIt() {

  var tweet = {
    status: 'here is a test to see if node.js is working'
  }

  T.post('statuses/update', tweet, tweeted);

  function tweeted(err, data, response) {
    if (err) {
      console.log('Something went wrong!');
    } else {
      console.log('It worked!');
    }
  }
}



//var params = {
//  q: 'citizen sensing',
//  count: 2

//}

//T.get('search/tweets', params, gotData);

//function gotData(err, data, response) {
//  var tweets = data.statuses;
//  for (var i = 0; i < tweets.length; i++) {
//    console.log(tweets[i].text);
//}
//}
```

05

```
const SerialPort = require('serialport')
const parsers = SerialPort.parsers

// Use a `\r\n` as a line terminator
const parser = new parsers.Readline({
  delimiter: '\r\n',
})

const port = new SerialPort('/dev/ttyACM1', {
  baudRate: 9600,
})

port.pipe(parser)

port.on('open', () => console.log('Port open'))

parser.on('data', console.log)
```

06

```
SyntaxError: Unexpected end of input
    at Object.compileFunction (node:vm:352:18)
    at wrapSafe (node:internal/modules/cjs/loader:1026:15)
    at Module._compile (node:internal/modules/cjs/loader:1061:27)
    at Object.Module._extensions..js (node:internal/modules/cjs/loader:1149:10)
    at Module.load (node:internal/modules/cjs/loader:975:32)
    at Function.Module._load (node:internal/modules/cjs/loader:822:12)
    at Function.executeUserEntryPoint [as runMain] (node:internal/modules/run_main:77:12)
    at node:internal/main/run_main_module:17:47

Node.js v17.4.0
pi@raspberrypi:~/plantbot $ sudo nano hellotwitterbot.js
pi@raspberrypi:~/plantbot $ node hellotwitterbot.js
/home/pi/plantbot/hellotwitterbot.js:52



SyntaxError: Unexpected end of input
    at Object.compileFunction (node:vm:352:18)
    at wrapSafe (node:internal/modules/cjs/loader:1026:15)
    at Module._compile (node:internal/modules/cjs/loader:1061:27)
    at Object.Module._extensions..js (node:internal/modules/cjs/loader:1149:10)
    at Module.load (node:internal/modules/cjs/loader:975:32)
    at Function.Module._load (node:internal/modules/cjs/loader:822:12)
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Bot is starting
Something went wrong!
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Something went wrong!
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pi@raspberrypi:~/plantbot $ node hellotwitterbot.js
Bot is starting
Something went wrong!
Something went wrong!
Something went wrong!
^C
pi@raspberrypi:~/plantbot $
```

07

@roamingplantbot

The **Plantbot** is using the designed system to the left to communicate wirelessly with a Twitter account, @roamingplantbot. The system is logging spikes in particulate matter in the air, tracking those spikes via GPS (**05**), where the GPS application is constantly looking for predefined numbers associated with those of the particulate matter sensor. After those initial numbers go through the 'filter' of the GPS application, they are submitting to the Twitter account via a serial communication application, Node.js (**06**), on a Raspberry Pi computer. Again, from Node.js, applying a translation to those initial numbers to know create a message stating why those numbers matter, and subsequently tweeting them out from the Twitter Development platform (**07**).

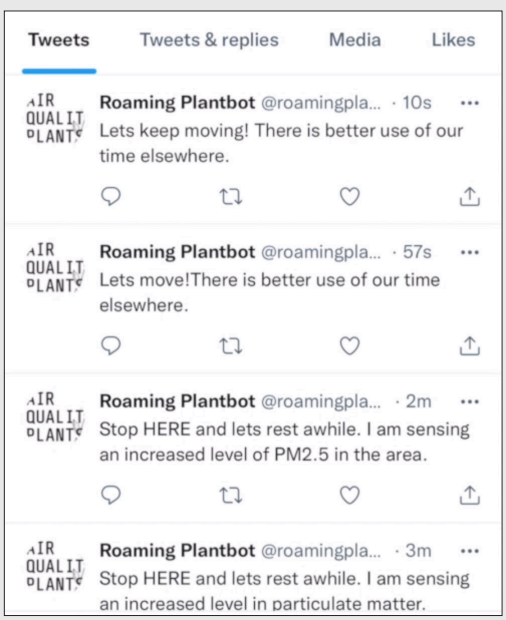
This is it inform a potential user of the **Plantbot**, that there are potential problem areas with the air-quality, and the plant could stay and do some scrubbing.

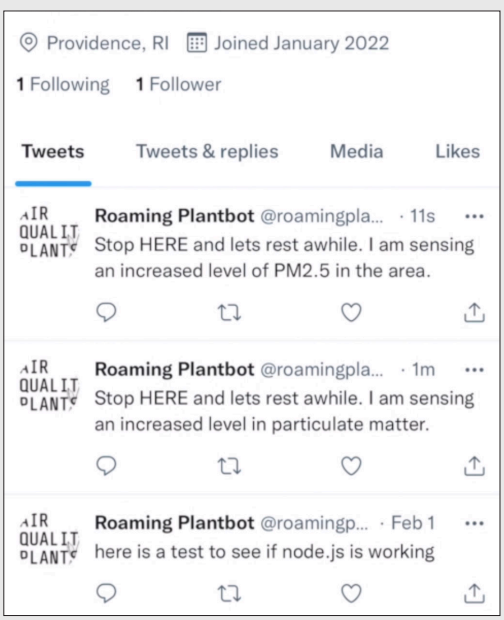

Roaming Plantbot
@roamingplantbot
I'm just a plant, roaming around, sequester
and telling you about it. Out here trying to r
invisible visible in 2022.
Providence, RI
1 Following
1 Follower
Tweets
Tweets & replies
Media
Roaming Pla... @roamingpla...
EMERGENCY! Set me down and le
here for awhile.

04 A sequence of automated postings executed by **@roamingplantbot.**









Synthetic Environments:
Filters, agents spread across the city. The agents latch onto trees in the park, in the median between the sidewalk and the street. On the ramp, or dark/ damp side of the building. These agents grow on the single tree before me. Its small, but its powerful. It captures methane, carbon dioxide.
All from the agent before me?
Something that looks like a parasite on this tree?
Yellow, brown, pancake-like, regenerative, a multiplicity.

Cities, with their multi-probable daily convening of people, experiences and systems, mapping an ever-evolving urban landscape that allows us to peer into the problems and promise.

Doors close; clock starts - they have between prince & canal to make an impression. The person pleads their case, needing some food. People surrounding act disengaged, awkwardly busy, in a trance. - Canal (a voice comes over the loud-speaker, graciously saving the people in the moment) - Doors open. People come alive, out of their trance.

The cart rattles past, a tin-like, empty sound. The front caster is loose - needs fixing. The cart has many jobs: a sleeping vessel, a security blanket, a safe, a closet, a mode of transportation, a job. Its packed, stuffed with life. It looks standardized; 1 of some bigger number.

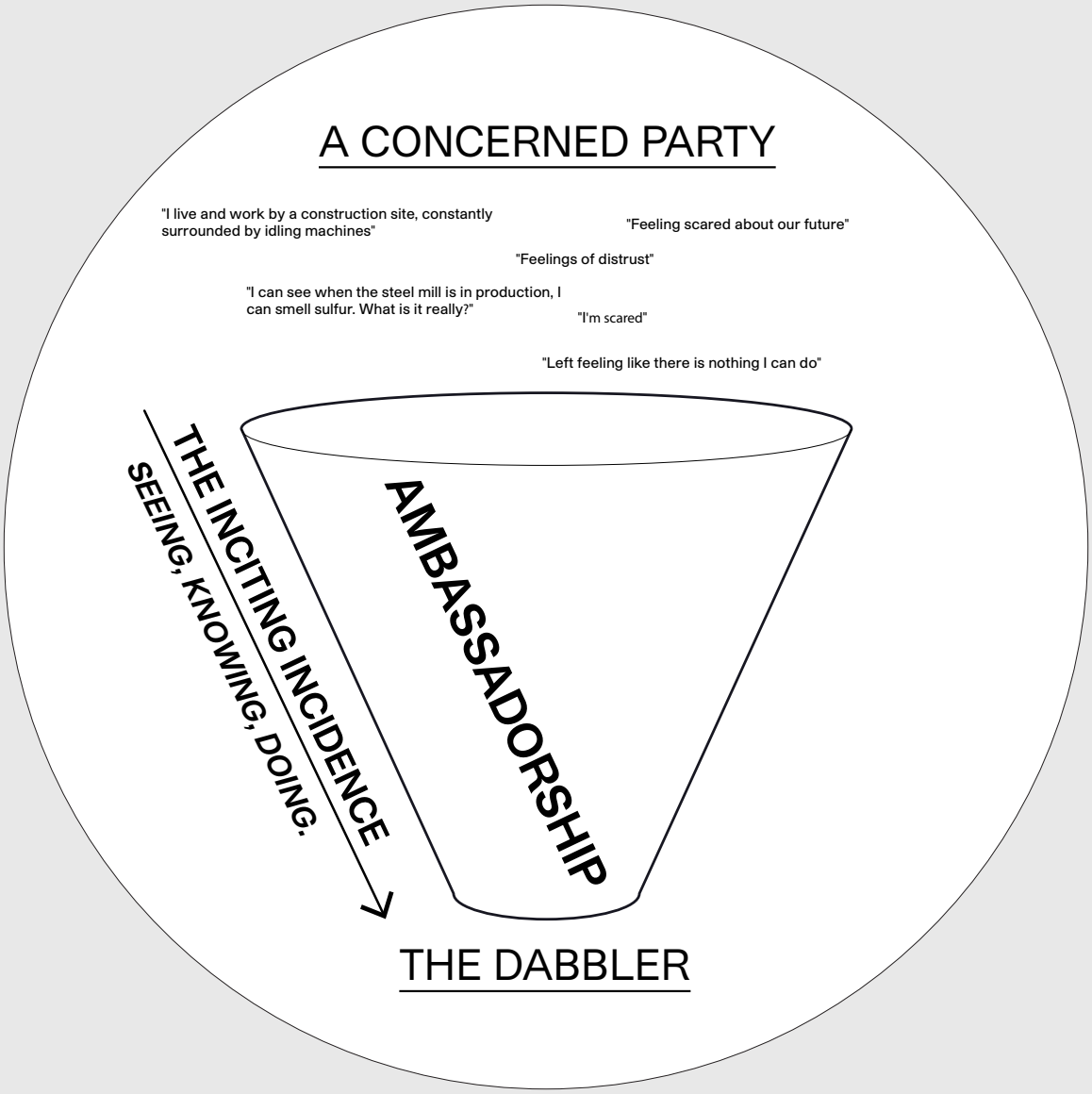
It continues to rattle past, drawing attention.





An On - Boarding Experience for the Dabbler



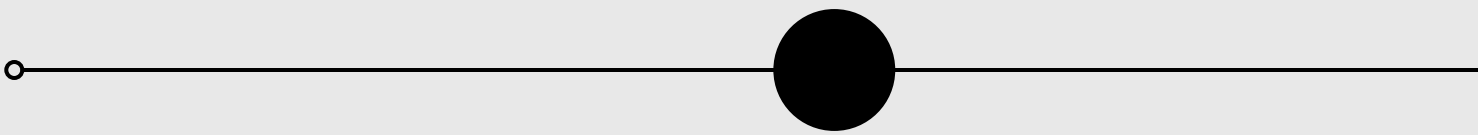


01 A sales funnel approach showing that through the recognition of pollution in an immediate environment provides an opportunity to become a primary sharer of information.



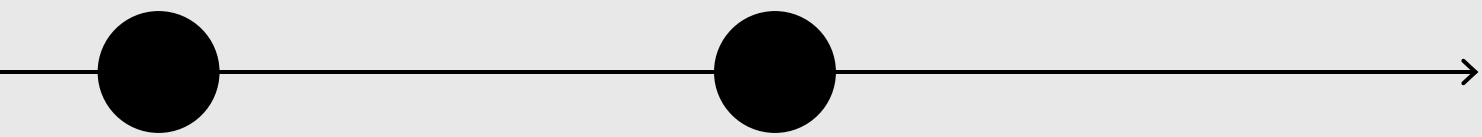
The Orders of Acquisition

I have identified that the inciting incidence, or recognizing the condition of nebulous pollution affecting one's body, leaves a concerned party with feelings of distrust of their surrounding environment, as well as feelings of despondency, like there is nothing they can do about it.
Through this identification, I have implemented three orders of acquisition - trying to give the concerned party a way to actively monitor air quality from the lowest ask: a simple measuring tool (a tree tag that has a colorimetric gas-sensing pigment applied to it that changes phases when in contact with volatile organic compounds). Through the iterative design process, I have discovered an interested in the pigment, not only as a static measurement tool, such as the hang tag, but also as a dynamic one - one that can been worn showing the contaminants the concerned party comes into contact with on their daily routes.



AN INCITING INCIDENCE

THE LOWEST ASK

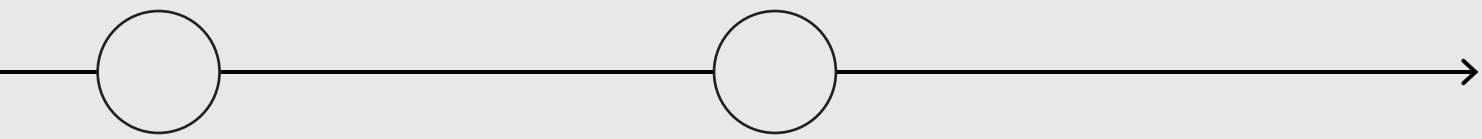


THE ON-BOARDING
OF THE DABBLER

PARTICIPATION OF THE STEADY

AN INCITING INCIDENCE

THE LOWEST ASK

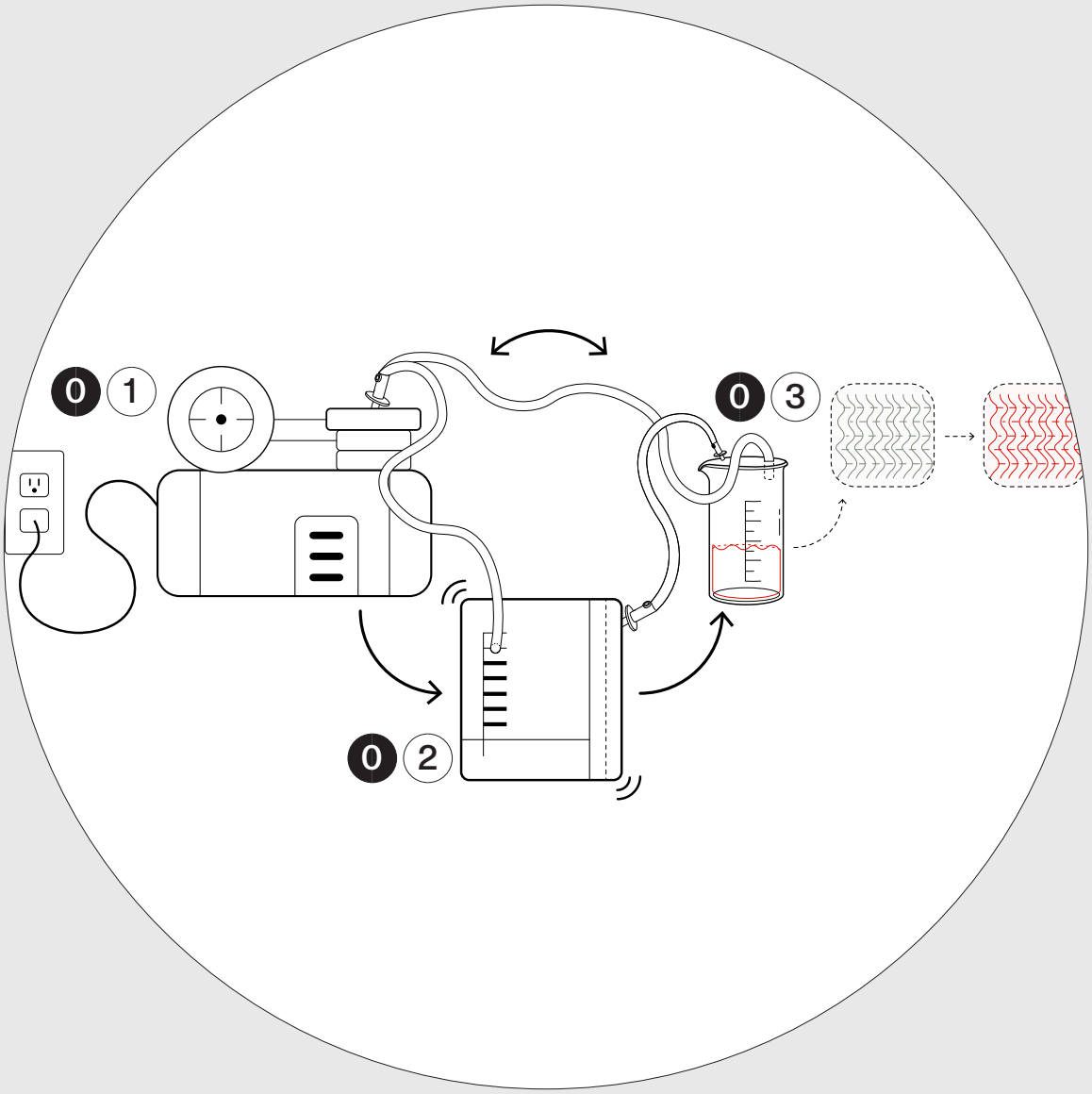


THE ON-BOARDING
OF THE DABBLER

PARTICIPATION OF THE STEADY



02 A vapor chamber to carryout controlled ammonia tests.
In a way, this was to falsify inputs and generate a consistent color output, and to better understand the spectrum of colors that are achieved from the phase changing pigment.
Preparation of dye solution: 5,10,15,20-Tetraphenyl-21H,23H-porphine manganese(III) chloride pigment (MnTPP);
Colorimetric Gas-sensing Pigment



03 **01:** A fish-tank air pump (deconstructed)
02: A humidifier (deconstructed)
03: A sealed container for material tests (constructed)
Constructing a vapor chamber out of found parts to explore phase-changing dyes that react to ammonia in a gaseous state.
Colorimetric Gas-sensing Pigment suspended in a silicon mixture to apply on materials such as paper, synthetic textiles, for use in screen-printing.

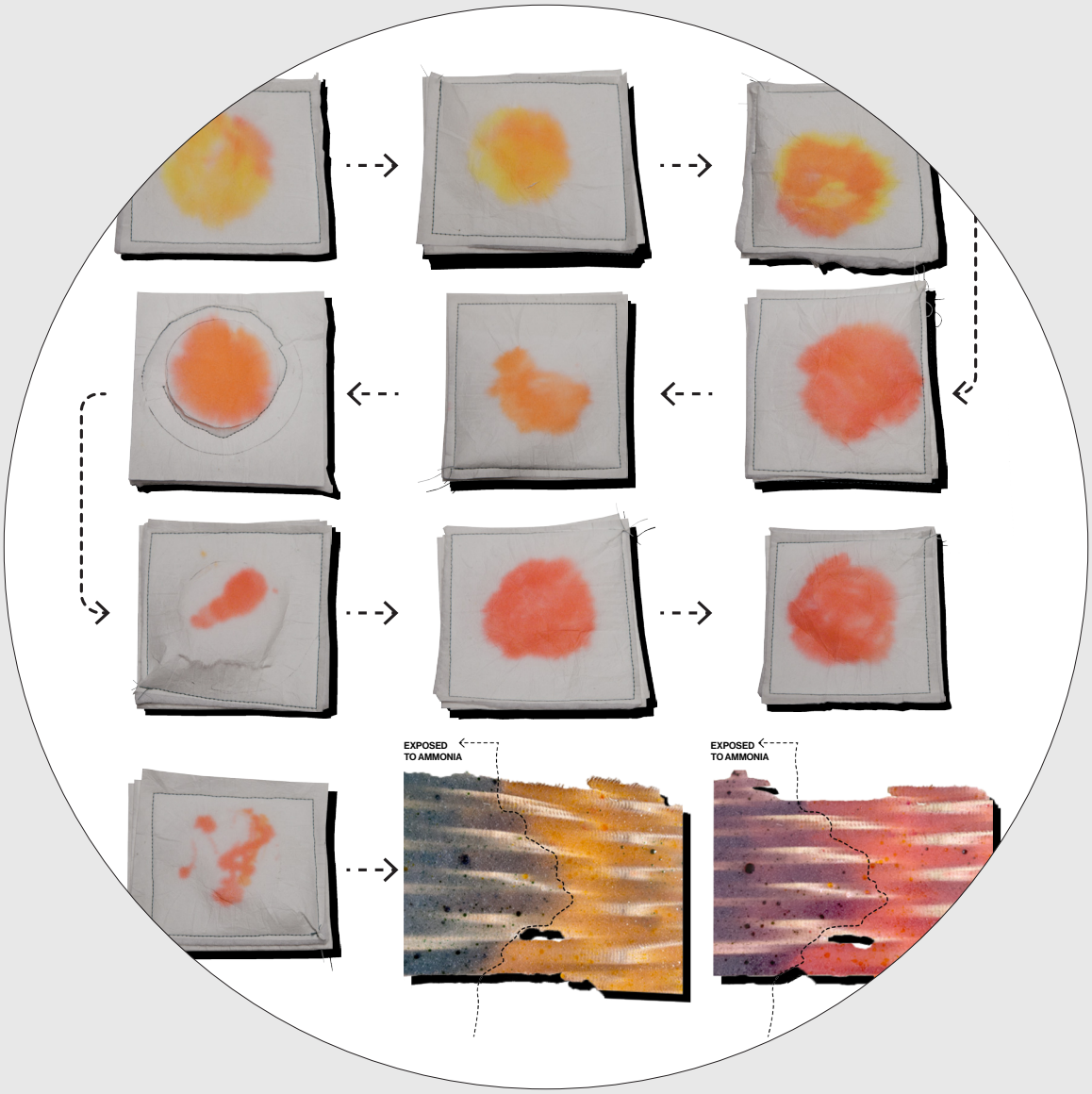












06 **Series of Dye Test:** A linear scale of material tests. Observing the reaction of MnTPP on fuseable interfacing and finally in a silicon substrate. From top left and reading to bottom right, the initial sample was left in the vapor chamber for two minutes and then adding two more minutes for each sample.



07 **Series of Dye Test, 001:** Applied phase-changing pigment, suspended in silicon via screen-printing on 80% recycled polyester and 20% cotton knit. Left in vapor chamber for twenty-six minutes.



08 **Series of Dye Test, 002:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Printed via screen-printing on 100% cotton knit. Left in vapor chamber for twelve minutes.



09 **Series of Dye Test, 003:** Applied phase-changing pigment directly on material sample of 40% recycled polyester and 60% cotton knit. Left in vapor chamber for four minutes.



10 **Series of Dye Test, 004:** Applied phase-changing pigment directly on material sample of 55% recycled polyester, 40% cotton knit, 5% elastine. Left in vapor chamber for nine minutes.


THNX
FOR
HANGIN'
LEARN HOW TO READ
THE TAG
TAKE A TAG. HANG A TAG.
HELP EACH OTHER SEE WHAT IS IN THE
AIR WE BREATH.


WHAT'S
IN THE
AIR?
LEARN HOW TO READ
THE TAG
TAKE A TAG. HANG A TAG.
HELP EACH OTHER SEE WHAT IS IN THE
AIR WE BREATH.


EAST BAY
BICYCLE PATH


THIS
IS A
TEST


THNX
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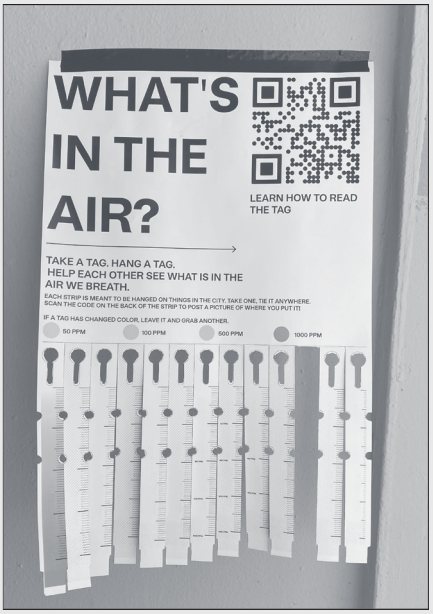
WHAT'S
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LEARN HOW TO READ
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50 PPM
100 PPM
500 PPM
1000 PPM


THIS
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WHAT'S
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WHAT'S
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HELP EACH OTHER SEE WHAT IS IN THE
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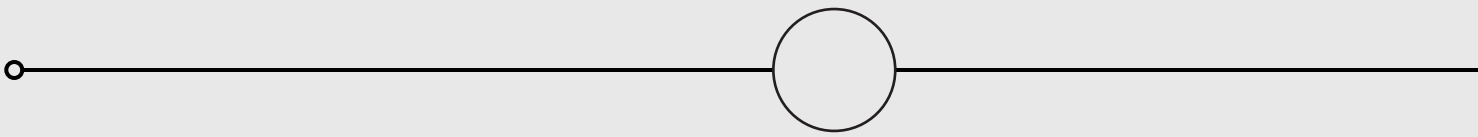
11 **Tear-away Flyers:** Identifying the willingness of self-selectors to participate in hanging tags, posted around Providence, RI. Over 130 tags have been posted. The process:
I have applied phase-changing pigment, suspended in silicon onto each tag. The QR code takes a user to a form where they can answer a question about the area they've hung a tag and post a picture.

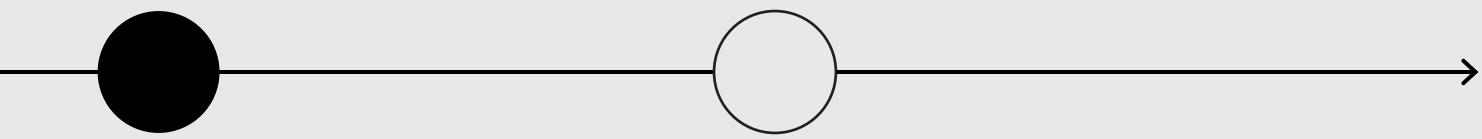

WHAT'S
IN THE
AIR?
LEARN HOW TO READ
THE TAG


WHAT'S IN THE AIR?
TAKE A TAG, HANG A TAG.
HELP EACH OTHER SEE WHAT IS IN THE AIR WE BREATH.



AN INCITING INCIDENCE

THE LOWEST ASK



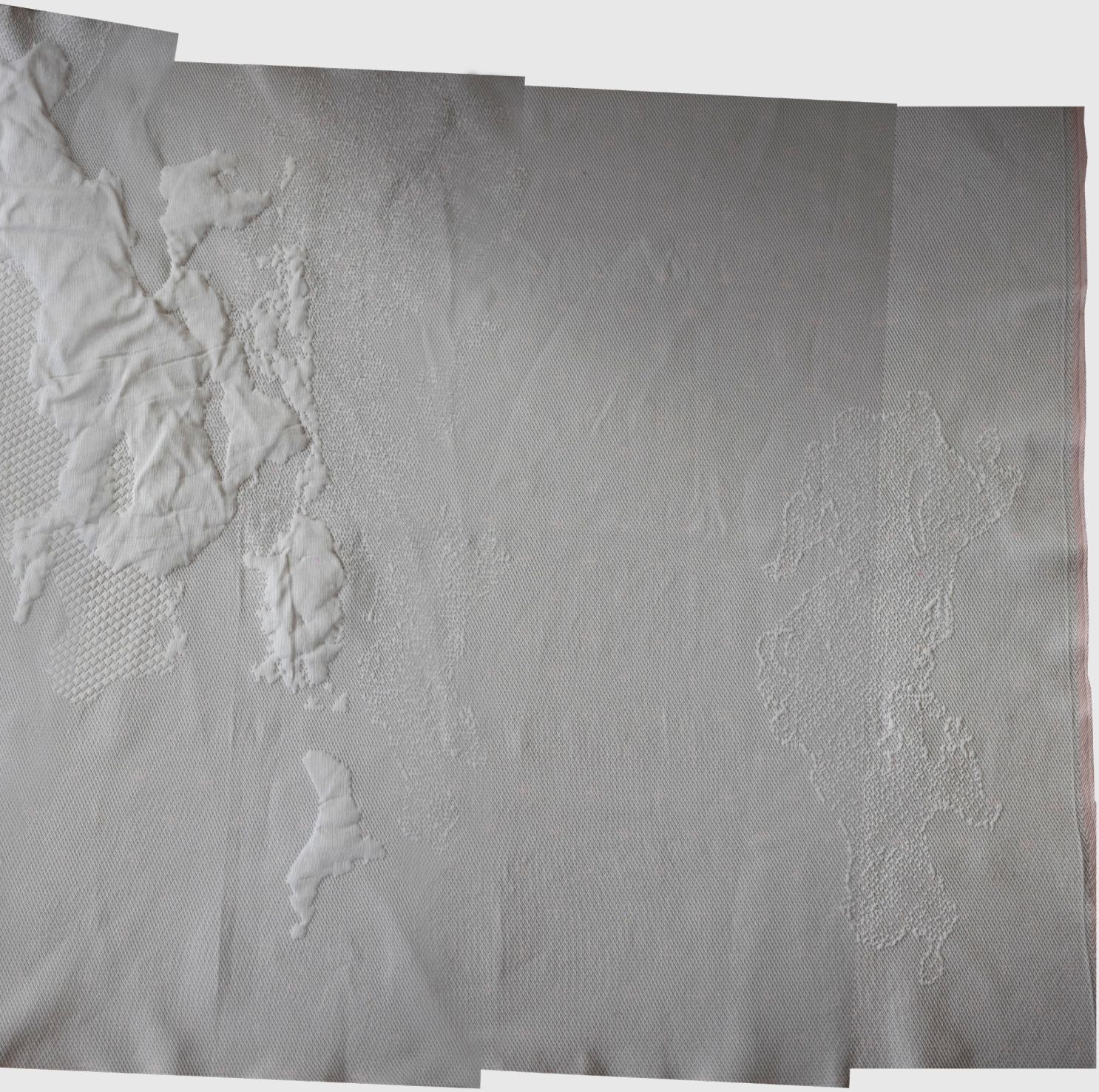
THE ON-BOARDING
OF THE DABBLER

PARTICIPATION OF THE STEADY

A garment that exists as the intermediary between a concerned party, one that wants to know more about monitoring air-quality, and the dabbler, one that is an active participant in the monitoring process. The textile is an abstraction of a map of Providence, RI along with the areas that have an opportunity to monitor air-quality. These areas are where the garment has been actuated with the phase-changing pigment. A requirement for the textile is that is has to be 100% cotton, it has been constructed on a digital jacquard loom.



12 An abstracted map of the Port of Providence, formed into a coat, and applied with colorimetric gas-sensing pigment to become an active, dynamic sensor.









13 Each garment has been applied with a varied amount of phase-changing pigment, so overtime the user will be able to identify the contaminates they have come into contact with, observing them as traces.

















14 **Dye Test, 000:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Applied on 100% cotton knit.



15 **Dye Test, 001:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Applied on 100% cotton knit. Left in vapor chamber for twelve minutes.



16 **Dye Test, 002:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Applied on 100% cotton knit.



17 **Dye Test, 003:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Applied on 100% cotton knit. Left in vapor chamber for twelve minutes.



18 **Dye Test, 004:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Applied on 100% cotton knit.



19 **Dye Test, 005:** Applied phase-changing pigment, suspended in an earlier version of the silicon mixture. Applied on 100% cotton knit. Left in vapor chamber for twelve minutes.



20 Identifying the willingness of self-selectors to participate in hanging tags. The process: taking a tag from the tear-away posters, hanging the tags, and then asking people to post the area where tags have been hung via a Google Survey and naming their tagged area as **Tagged Zone.**















21 From Top Left to Bottom Right, **Tagged Zones**: Untitled 01, Fly Zone, IPP_Under, Regular Survey, Untitled 02, Try and Find It, Greenway



0 1



0 3



0 4



0 6



0 2



0 5



0 7

21 Taking the metadata from the uploaded photos to understand the location around Providence. For each image there is an assigned geo-location. On page right, these are the latitude and longitude coordinates for the areas where participants have hung tags.

01	41°82.7861’ N	-71°42.3948’ W
02	41°75.1363’ N	-71°27.7012’ W
03	41°50.2940’ N	-71°22.5800’ W
04	41°78.5561’ N	-71°36.9847’ W
05	41°65.5735’ N	-71°30.1114’ W
06	41°79.7646’ N	-71°39.1788’ W
07	41°82.0624’ N	-71°41.0166’ W


01
04
05
03
06
02
07

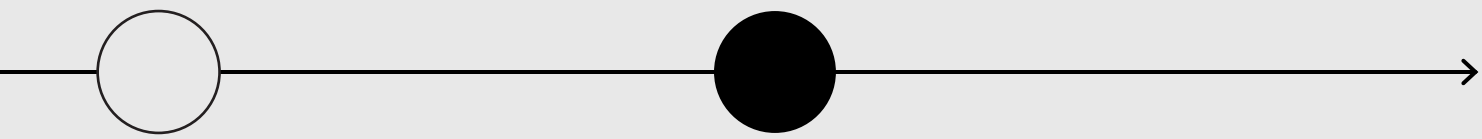
The fragmented map is intended to highlight the areas that are not yet actively being monitored by dabblers. This map was made to offer an individual instance where seven people were initially interested in taking a hang-tag to measure air-quality (the lowest ask), be offered a garment as a way to observe how air quality changes on a daily route (the on-boarding experience), and finally, as a way to close a feed-back loop, actively contribute that information back to a public facing map, where the information is logged and observed by others in the community. This map is meant to be public, exist outside, be used, be changed, be an information tool.



22 A final resolution of the map displaying the current areas where tags have been hung by participants - adding an extra level of information as overlay.
This is meant to identify the closing of a feed-back loop.

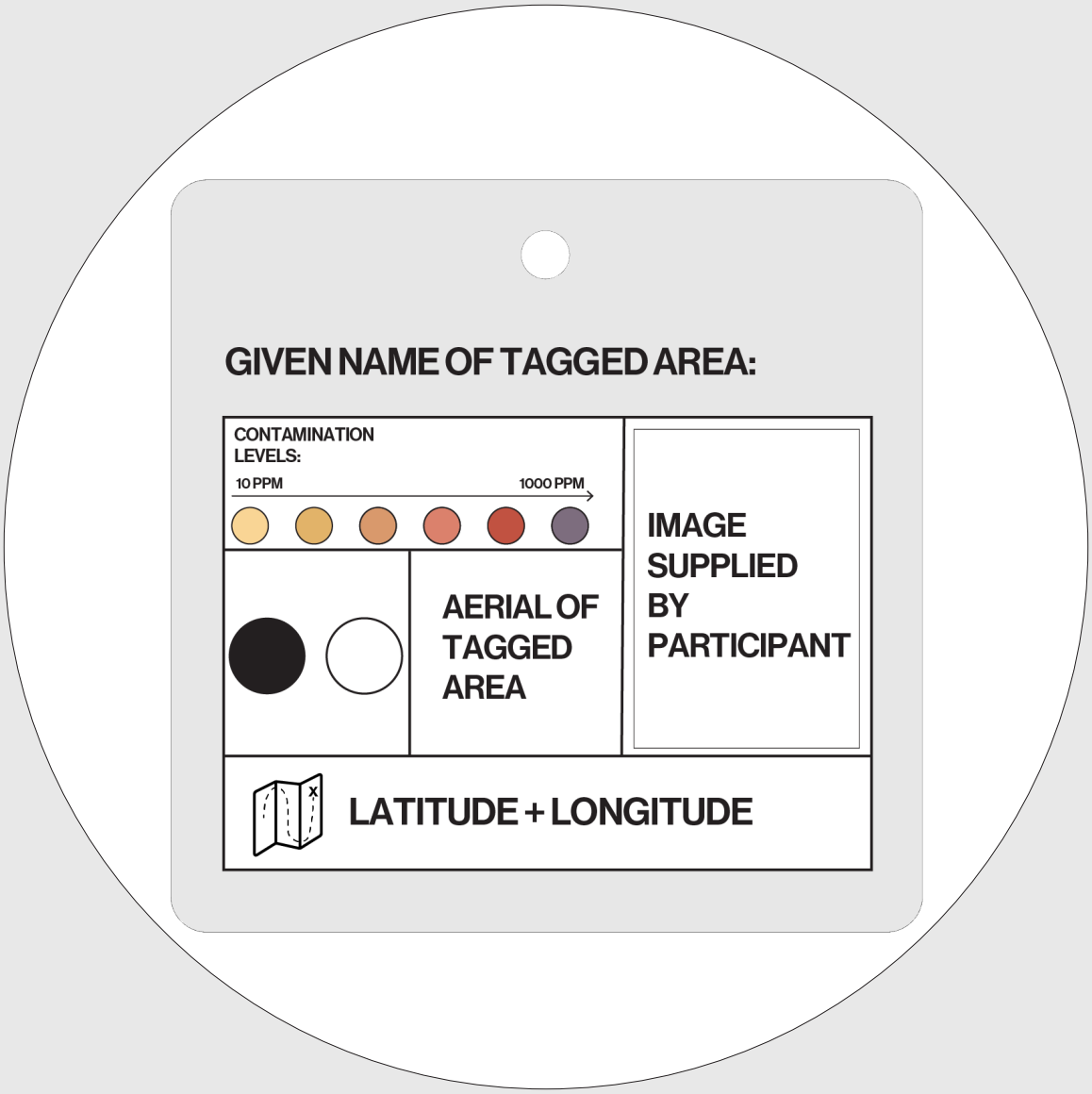
AN INCITING INCIDENCE

THE LOWEST ASK

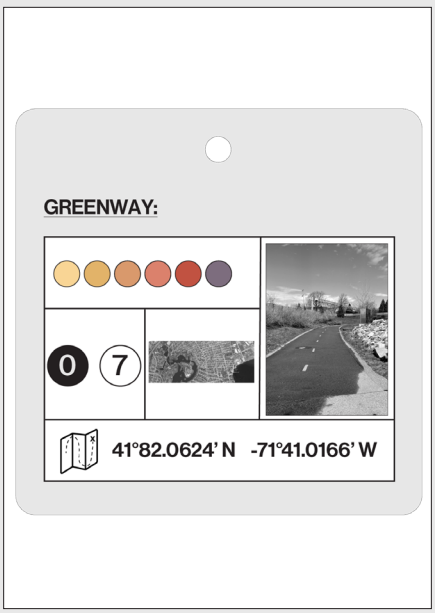


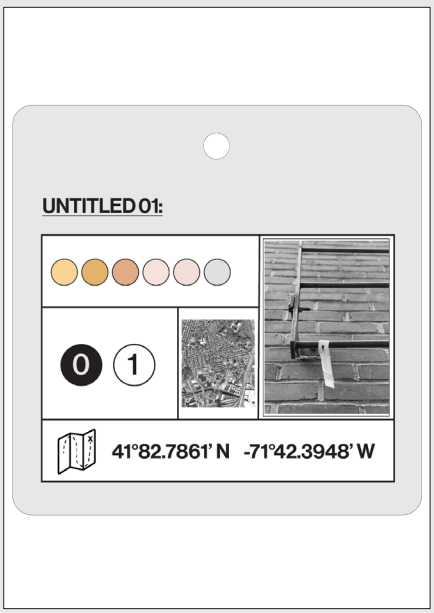
THE ON-BOARDING
OF THE DABBLER

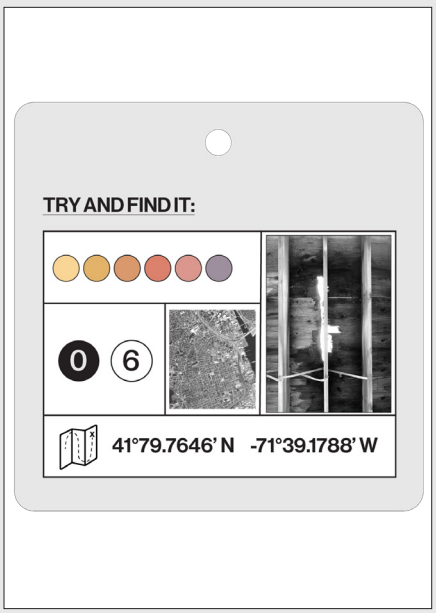
PARTICIPATION OF THE STEADY



23 A tag that catalogs the information provided from the 'lowest ask' hang tags dispersed across the city of Providence. The tags represent the air quality with a spectrum of colors that correlate to the colors displayed on the jackets.







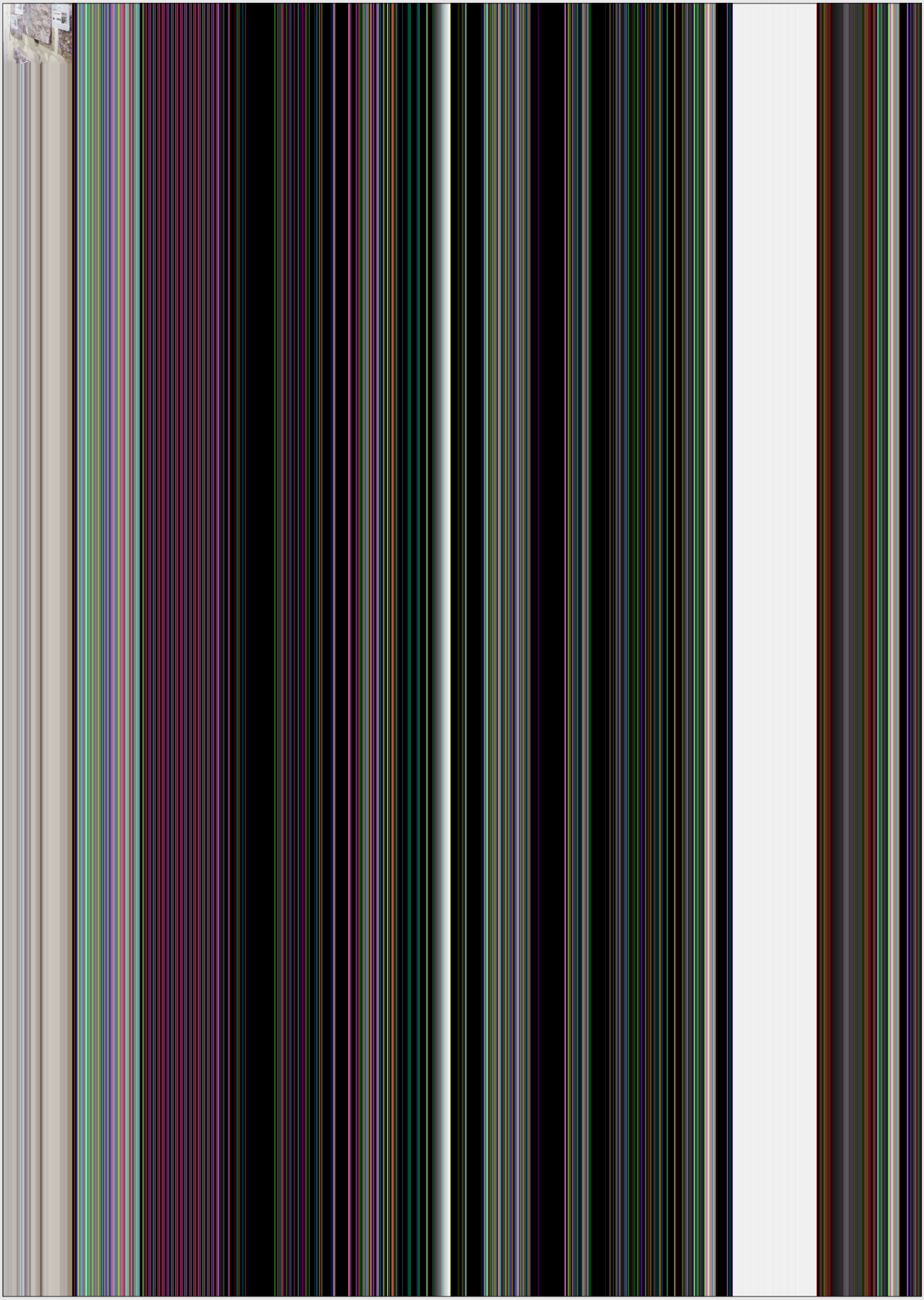
24 Each tag is meant to incorporate the zone name given by the participant that has hung a tag and reported its location.

A Proposal:
The tags are hung on a public-facing display - a repository for others to see the information displayed on the map of the Port of Providence and, hopefully, get new concerned parties interested and willing to participate in monitoring the air we breathe.




SUB
SEQUENCE
What might it look like to make
the nebulous quality of air
pollution visible?
WHAT'S
IN THE
AIR?
HARD TO
DESCRIBE


SUB
SEQUENCE
What might it look like to make the nebulous quality of air pollution visible?
WHAT'S IN THE AIR?





Epilogue

The work and insights discovered throughout this process have centered around confidence building, trust, and reliability. To further the work that has been accomplished up to this point requires partnership. Partnership is something that presents itself once you are clear on the initiative, you cannot seek partnership and then work to unearth initiative. A hope is to utilize connections that have emerged with the Rhode Island DEM: coordinate co-creation workshops, and participatory action research on how to on-board willing participants to the realm of citizen-science.

An exciting, under-researched realm is that of prediction, machine learning, and the intersection of these within the citizen-science field. Can we imagine and realize creative future relationships with the predictive machines? How does that correspond with health, decision making, communicating to acquaintances?

I believe that literacy for environmental data collection is an imperative step to shape change.

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Edition _____