Max Willis
MFA, PhD
Design Research

My design research practice is discursive, enacted with two distinct voices, that of a researcher and that of a creative practitioner. I try to let both speak freely: in my research I articulate towards shaping plausible futures, harvesting precedents and actionable possibilities from scientific literature, collaborating across communities of practice, and documenting processes and outcomes as research contributions. In my creative works I speak to explorations and expressions of a more intimate, activist and socially interventionist nature, sharpened on the whetstone of critical and speculative design futuring. I extend my scientific vocabulary with local, traditional, tacit and experiential knowledge forms. My goal with each design is to create an engaging, immersive experience through which to study social realities, to shape future trajectories, and where possible to leverage the mediation potential of technology, the unique dispositions of game and play, and the interaction design techniques of discourse and dialogue to influence those realities towards preferable, equitable and sustainable futures.

Learn more about me, my heritage and creative background as I ride a skateboard 1400 Km across Amdo and Kham Tibet, in this action art documentary **Coffee High**

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Risky Futures : An Adversarial Discourse Game and Group Modelling Tool

Communication of Climate Change and other socio-technical risks (e.g. heatwaves, floods, infrastructure failure, alien invasion) aims to reduce impacts, limit damage and ultimately save lives, as well as foster people's adaptive and coping capacities to prepare for future events. Yet risk is a complex, at times ambiguous notion, which affects its understanding and management. Risk communication is further hindered by factors such as expert/non-expert knowledge exchange, imbalances of top-down approaches, trust, and empowerment. In response to this, participatory and community-oriented strategies, including game-based interactions, have been implemented to support risk management through stakeholder engagement. Joining this conversation on participatory strategies in risk communication, is Risky Futures, an adversarial discourse game that facilitates discussion of future environmental, social and technological risks, and imaginaries of appropriate human responses. The game is played with a Team Risk and Team Humanity: in Level 1 conversational play, we speculate on risks and imagine responses; In Level 2 group modelling play teams engage in semantically enriched conceptual modelling using ontology-based formalisations. The collective activity of visually communicating ideas in addition to discussion and arguementation is mediated by the egalitarian, inclusive, multi-perspective engagement that is game and play.

15 Risk Cards

EARTH
- Earthquake
- Volcanic eruption
- Resource scarcity
- Waste Management
- Soil contamination
- Nutrient defficiency
- Landslide, etc

RISK

TECHNOLOGY
- Breakdown
- Lacking ICT Capacity
- Unintended uses
- Energy Consumption
- Path-dependency
- Cybersecurity Attack
- Identity theft
- AI, etc

RISK

SOCIAL
- Inequality, Injustice
- Gender Discrimination
- Intercommunal conflict
- Loss of Intangible Cultural Heritage
- Criminality
- Education access
- Migration, etc

RISK

ENERGY
- Expand renewables
- Smart grid
- Ocean wave energy
- Hydrogen systems
- Efficient storage
- Reduce consumption
- Reduce waste, etc

MITIGATE OR ADAPT

INFORMATION
- Open Science
- Free and Open Source software/hardware
- FAIR data practices
- Science and risk communication
- Open Access
- Democratisation, etc

MITIGATE OR ADAPT

URBAN
- Blue-green spaces
- Sustainable transport
- Urban farming
- Water and energy saving
- Walkable cities
- Spatial planning
- Seawalls, etc

MITIGATE OR ADAPT

15 Response Cards

Team Risk:
Choose 1 Risk Card
Describe a future risk
Imagine impacts
Exploit vulnerabilities!

Team Humanity
choose 2 Mitigate - Adapt cards
Describe your futurre response
Reduce exposure to hazards
Reduce harm of impacts
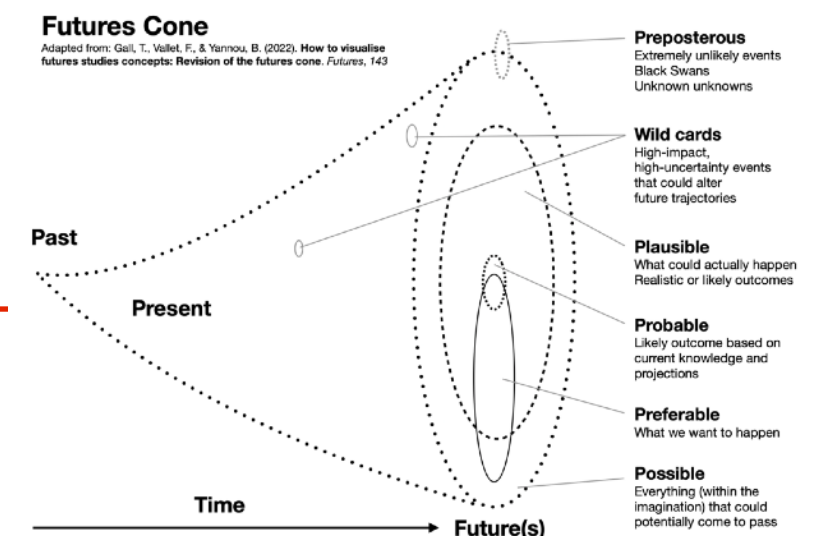**Address vulnerabilities**

15 Discourse Cards

AGGREGATE RISK
Choose one more Risk card and imagine a co-occurring risk that adds to humanity's problems.

$R^1 + R^2$

RESPONSE OUTCOME RISK
Invent a possible disastrous consequence of humanity's response to the proposed risk

+1 vote for Risk

EQUILIBRIUM
Overcome the risk with a possible, plausible evolution of the system that redirects, reduces or removes the impact

+1 vote for Humanity

Each Player and Spectator
choose 1 Discourse Card
Make Humanity's troubles worse
Counteract Risk with new ideas
Influence the Discussion

1 Futures Cone

Futures Cone
Adapted from: Gall, T., Vallet, F., & Yannou, B. (2022). How to visualise futures studies concepts: Revision of the futures cone. Futures, 143

Past
Present
Time
Future(s)

Preposterous Extremely unlikely events Black Swans Unknown unknowns

Wild cards High-impact, high-uncertainty events that could alter future trajectories

Plausible What could actually happen Realistic or likely outcomes

Probable Likely outcome based on current knowledge and projections

Preferable What we want to happen

Possible Everything (within the imagination) that could potentially come to pass

Vote!
Is Humanity's Preferable future Plausible, Probable…
…or Preposterous?

Group Models and Multimodal Discourse Analysis

Risky Futures has been deployed in numerous formal and semi-formal workshops with environmental scientists and domain experts, and information systems professionals. In each round of gameplay, players create models of risks and responses following reference frameworks, e.g. Social-Ecological systems Integrated Ontology github.com/gretaAd/session, and the Common Ontology of Value and Risk (COVER). Through a practice of Multimodal Discourse Analysis, I examine these models together with notes on in-game discussions, group debriefs, pre- and post-experience questionnaires, and observations of embodied interactions during gameplay, to identify emergent shared understandings vis-a-vis the domain, and the conceptual reference models themselves.

Willis, M., Adamo, G., & Sperotto, A. (2025). Risk Response. In International Conference on Research Challenges in Information Science (pp. 156-172). Springer, Cham. **(Link)**

Low-cost and Open:

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Design speculations on values for sustainable future technology

For my first postdoc (2019-2021) I relocated to Madeira, Portugal and joined James Auger's project ***Redesigning Madeira: Using Speculative Design to Rethink Energy Policy and Consumer Behavior***, funded by the Portuguese Fountation for Sceince and Technology (PTDC/ART- DAQ/31691/2017). My research there began with a review of Auger's Gravity Battery energy storage demonstration, elaborating the disruptive potential of new energy technologies for energy storage, transmission and commercial applications. While James had derived his design inspirations from the radical elevation profile of the island, I shifted focus to the coastline and marine renewable energy. Leading the project's small team, I explored backcasting and material speculations, imagining a preferred future in which environmental monitoring was affordable, open and accessible, and which could support local scientists and communities, and working backwards from that future to define what design actions can be taken in the present to advance on that future. We developed low-cost marine wave dynamics and water quality monitoring systems to demonstrate the plausibility of our future vision, and in the process elaborated value

propositions, design and deployment constraints, and how Open Science principles can contribute to sustainable futures. Our monitoring systems consist of solar-powered data buoys, radio transmissions, shore-based gateways and a server-side implementation that captures, transmits and makes sea state data available in near-real time via the web. Our functional prototypes, built using recycled and re-purposed materials, inexpensive components, open-source code and in-house digital fabrication were field tested in Madeira's Garajau Marine Protected Area (PT). This research not only demonstrates the challenges of developing technology from the periphery and technology values as experienced on remote islands, but evidenced the discursive nature of speculative artefacts, which drove conversations on sustainability, technology and small island development, engaging the knowledge of a wide range local professionals from the Oceanographic Observatory of Madeira, the Madeira Marine Sciences Center, the Institute of Forests and Conservation, regional port authorities, maritime police, Environmental Impact Assessment agency and other local stakeholders.

Functional and Discursive Dispositions of Speculative Artefacts

Design first expands potentiality, by inciting new ideas and approaches, then it expands actuality, through the prototyping and construction of designed things. A thing carries its own future once its concept is given a material form. The research that emerged from this study ultimately examined dual dispositions of technology, elaborating how the functionality of the artefact aligns it with existing reality and makes it's proffered future more plausible, and illuminating the discursive dispositions of speculative artefacts. Throughout the prototyping and deployment of our future things, we observed the cross-pollinated ideas between local scientists and stakeholders, and started an extended conversation involving designers, engineers, marine biologists and oceanographers, local dive professionals and citizens, even navy admirals discussed with us the local precedents and future implications of our buoy project. The research was shared at Macaronight inter-island Macaronesia research sympoosium, in videos and television interviews, in a presentation at 22nd MARE People and the Sea Conference at University of Amsterdam, and a journal article (submitted); all of these engagements demonstrate the extended and continuing discourse produced by the speculative artefact.

Visit the project website **http://www.islandfutures.net/databuoy**

Mind the Gap: A Game-based Collective Narrative on Gender Roles and Identities in STEM

Mind the Gap is a design research that elaborates gendered experiences and identities in STEM education and careers. It takes the form of a role-playing game, directed by participant-authored scenario and rule cards. Structural inequalities are built into the game using procedural rhetorics and adversarial rule cards. The research was initiated with a review of literature, commentary, research reports and surveys that highlighted the diverse challenges facing women and LGBTQAI+ people especially in technology fields. From this discourse, the Mind the Gap proto-game was developed with small groups of play testers to create the research artefact which was then co-created in the field by hundreds players at conferences, demos and exhibitions around Europe, even in India and Taiwan. The game has subsequently been translated into Spanish and Mandarin Chinese for distribution in Spain, Central- and South America, Hong Kong and Taiwan.

Mind the Gap gameplay revolves around cards containing micro-narratives that describe situations of gender advantage or disadvantage. Context cards report a scenario and gender-related privilege or detriment. These cards impact gendered player-characters negatively, for example, *"Your boss wants to date you, but you refuse. No promotion? (Woman: -3, Man: 0)"* and positively, *"Your mother went to work and father stayed at home, (Woman: 3, Man: 1)"*. Mechanic cards introduced game rules to enact discrimination, *"Congratulations! You're having a baby. If you are a woman, go to Biological Clocktower and continue on the Family Line"* as well as empowerment, *"Women Unite! A new gender studies program starts at your University. Each female player roll the die, add the numbers and all advance together"*. The Decision card gave players a choice of actions stating *"Congratulations! You can have a promotion. Men plus 30% salary, Women plus 7% salary. Take the promotion or go back to Gender Central"*

Players are randomly assigned a gendered character, with Man players using a 6-sided dice to advance, while Woman and Rainbow players use a 4-sided dice. Players then compete on the gameboard to fulfill their careers. The main rule card is "Congratulations, you're having a baby! Woman players move to Biological Clocktower and continue on the Family line" which takes players on a longer route backwards on the career line. Responding to the almost universal commentary from players, the initial binary representation of gender was redesigned to include a third, Rainbow gender which significantly altered play.

Discourse analysis of participant-authored collective narratives

Building on an initial 21 seed cards, Mind the Gap grew to more than 250 participant-authored game cards (and counting) whose scenarios, rules, decisions and the relative weight placed by participants on the impacts of their contributions offer an incredibly detailed and intimate perspective into gendered experiences in STEM. Using Discourse Analysis techniques of thematic analysis, dialogic syntax and discursive psychology, clear markers of emergent, negotiated interactional identities can be observed in the gameplay, the formation of agonistic space and interplay of identities between player and player-subject. Meanwhile players begin to co-opt the gameworld, adding genders, changing the rules and making suggestions through their gameplay for potential, more equitable future gender perspectives in STEM.

Read more about this unique collective narrative in my thesis "On Agonism and Design: Dialogues between theory and practice **here**

Visualizing Urban Narratives:
The Story of the City and the Automobile

One of the more challenging narratives playing out in Sincil Bank, Lincoln, UK is related to the historical shape of the neighborhood and evolving urban practices that define it as a place. That narrative , is "The Story of the City and the Automobile." Sincil Bank was designed for walking or bicycle access to essential services and the factories where most residents would have worked. In contemporary Sincil Bank, the employment provided by the factories has largely evaporated, and with the rising rate of automobile ownership, the tight urban space with narrow streets has an overabundance of cars. Car garages currently occupy the few spaces that might potentially be available for re-purposing as green areas. Residents complain that outsiders visiting Lincoln use Sincil Bank streets as 'free public parking', and there is widespread concern that some streets have become dangerous for children. Several streets are known as 'rat-runs' and are often full of fast-moving traffic, cutting from the High Street to the highway on the way out of town. The entire neighborhood is bordered on the eastern side by the three-lane Canwick road, where the walkability of the neighborhood is diminished.

To investigate, a creative inquiry was built on the historical city-making practice of Dérive, or Urban Drifting, promoted by Situationist International and COBRA, two urban arts collectives that were active in Paris, Amsterdam and Berlin after World War II. These groups comprised of theorists, artists and architects who interpreted dérive as urban drifting, performative wandering as an investigation of urban life and challenge to hegemonies of power evident in the socio-material configurations of the city. Their collaborations spawned a number of foundational performance artworks and a new field of psycho-geography. This investigation of the emotions, sensations and ambiences of places in the city made visible how maps influence both the shaping of the urban environment and the citizenry's understanding of it. For example Guy Debord's 1955 "Psychogeographic Guide to Paris" isolated the emotional and social characteristics of favored Paris neighborhoods, and remapped them showing the traces between ambiances. Paul-Henri Chombart de Lauwe's 1957 map of the 16th Arrondissement depicting the movement of a student in one year as well pointed out the unique shape of a lived environment from an individual's perspective. These constructions aimed a critique at the maps and plans of contemporary architects and city planners and suggested that citizens were being overlooked as the urban environment was being developed around them. As such, they provided some relevant background materials upon which to develop creative inquiries in contemporary Sincil Bank.

Psychogeographic Guide to Paris, 1955
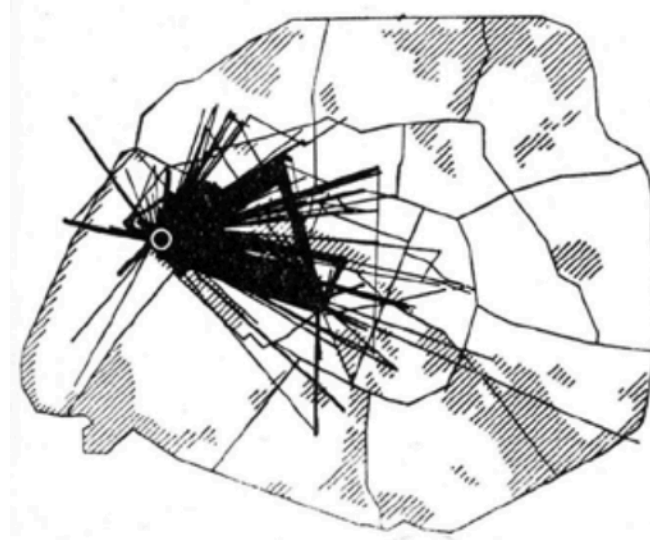
Map of Paris' 16th Arrondissement, 1957

Creative inquiry: Urban Drifting with bicycle and gps

"The Story of the City and the Automobile." was visualized with a bicycle, satellite tracking device, and open source mapping application to enact gps drawing as a new way of experiencing the city and investigating its walkable, cyclable aspects. A series of experimental tracks were created that could be displayed on any mobile device using a web browser, and followed using a free web map interface by members of the public who wished to engage in this unique urban placemaking and mapping activity.

The activity of derive bicycle gps pictures drew sharp attention to personal safety and the very real traffic dangers in Sincil Bank, as focusing too much on the gps device or mobile phone while cycling proved to be potentially quite dangerous. This was obvious to me as well as to bystanders: once while the drawings were being scoped, a young child, himself riding a bicycle called out "Be careful, Mister!" This derive project highlighted a critical disconnect between the whims of pedestrian or cyclist engaging in creative city making and the constraints of the built urban environment.

*Read more about bicycle gps urban drifting in my thesis "On Agonism and Design: Dialogues between theory and practice [here](). *

Urban Resource Heat Map

Circular Economy Amsterdam
Urban Mining location-based game
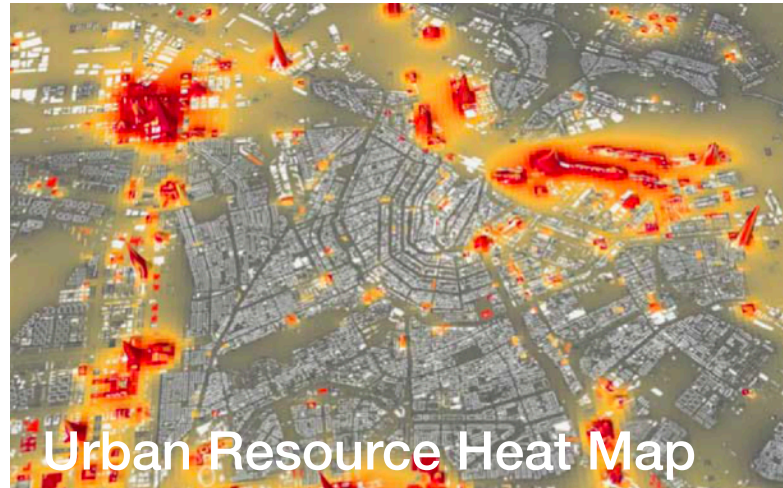
During our attendance of the Games for Cities COST Training School : Circular Economy Amsterdam, my design teammates Moozhan Shakeri and Mauro Salvador and myself partnered with Amsterdam Institute for Advanced Metropolitan Systems (AMS) to address *Prospecting Urban Mines of Amsterdam*. This initiative, supported by the Waag and University of Delft, is an aspect of futures-focused circular economy that imagines a potential future in which material resources become financially nonviable or too carbon sensitive to bring into the urban area. These resources will then need to be retrieved from existing urban infrastructures, hence the concept of urban mining. The game design team was tasked with raising awareness among citizens to the value of metal resources in existing structures in the City of Amsterdam and the potential for future recycling and or reuse. AMS provided a heat map of surveyors' perceived material values of the city and confined the investigation to the neighborhoods between Staadsleidenbuurt and Westerpark, an area that did not feature as particularly mineral rich on the map.

In-game data collection

The challenge was approached as a location-based game and was strongly influenced by Critical and Speculative Design concepts. A game design was imagined that would run for a half hour, with players beginning and ending gameplay in Westerpark. The game was narrative driven and revolved around a non-player character Kong, a giant ape that was destroying the city. Players must save the city by building a metal cage to contain the ape, and that metal must be mined from the urban environment. Failure to collect enough metal to build the cage resulted in Kong destroying the neighborhood and players losing the game. If enough metal was collected, Kong was contained and put on a ship out of the city. The gameplay would unfold as players navigate the game-space using a gps-enabled tablet or mobile phone, and follow a pathway through the neighborhood that passed by selected structures. At each place, players would be presented with information about the building in question, its potential value in material resources, thus elaborating the public awareness aspect, as the game interface and activity transmitted information about the structures and environment. Before deciding to reclaim the materials from each structure, and thereby destroying it, players would be prompted to provide their own evaluation of the *social value* of the structure. The intention was to extend the idea of value in the building to the potential rezoning or reuse of the building along the principles of reduce and reuse, rather than an immediately move to recycle.

Prototype & Enactment

MetalKong was sketched and fitted into a mockup digital device as a paper prototype which was then play-tested with volunteers. A video was created to depict the use of the artefact if played as a citizen engagement game on the streets of Amsterdam. The prototype as a speculative artefact served as a prop for envisioning the lived experience of the thing and demonstrating gameful communication and data collection potentials.

Watch the MetalKong video here
maxwillis.net/media/videos/
metalKong.html

Listening to the Walkable City

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Mapping spatial perceptions between real and virtual

This immersive soundscape installation investigates pedestrian alleys and staircases on Hong Kong Island, an addition to the research project "Hong Kong Stair Archive: Documenting the Walkable City" with architect Melissa Cate Christ. When mapping and creating an online catalog of stairs we wanted to capture the particular characteristics of these urban spaces through their unique sonic ambiences. Relatively quiet places buried within the roar of a noisy megacity, their inaccessibility to cars and delivery vans give precedence to voices, laughter, birdsong, and the sounds of human life and activity so often lost in the drone of traffic and trams. I recorded an archive of sounds to capture the contemporary social, cultural and commercial activities which define the areas' spatial practices, and recreated the sonic environment as an ambisonic soundscape installation in a car park in Trento, Italy during the COOP2016 conference. The sounds are disembodied, decontextualized as individual urban cultural records from several months, and thousands of kilometers distant. Yet recombined and experienced as a technology-mediated construct, the ambience of the actual environment is recreated, and experienced first-hand in an exercise of virtual urban placemaking.

"A gutter, a water loss slips unseen in a silent narrow street, on the margin of the big and noise metropolitan arteries"
(Anonymous Participant)

"I felt I was walking a bit in circles; maybe moving back-and-forth; am I looking for an address?; The sounds move from one side to another; but I felt more like it was me that was moving."
(Anonymous Participant)

"If I close my eyes I have the impression of find myself elsewhere"
(Anonymous Participant)

"crimescene…"
(Anonymous Participant)

Cognitive Mapping and Thematic Analysis

Participants to the installation were invited to take part in the evaluation and produced cognitive maps while immersed in the soundscape, which described the sounds they heard, spatial perceptions and reactions to the ambience portrayed by the sounds. The probe's 34 participant-authored cognitive maps were transcribed and thematically analyzed using AtlasTi, first grouping descriptions of sounds and sources together, then examining for inscriptions of sense of self and place, exploring not only what, but how people reported. This work spurred my interest in embedding feedback mechanisms within technology-mediated experiences, even within the digital construct to draw out attitudes and perspectives from within the experience.
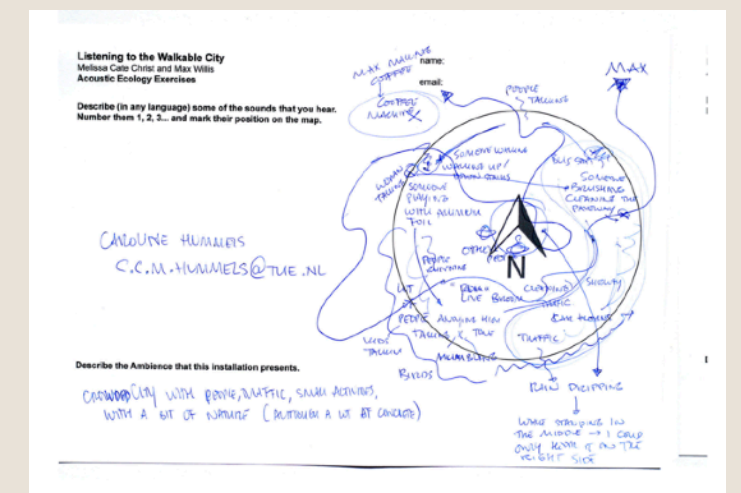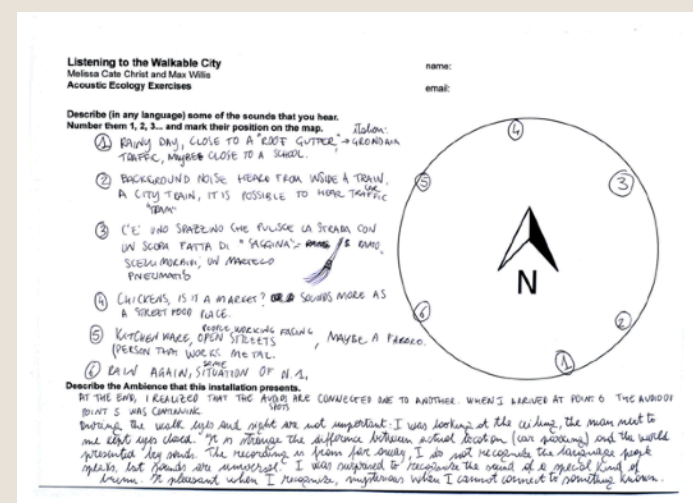
Willis, M., De Angeli, A., & Zancanaro, M. (2017). Experience probes: Immersion and reflection between reality and virtuality. In *Human-Computer Interaction–INTERACT 2017: 16th IFIP TC 13 International Conference, Mumbai, India, September 25-29, 2017, Proceedings, Part IV 16* (pp. 253-262). Springer Publishing. *(Link)*