Growers Without Borders: Community and Remote Sensing of Encounters with Nature

FINAL ACCEPTED MANUSCRIPT

To cite this article: Markus Wernli & Ilpo Koskinen (2025): *Growers Without Borders*: community and remote sensing of encounters with nature, *CoDesign*, DOI: 10.1080/15710882.2024.2447851

To link to this article: https://doi.org/10.1080/15710882.2024.2447851.

Published online: 21 Jan 2025

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Abstract

This paper studies the benefits of a collective remote sensing method in the context of Growers Without Borders, an eco-social farm in Hong Kong. The farm was a collaborative effort of a design school and a hotel association to develop methods for recycling compost and food waste. Researchers recruited volunteers and asked them to sign in to a WhatsApp group. The group provided the researchers an opportunity to understand the volunteers when they were working on the farm and encountered issues they would not have faced in their city life. This paper describes encounters with plants, critters, and soil to show how these methods gave geographically dispersed participants and researchers an access to the farm and its activities.

Keywords

codesign – remote sensing – instant messaging – interspecies permeability

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1. Introduction

This paper describes how collective remote sensing was used to co-constitute Growers Without Borders, an eco-social farming pilot in rural Hong Kong, and how instant messaging created a generative interspecies permeability (Wernli and Chan 2023, Koskinen 2003). The farm was a collaboration between a hotel in central Hong Kong and a welfare center in the countryside near the farm. Its purpose was to reduce the hotel's environmental load by composting food waste into biofertilizers for growing organic vegetables and providing food assistance to families in need (Wernli and Chan 2023). The pilot was codesigned by a research team led by Author 1, but its core was a community of volunteers who ran the farm operation on the ground.

Growers Without Borders had two main goals. The design goal was to codesign a system for recycling nutrients from food waste locally and to create a community that provided support for this activity. The research goal was to understand how the community came together during the pilot. The aim of this paper is to describe how Author 1 followed the community *inter pares* using instant messaging as a remote sensing method. We illustrate these methods by showing how the community, consisting mostly of urban inhabitants with little farming knowhow, came to interact with nonhuman entities it encountered during the pilot and how it came to discover its interdependency on the natural world.

Design and HCI literature show increased interest in remote sensing. However, most research is technical, expert-driven, often still conceptual (Du et al. 2023, ACM Proceedings 2023). It focuses either on sensor devices or data processing. Some studies that have studied it in the context of design, for example, in landscaping (Wu 2023), health (Kolovson et al. 2020, Orlowski et al. 2016), citizen science (Coulson and Woods 2021), and sustainability (Mohanty et al. 2024), typically use cameras, detection devices and sometimes data points or visualizations. In this definition, remote sensing becomes a technical system that collects sensor information to be monitored and actioned from afar by humans, organizations, or technical actuators. In contrast, this paper shifts focus and studies a collectivized sensorial field. It describes a method for studying a sensing community for advancing competencies in situated work settings (Goodwin and Goodwin 1996, Szymanski and Whalen 2011).

2. Remote Sensing in Design Research

The volunteers of Growers Without Borders coordinated their actions through a WhatsApp group. It created a perpetual contact for talking about the needs of the farm, events in it, and

experiences. WhatsApp interactions guaranteed an overall continuity (Mol 2021, 35–49) for the eco-social operation. These interactions helped the volunteers to formulate, suggest, and affirm responses that tend to be contextually appropriate and made them aware of interspecies dependencies (Butler et al. 2016, 278–302, Gatto and McCardle 2019).

The interactions gave the volunteers an opportunity to follow the farm even when they were not there (Wernli and Chan 2023). Previous codesign research has usually built on sociological insights from ethnomethodology, symbolic interactionism, activity theory, and practice theory to understand these interactions (Crabtree 2003, Koskinen 2003, Kuutti 1996, Shove et al. 2012). These perspectives all foreground the importance of studying social activities.

The problem is not theory but research practice: how to follow these interactions when they unfold. Design researchers have used several methods for capturing these interactions, but these confront limitations. Ethnographic methods push designers to "be there" (Geertz 1983) to study the interactions as they happen and collect evidence about them with observations, interviews, photographs, and videos. Ethnography, however, has drawbacks: the researcher cannot "be there" all the time. Instead, their data depends on their skill in recruiting sponsors and informants, as well as their sampling scheme and research strategy. Another popular class of methods builds on cultural probes that share many of the desirable qualities of diary methods (Gaver et al. 1999, Bolger and Rafaeli 2003). With diaries and probes, researchers can observe interactions even when they are not there. Yet, they cannot influence who writes a note or performs the probe tasks, and the results are almost always retrospective rationalizations of what happened. Diary keepers vary in conscientiousness, ability, and interest, and the probes ultimately capture only those interactions that they have been designed to capture. Some of these potential biases can be mitigated by experience sampling techniques and mobile probes (Csikszentmihalyi and Larson 1987, Hulkko et al. 2004). However, the probe returns remain indirect and dependent on how people produce them.

Instances of the interactions, however, can also be collected remotely, which helps address some of these issues. In a series of mobile multimedia research in Helsinki and Paris (Kurvinen et al. 2008, Relieu 2002), researchers recorded mobile interactions remotely in real-time, capturing those very interactions that members of the groups experienced by themselves. In these studies, remote methods allowed researchers to follow activities:

- When they were not witnessing them;
- In a natural setting, unconstrained by researchers' questions and interactions (Kurvinen et al. 2008);
- As they happened and by implication to how the recipients made sense of events collectively (Kurvinen et al. 2008);
- Without distorting them by their presence, which helped to avoid "Hawthorne effects" where volunteers react to their perception of the researcher rather than behave normally (Roethlisberger and Dickson 1939; Kong-Ming New 1956);

- Outside the site in kaffeeklatsch, shared walks, acts of ostracism, and any other mundane interactions happening in the peripheries of the design activities. Informal interactions can be crucial for researchers with an interest in understanding how considered ways of engagement and community are constituted (Light and Akama 2019).

As in these two precedents, Growers Without Borders co-constituted a WhatsApp group that provided Author 1 a means to follow how people discovered issues, tried to resolve them, organized their activities, and shared their experiences. The group had several benefits in the case of the farming pilot. Firstly, the volunteers could drop into the farm when they had time. For this reason alone, usual contextual methods like ethnography and cultural probes would have been either impossible or expensive (Wernli and Chan 2023). Second, the pilot was conducted partially under Hong Kong's Covid-19 protocols, which were among the strictest in Asia. When Covid-19, a relative of SARS that had traumatized Hong Kong in 2002–2004, the city went into lockdown, restricted outdoor activities and access to public transport.

3. Growers Without Borders

Growers Without Borders was sponsored by the local hospitality industry. It comprised farm volunteers as part of intersectoral agriculture research (Wernli and Chan 2024). Hong Kong's agriculture is characterized by small acreage, family ownership, aging farmers, and staffing shortages. Thus, the researchers experimented with a collective farming format to engage younger and diverse populations in land care. The researchers were able to rehabilitate a fallow field inside a larger vegetable farm whose veteran farmer was keen to assist in improving local soils through the study. The research contract required Growers Without Borders to generate 50 liters of microbial catalyst monthly for the chefs of a collaborating hotel. The chefs interlaid the catalyst with food waste in fermentation containers to minimize odors. The fermented organic material was transported to the farm. At the farm, the volunteers maturated this into one cubic meter of compost monthly. The growing process required observing and restacking the compost at least three times a week to avoid bacterial overheating and suffocation. The compost site was located about 40 kilometers from the hotel and 30 minutes from the nearest train station by foot.

The mixed-gender cohort of volunteers under study had 31 volunteers, 20 females and 11 males (including Author 1) aged between 18 to 55 years. They agreed to volunteer time on the farm in return for farmland access, free harvest, upskilling, and companionship. The farm team was ethnically and demographically diverse. It had immigrant mothers associated with a welfare center near the farm, subscribers of a food localization retailer, final-year bachelor design students partaking in Work-Integrated Learning, and remote social media followers intrigued by Growers Without Borders' Instagram posts. About half the volunteers lived within a 15-kilometer radius of the farm, the rest in surrounding metropolitan and island districts. The research team consisted of Author 1 and three research collaborators.

The enrolment initially took place in orientation meetings at the welfare center and design school, followed by a communal farm visit to get acquainted with its conditions, validate personal aptitudes, and form workgroups. There were three hybrid workgroup sessions each week. This program was punctuated by seasonal planting and harvesting events where the volunteers occasionally mingled with hospitality professionals, villagers, neighboring farmers, university personnel, and external visitors.

Volunteers were asked to help implement regenerative farm practices (Wernli and Chan 2024) at least one morning per week for three hours—either on Mondays, Wednesdays, or Saturdays. They joined a small workgroup onsite consisting of three to five people assisting in the upkeep of compost and cultivation. Additional requirements were completing an informed consent form, access to a mobile phone, and joining the Growers Without Borders' WhatsApp group. During the initial farm sessions, researchers, including a permaculture practitioner, primed each workgroup by introducing the villagers, host farm, irrigation system, farm principles, tool maintenance, and biodiversity markers.

4. Remote Sensing as a Method

Remote sensing in this study entailed a sensing community approach using instant messaging to hold together farm operations and volunteers over 41 weeks from Summer 2022 to Spring 2023. Specifically, researchers instructed volunteers: (1) to register changes they observe every time they enter the farm; (2) to report on WhatsApp what they accomplished during the workgroup session; and (3) to inform the following group about what awaits them. Conveying observations remotely was to keep the absent team members informed. Messages consisted of updates on irrigation, crop health, disease detection, insect occurrences, and inventory of bioremediation supplies. The messages also traced the maturation of compost stacks, including temperature and moisture. Between workgroup sessions, volunteers were encouraged to document how they consumed the harvested crops or implemented food waste collection at home and to share anything else they found noteworthy on their commute to and from the farm.

During the 10-month-long farming pilot, the 31 volunteers sent over 3000 messages comprising 60 video files, 1538 photographs, 1479 texts, plus emojis and animated stickers. Over 2500 messages were unique, with the rest being reposted. The field material consisted of 1.5 gigabytes of data, including 34 minutes of video and a tabulated text document with 55 pages (DIN A4) containing 28,743 words. Measured by word count, half the text volume was written and sent by the four researchers and the other half by the 26 volunteers.

The messages were collected by downloading the chat history as a Rich Text Format (RTF) file with timestamped media assets into a chat archive. In addition, audio of voice memos was transcribed, video footage annotated with frame-by-frame image scrubbing, and photographs

through object coding. The members were informed about the ethical procedures required by the university. Specifically, researchers pledged to: restrict data use for biosocial research, hide the real identities of participants and ask permission to publish any data generated by them, involve participants in the interpretation of data to consider contextual factors, provide participants access to their messages, maintain data on password protected hard drives, and delete data after three years. The WhatsApp data was complemented by an onsite farm logbook where volunteers recorded crop yields and citizen science data to keep track of ongoing agrarian field trials. Still, this paper focuses on sensing community practice and has used these extra data only for context.

The analytical focus of this paper is on how remote sensing was used to follow Growers Without Borders and how researchers interacted with the emergent community through them. Using instant messaging, farm volunteers reported their encounters with plants, animals, and soil. Much like in mobile multimedia messaging analyzed by Battarbee and Koskinen (2005), the volunteers lifted aspects from lived experience into focus, where they became subjects of curiosity, concern, and sometimes responsiveness rather than mere occurrence before they were dropped off from focus. In contrast to Battarbee and Koskinen's paper, which focused on experience, collective remote sensing gave access to how the volunteers experienced their interactions with plants, critters, and soil and how they acted based on their interrelatedness.

Analysis was supported by Atlas TI software for data tabulation, followed by the steps of analytic induction that treated text and image with equal weight (Koskinen 2003). Initially, the analytic focus was on sensor data (see Figure 6B and C, Figure 7A and B). These references covered only a small part of the data, however, so the focus was widened to participants' relationship to composting (Figure 6A and C). This analysis still neglected major parts of how the community was sensing the farm. Community sensing was finally subjected to *explication de texte*, a hermeneutic process of understanding the object of interpretation by referring to the whole, then to its parts, and vice versa (Fowler 1986). Explication contributed a contextually textured understanding of the social functioning of the farm, including frequency of contact making, patterns of activity, nature of decision making, as well as spatial arrangements and seasonal sequence of social interactions. In the tradition of analytic induction, it provided a rich analysis of three main interspecies relationships illustrated in the next section. As in analytic induction in general, the results capture variation in the case; whether they can be generalized to other cases is a separate question not addressed in the case reported in this paper because it would have required a better-resourced multi-case approach.

5. Remote Sensing of Interspecies Permeability

Remote sensing provided researchers a trifold access in which the volunteers interacted with—plants, animals, and soil. It gave them a method for following (rather than monitoring) the ensuing actions. The relationship between the volunteers and the natural environment was the very heart of the farm. Yet, the volunteers had little farming experience, a fact that, in

comparison to experienced farmers, encounters with nature (outlined in Table 1) constantly created challenges that volunteers often resolved through WhatsApp messages.

Table 1: Encounters with nature

Revisiting plants	Co-narrating critters	Engaging soil and friction
• Admitting weeding mishap • Discussing toxicity • Contributing to identification	• Enchanting lizards and praying mantises • Following insects on the plate	• Taking care of the compost • Approaching compost in unexpected ways

5.1 Revisiting plants

Crops were the social currency of the farm pilot and, perhaps because of that, a good deal of interactions about nonhumans focused on plants. The volunteers used WhatsApp to talk about them, and some of these took place in situations that would have been hard to predict by the researchers. One context was weeding, a necessity on a farm without herbicides. Weeding, however, requires botanical knowledge that city dwellers often do not have. Figure 1 (A–B) is a good sample of how three volunteers turn their lack of plant literacy into a shared learning opportunity.

Figure 1: **Admitting weeding mishap**

A

From: Janitha, 15 Aug 2022, 1:47 PM.
Text: Today, Laakini, Tarala, and Jeevan did weeding, first thing in the morning…

B

From: Janitha, 15 Aug 2022, 1:49 PM.
Text: Laakini accidentally pulled out tomato plants from last season… she planted them right back after realizing 😬

From: Xiaotong, Laakini, Lexi, Meirong to Janitha. **Emoji:** 😞😯🙈😢

WhatsApp exchange gauging between crop and weed.

Another set of interactions with plants developed botanical knowledge for harvesting. Figure 2 shows how the community came to decide whether a plant on the farm was edible or toxic. The thread opens cheerfully when farm manager Sunwei invites volunteers to harvest turmeric planted years ago by a previous farmer. In instance A, Sunwei pinpoints to the bed of turmeric that is ready to be harvested. He used yellow, hand–drawn markups on the picture. After the next workgroup has unearthed some turmeric, a volunteer comments on the erratic shape of the root plant in instance B. Four days into the turmeric harvest, Sunwei became aware of look-alike, close relatives of turmeric that have medicinal and potentially toxic side effects (C) and encouraged volunteers to contribute to the emergent visual plant identification by asking them to send images of the blooming plant (D).

Figure 2: **Discussing toxicity**

A

From: Sunwei, 12 Nov 2022, 6:05 PM. **Text:** Hi all, who wants to harvest some turmeric in our last row? Please let me know so that we can harvest together.
From: Lexi, 12 Nov 2022, 6:06 PM. **Text:** Yes, I would like some turmeric!
From: Markus, 12 Nov 2022, 6:11 PM. **Text:** How to use turmeric?
From: Sunwei, 12 Nov 2022, 6:11 PM. **Text:** Ground turmeric can be used to make curry rice or 'Golden Milk.' Please share recipes from your countries!

B

From: Tarala, 14 Nov 2022, 5:35 PM. **Text:** Today we dug out lots of turmeric with students: this one looks like a cockroach 😂
From: Markus to Tarala, 14 Nov 2022, 6:07 PM. **Text:** I think it looks like a 'soil octopus.'
From: Tarala to Markus. **Text:** Yes, like an octopus with eight tentacles.
From: Markus, Lexi, Meirong to Tarala. **Emoji:** 😂👍🏽👍🏽

C

From: Sunwei, 16 Nov 2022, 2:37 PM. **Text:** IMPORTANT NOTICE: These past few days, we excavated what looks like turmeric but possibly is Yujin (鬱金), a close relative in the ginger family. We are still trying to identify it properly. Yujin promotes blood flow and sleep and is harmful during pregnancy. It may trigger miscarriages. Don't worry if you have already consumed a small amount. Yet, until we get exact identification, please stop eating the turmeric plants.
From: Lexi, Kabani, Janitha, Tarala to Sunwei. **Emoji:** 🙏🏽👍🏽👍🏽🙏🏽

D

From: Sunwei, 16 Nov 2022, 6:00 PM. **Text:** I've found pictures you took before. Turns out, how the flowers emerge from the plant is important to tell different strains within the ginger family. As now all the flowers have wilted, did anyone take more photos of our turmeric row, especially of the flowers, stem, and leaves? Can you please send them here?

From: Lexi to Sunwei, 6:07 PM. **Text:** Understood.

From: Markus to Sunwei, 6:09 PM. **Text:** Your photos for our botanical forensics 🙏!

WhatsApp exchange specifying harvest.

Within 34 minutes of Sunwei's help request, three volunteers had submitted previously unshared images of turmeric in blossom. The incoming pictures by Maryska and Laakini show detailed views of turmeric stems and flowers (Figure 3, E–F), while Tarala's picture (G) captures her friend Laakini posing in the field.

Figure 3: **Contributing to identification**

E

From: Maryska, 16 Nov 2022, 6:14 PM.

F

From: Laakini, 16 Nov 2022, 6:31 PM.

G

From: Tarala, 16 Nov 2022, 6:34 PM.

WhatsApp exchange pooling botanical knowledge.

These images proved to be inconclusive for plant identification, but picture G gave researchers an unexpected glimpse of how volunteers adopted the natural scenery for photo shoots and thereby revealed another multifunctional facet of eco-social farming. Two days later, Sunwei messaged that the plants were turmeric using two methods. He ate the plants and tracked the

farmer who had planted them several years ago. In one message, he texted everyone how "all ginger plants have been harvested, and there is a high chance that most are turmeric," and continued to tell that he would "eat some first before giving them to you" (Sunwei, 18 Nov 2022, 5:17 PM). Lexi responded with a thumb-up emoji (👍🏽). Almost a month later, he reported having found "the man who planted our ginger plants," saying that "he [had] confirmed they're turmeric!" and finished by urging people to "take as much as you want!" (13 Dec 2022, 5:16 PM). Lexi responded several minutes later, saying, "Feeling relieved!" while Author 1 responded with an emoji 😌.

This episode illustrated how volunteers used instant messaging to acquire, affirm, and rely on botanical knowledge to develop environmental affinities and how they pooled knowledge in the face of uncertainty. Also, researchers were able to follow the events as they happened to explore methodological narration of camera, microphone, text, and emojis. For researchers, the main value of remote sensing was that they did not have to be on the farm when the episode took place. They also saw how botanical knowhow was created: how Sunwei stalled the harvest, explained it, elicited evidence from volunteers, and finally concluded the episode. It might have been possible to study the episode by interviewing the volunteers. Yet, as issues like medicinal properties of plants were not on the original research agenda, they would have gone unnoticed without the remote sensing community.

5.2 Co-narrating critters

While working on the farm, the volunteers also encountered a range of critters or evidence of their presence. For example, they came in contact with insects, skinks, birds and found excrements they could attribute to mammals like rodents and buffalos. They had to define how to relate to the critters, whether to act and how to act.

Some encounters could be described as charming the volunteers. For example, for several months, a young immigrant woman, Maryska, who grew up in rural Ukraine, sustained an ongoing narrative that put herself in direct dialogue with reptiles, insects, plants, and buffalo manure she encountered during farm duty. In Figure 4, she initiates her interspecies narrative by simply juxtaposing her picture of a lizard with a statement attributing the amphibian with an endearing "her." This deliberation sparked a dialog with remote peers about Lady Amphibian's whereabouts and intentions (A). Once, she even attributed personhood to a praying mantis (B). As the responses show, other volunteers share her delight in meeting the critter.

Figure 4: **Enchanting lizards and praying mantises**

A

From: Maryska, 7 Sep 2022, 2:04 PM. **Text:** We found her in the bucket.

From: Meirong to Maryska, 7 Sep 2022, 2:12 PM. **Text:** Oh, is it still alive?

From: Maryska to Meirong, 7 Sep 2022, 2:14 PM. **Text:** Yes, she ran away after posing 😄

B

From: Maryska, 12 Dec 2022, 12:22 PM. **Text:** When I cut the grass this morning, I found somebody worshipping our fence.

From: Amida, Melissa, Dawei, Tarala to Maryska. **Emoji:** ❤️❤️❤️👍🏽

WhatsApp exchange infusing personality to nonhumans.

Some messages expanded the research site from the farm to the home. Figure 5 shows encounters with caterpillars the unassuming volunteers found at home when using the harvest. First, Amida depicts broccoli arranged on a plate (A). The caption directs the viewers to pay attention to an easily overlooked larva on a broccoli stem. Three days later, Dawei videotapes a caterpillar in his salad and reports on video how a caterpillar accompanied him to his home (B). Their emojis suggest delight and surprise, and the responses validate these feelings.

Figure 5: **Following insects on the plate**

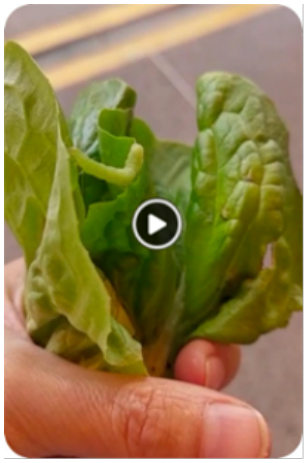
A

From: Amida, 18 Jan 2023, 3:20 PM. **Text:** I nearly ate it 🙈!

From: Tarala, Kabani, Meirong to Amida. **Emoji:** 😁😂😆

From: Markus, 18 Jan 2023, 6:20 PM. **Text:** Can you return the hitchhiker to the farm? 😆

B



From: Dawei, 21 Jan 2023, 5:45 PM.
Video [caterpillar wriggles atop lettuce leaves, seemingly unimpressed by street noise in the background].

Text: Active insect followed us from the farm to our home 😁

From: Kam Fai, Meirong to Dawei. **Emoji:** 😂😂

WhatsApp exchange distinguishing food from nonfood.

Such encounters are an inevitable part of farming, especially if the farm is biodynamic. Collectively, these caterpillar images show how volunteers made these encounters visible and how they shared the experience in instant messaging by turning it into short narratives. These encounters contributed to their connection with the farm and enriched their knowledge of its nonhuman agents, but they also did more. As Figure 5 shows, the volunteers' relationship to critters was not just functional. It could be happy, endeared, or unsettling, and responses show overwhelmingly how the recipients both shared and elaborated these feelings of enchantment and rapture. These interactions were a far cry from social media postings of caterpillars and snails in supermarket salads, perhaps because of the connection they had developed to the land while farming.

As with plant life, encounters with critters could be another vector in shaping the volunteers' relationship to the farm and to each other. They were, however, instantaneous and fleeting, and it can be argued that without a remote sensing tool like WhatsApp, the researchers could not have seen how the relationship with critters took place and how it was co-narrated by the community. It is impossible to know whether the volunteers reported all their encounters with critters – perhaps not – but the WhatsApp group undoubtedly gave the researchers a tool to understand these fleeting moments as they took place and as they were jointly discussed while they were

still relevant to the volunteers. Just like stories of plants, these instances shifted the attention of researchers from purposeful activities to experiencing nature in ways that went beyond utility.

5.3 Engaging soil and friction

Farming brings people into contact with soil and processes that replenish it. One essential relationship in Growers Without Borders was soil, specifically, the composting process of foodwaste. Composting brought the volunteers in contact with unfamiliar equipment, organic matter, manure, worms and insects, water, heat, and ultimately arable soil that the compost was designed to sustain.

A wealth of conversations ensued from discoveries emanating from soil encounters. Figure 6 offers a simple example. It chronicles the remote-assisted compost turning by an agriculturally inexperienced volunteer crew. They could draw in real-time on external expertise to evaluate the given conditions and respond adequately. In previous remote debriefings on WhatsApp, volunteers became sensitized about the delicate microbiome in newly stacked compost piles. Volunteers announced their arrival at the farm, knowing their vital role in compost care. In response, farm manager Sunwei, who was busy elsewhere, gave instructions, including a picture of prepared compost feedstock (Figure 6A). When Alam, Howin, and Tatyan reached the farm's soil yard, they found several indistinguishable compost stacks: they relied on the messaging group to identify the newest – bacterially most active – stack through a picture prompt (B). To decide if compost turning is needed, the researchers asked volunteers to measure the compost's temperature (C). Moreover, they try to justify the physical work from the bacteria's point of view. The episode concludes 45 minutes later (D) when Alam shares a selfie of the group posing proudly around their restored compost pile.

Figure 6: **Taking care of the compost**

A

From: Sunwei, 8 Feb 2023, 9:25 AM. **Text:** Please help chop these brown materials, including the twigs and the dried grass, into smaller pieces so that they can be easily decomposed. Also, the latest pile with the white aeration pipe needs turning today. Thanks a lot for helping. I will return once I finish the hotel foodwaste delivery.

B

From: Alam, 8 Feb 2023, 9:57 AM. **Text:** Is this the pile we need to turn?

From: Markus, 8 Feb 2023, 9:58 AM. **Text:** Yes, this is the one. Can you please measure its temperature?

C

From: Alam, 8 Feb 2023, 9:58 AM. **Text:** Temperature is 54 degrees.

From: Markus to Alam, 8 Feb 2023, 9:59 AM. **Text:** Yes, the compost bacteria are still working hard and want air for breathing 😃. Please add a little water when you've stacked it halfway up and a second time when all is piled up🙏

From: Sunwei to Alam, 8 Feb 2023, 10:00 AM. **Text:** Yes, it stays around this temperature for a few days, so another turning will be good for maturation.

D

From: Alam, 8 Feb 2023, 10:43 AM. **Text:** Done!!!

From: Xiaotong, Meirong, Dawei, Sunwei, Markus to Alam.
Emoji: 👍🏽🙏🏽✌🏽❤️👌🏽

WhatsApp exchange remotely coordinating compost care.

The bacterial successions in composting require frequent aerating, feeding, and watering to prevent overheating, dehydration, or suffocation. But composting is more than a human affair. It is a life-transforming process with its own biology, chemistry, and physics that the farm team could assist but also expand upon. Compost is capable of doing more than just decomposing. In Figure 7, Sunwei shifted the volunteers' original resentment to putrification by showing how its excess energy could be harnessed for cooking. The figure shows still images of Sunwei's video commentary of retrieving and devouring an egg that was buried and hard-boiled over two days in compost heat (A–B). The compost also became a base for unexpected transformations. In (C), Amida documents the stunning fruiting bodies of the Goldenhaired Inkcap mushroom *(Parasola auricoma)* that only sprouts on compost at night after rain and decomposes within hours after the spores are dispersed. Knowing how fleeting this fungal microforest is, Amida whispers her comments in a low voice to respectfully capture this phenomenon with those who were absent.

Figure 7: **Approaching compost in unexpected ways**

A

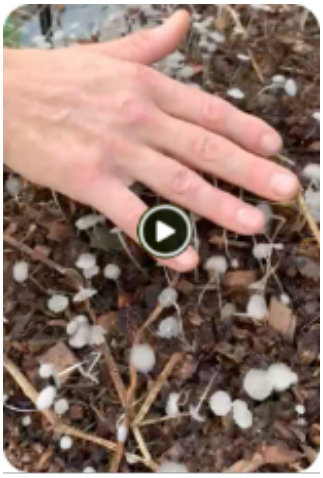
From: Sunwei, 31 Oct 2022, 10:17 PM. **Video** [sequence 1, excavation of egg: Point-of-view clip of farm manager preparing a compost-boiled egg with think-aloud comment: "Hi everyone, let's check out our compost cooking experiment. Two days ago, we buried this egg in our compost pile, which is almost 70 degrees Celsius hot. Now, I pull out the egg and give it a rinse. Look at this beautifully boiled egg, and – yum – it becomes my lunch!]

B

From: Sunwei, 31 Oct 2022, 10:17 PM. **Video** [sequence 2, eating egg boiled with compost's excess heat] **Text:** Compost egg experiment.

From: Janitha, Xiaotong, Laakini, Tarala to Sunwei. **Emoji:** 😙😙😙👍🏽

C



From: Amida, 14 Jan 2023, 7:54 PM. **Video** [birds sing in the background, and Amida's voice whispers, "so cute!" as her hand caresses mushrooms germinating on the compost pile]. **Text:** Cutest! 🍄

From: Dawei, Melissa, Selena, Meirong, Markus to Amida. **Emoji:** ❤️❤️❤️👍🏽👌🏽

WhatsApp exchange recording unexpected discoveries.

As these examples show, in farming, people encounter nonhuman nature in many ways. The farm brought diverse peers together while creating shared experiences. It also brought them into encounters with natural processes that are rarely met in industrialized and urbanized life. Instant messaging, in its part, gave volunteers ways to share these encounters with members who were not there, giving this experience an instantaneous and perpetual quality. It also engendered

diversity awareness for a wide range of perspectives, experiences, and backgrounds present in volunteers and engaged these differences in tactful and empathetic ways.

For researchers, these qualities, in turn, provided a remote access to things they would not have been able with alternative techniques like ethnography, probing, or codesign workshops. Whether these moments of shared otherness would have been captured with these methods would have been left to whether the researchers would have been imaginative enough to ask about them, lucky enough to be there when these encounters happened, whether design probes had recorded them, or whether they would have been discussed in workshops.

6. Discussion

This paper has proposed a community-centered approach to sensing. The benefit of this approach, we argue, is that it puts technical information in context of emotions like joy, disgust, delight of discovery, and so on. It also shows how they sometimes turn into actions. The paper has shown that participants followed the farm through technical sensors (for soil pH, moisture, temperature, etc.), but they were less important to the community than sight, smell, hearing, taste, touch, and conversation. The paper has seen the farm from the perspective of human beings; it has also shown how humans can encounter life respectfully and with curiosity instead of seeing it as an object of management, control, threat, and destruction. Instant messaging provided the community a means to bond with both humans and nonhumans. Technology, as such, faded into the background, as so often in the case of interactive technology (Moggridge 2006, Koskinen 2023, 46).

This collective remote data collection exceeds existing design research that employs multispecies perspectives retrospectively to design scenarios or speculation as an educational or curational strategy (Gatto and McCardle 2019). Co-designing interspecies permeability opens a generative research agenda for sensitizing people and groups to living with, knowing through, and acting upon the contingency of living environments. It challenges fragmented or contained views of data (Alexander and Sanchez 2019, 8) and explores lived alternatives of co-designing data collection (Wernli and Chan 2023, Marres et al. 2018, 17–40) in close interactions with the natural world. The approach is community-centric and, in this sense, assumes that the best we can do as researchers is to create interactions between humans and other life forms and see how these interactions evolve into a respectful relationship not characterized by fear and domination of nature.

The remote sensing tools of the study have precedents in design literature. As in some earlier studies in Helsinki and Paris (Kurvinen et al. 2008, Relieu 2002), these tools had several benefits. They provided access to: interactions on the farm or when the researchers were absent; as they arose naturally; interactions unconstrained by the researchers (Figures 1–6); and

interactions outside the site (Figure 5). In the spirit of codesign, these tools provided researchers a means to participate in the community activities (Figures 2A, B and D; 5A; 6B–D), ways to participate in its rituals and festivities, and a tool to extend the pilot from its original time frame: the group is still available well over a year after the farm has closed.

The two main precedents in Helsinki and Paris were conducted when mobile technology was immature, and both studies required extensive instrumentation. This has changed. Remote sensing technologies are readily available today. People know how to use them, and they are usually free. Our recommendation is to integrate them into codesign routinely. It is important to note that Growers Without Borders used remote sensing as a part of the methods mixture. The study relied equally on ethnographic methods. As several authors have noted, any analysis of electronic communication must be seen in a broader context to avoid attributing too much importance to it (Miller and Slater 2000, Pertierra et al. 2002, 101–124). By extending Author 1's perceptive abilities, instant messaging improved his sensibilities for the activities on the farm and the volunteers' and their social dynamic. It gave him a way to design his activities better: he knew when to be there, what to ask about incidents that had to be addressed, and what to prepare before visiting the farm. Also, collective sensing shaped the researchers' ethnographic inquiry by posing the question of what constitutes relevant knowledge and multidimensional learning in eco-social land care. For example, it pointed to the importance of humor and wit when engaging with visceral, biological processes or lively otherness. Technical information had value for the participants, but only through their evolving knowledge of the farm; in studies of remote sensing, the latter kind of knowledge ought to be respected rather than sneered at because of its seemingly unscientific nature. Having a collective remote sensing component in the methods mix led to better insight into participants' knowledge and activities, and it improved codesign by creating a connection between research and the farm.

Partly a reflection of Hong Kong's diversity, the participants came from many walks of life. On the farm, they had to focus on tasks rather than their human differences. Yet, it is possible to argue that this diversity may have made the findings more robust, although we cannot say whether the results would be different in monocultural groups which is for future research to explore. The potential of social media in maintaining the long tail of research for years after the active phase of research has finished has been discussed in some codesign studies. In particular, Andrea Júdice (2014, 282–294) discusses how she maintained contact with a village she studied for over ten years after her fieldwork. During this time, her role changed from a researcher to a design consultant, advisor, liaison, and trusted friend. A close analysis remains outside the scope of this paper and is subject to subsequent studies. However, instant messaging gave the researchers a way to follow how the farm shifted the volunteers' utilitarian relationship to nature to an appreciation of biological knowhow or attentiveness to others. This redistributed approach to remote sensing promises future uses in community-involving environmental care, indigenous reforestation or renaturalization, endangered species protection, or bioregional revitalization. To our knowledge, this long tail has not been studied in design literature even though it is common

these days because of new communication tools and, we would argue, could well be a part of responsible research practice.

7. Conclusion

This paper has described the case of Growers Without Borders, an eco-social farming experiment in Hong Kong. The focus of this paper has been on how volunteers navigated the complexity of their encounters with plants, animals, and soil in real-time exchanges on WhatsApp, injecting multiple witness accounts, dialogical diagnoses, empathic instructions, and provoking explanations. Remote data collection created a collectively accessible window into a rich and nuanced picture of interspecies specificity and interaction on the farm.

Growers Without Borders was a pandemic-era project, but its way of studying community sensing through instant messaging opens research opportunities beyond the usual methods in design literature. This paper can recommend a similar method to any piece of codesign in which researchers must sometimes be absent from the field. The method gives researchers an opportunity to respond to what they see and act immediately in the spirit of codesign that requires a blurred boundary between researchers, participants, and the environment.

8. Acknowledgements and declaration of interest statement

We thank the Growers Without Borders volunteers for bringing the compost enterprise to life and Zero Foodprint Asia for funding the farm pilot with grant no. P0043094: “Soil–Care Hospitality, Intersectoral Research Partnership for Regenerative Strategies.” The authors report no competing interests to declare.

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