CHAPTER 7

Knowing and Imagining with Sustainable Makers

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In the space of just a few years, safeguarding the future and even sustaining human civilization has become a widespread concern. Incumbent political and commercial regimes, as well as media outlets, now actively participate in the study of future worlds, while planetary challenges such as climate change grab attentions (Fry 2012; Appadurai 2013; Granjou et al. 2017). Although this generates anguished calls for urgent and drastic intervention, overwhelmingly, hegemonic institutions and individuals within them still indulge hopes that the future will be much like today only with different gadgets. Wild flights of fancy are, of course, out there in an increasingly cluttered landscape of literary, artistic, popular, technological, and all kinds of futures.

This profusion extends also to academic work on sustainable futures, both in anthropology (e.g., Mathews and Barnes 2016) and in design (e.g., Ehn et al. 2014), our respective academic comfort zones. We find more and more events and publications that are presented as radical and

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more scholars who are adopting an activist posture. Yet in most Euro-American contexts, such activism, like the vocabularies associated with it, too easily aligns with neoliberal values. One example is the "Maker movement" that espouses the shrinking and distributing of digital manufacturing technologies (such as 3D printers and CNC milling machines), not only as a route to replacing or adjusting environmentally damaging consumerism, but also as "democratizing." The hype and over-optimism around the movement serve to promote US engineering (Turner 2018), while often imperializing free culture and community technology movements elsewhere (Braybrooke and Jordan 2017) and actively obfuscating global supply chains and the working conditions wherein their playthings, like electronic components and equipment, are made (Kohtala 2017). Critiques notwithstanding (e.g., Morozov 2014), the literature around self-organizing sustainability initiatives, including makers, has a romanticizing as well as noticeably declamatory tone, but it is often thin on understandings of real-world future-making. We prefer to approach such activity by trying to understand concrete social practices, something that ethnographic research, as we will argue, is well equipped to do. We train our lens on a style of activism and activist imaginings involving more or less autonomous and low-budget groupings in wealthy parts of the world who seek to rethink everything. In their activist spaces and in everyday life, they behave as if the techno-utopian solutionism of the mainstream were impossible, and they are actively curious about the unknowables produced by what passes for normal.

We refer to these spaces of future-making as MACs, Materialist Activist Communities, because they concern themselves with material flows, embrace a critical ethos, and participate in a politically engaged form of maker culture. They are explicitly alternative groups developing collective practices of speculating, designing, and making, with a marked environmental orientation. The futures animating their activities are radically different from, but have grown out of, the mundane presents of the early twenty-first century. Those we have encountered, and whose activities inform this paper, feature explorations into small-scale technology development and new media art, but also urban agriculture, DIY and synthetic biology, chemistry, genetics, and pharmacology that do appear improbable if not impossible: bio-hacking and bio-art that open up the spaces and forms of institutionalized natural science.

In Helsinki, as elsewhere in Europe, from Barcelona and Paris to smaller cities in the Netherlands, the activist spaces we have visited are

often temporary and usually precarious. They are likely to have visible signs of artistic and technical skill in quirky objects left over from previous projects, evidence of know-how in building, architecture, and design. They contain small and large, simple and complex tools for exploring: soldering stations for electronics and sewing machines, fridges, and sinks. Sofas and coffee tables invite conviviality. These spaces house future horizons that are radically different from what passes for normal in Finland (and similar places) today, while offering immediate pleasures where bodies, minds, and stuff mingle, clearly offering intellectual and emotional rewards.

As is typical of a smaller European city, several individuals are active in many Helsinki groups, while others participate only in specific events. Sometimes projects use the facilities of the city's makerspaces, hacklab, and fab lab. Others are associated with highly visible community venues (such as an urban greenhouse), while some groups use spaces offered by others to produce discrete events (Fig. 7.1). *Kääntöpöytä* ("Turntable"), for instance, is a low-key center of urban gardening and sustainable lifeways that has been operating on central but not-yet-developed land in Helsinki since 2009 run by Dodo, an environmentalist association (see Berglund 2016). It hosts workshops, on DIY solar PV panels, "peeponics," making soap from used cooking oil, furniture making with reclaimed wood, and the like, and has periodically organized popular brunches featuring the garden's plentiful offerings in a vegetarian and vegan spread. Pixelache[1] is a long-running arts collective whose yearly festivals' themes straddle art, technology, environmentalism, and activism. Often these are staged in contentious venues: a DIY-biology summit arranged in an old barn on an idyllic island threatened by urban development, a bio-art exhibition in a former mental hospital that temporarily hosts grassroots cooperatives.

What we are calling MACs are then physical and conceptual spaces where practices of knowing as well as of making forge ways of imagining beyond neoliberal frames. MACs could be framed as intense cases of a shift, identified by David Schlosberg and Romand Coles (2016) in how critical politics is developing in industrialized and wealthy places. Not quite post-material, the new environmentalism identified by Schlosberg and Coles nevertheless builds repertoires of embodied and applied modes of political action that offer "new modes of organization, forms of resistance, and prefigurative models of democratic living, all immersed in re-formed relations with each other and the natural world" (2016:

Fig. 7.1 Open-Source Circular Economy Days Helsinki 2016 at *Kääntöpöytä*, Photo by Cindy Kohtala. "OSCE Days" is a global grassroots initiative that links local organizers' events to promote open-source design, closing material loops, and alternative economies

161). Thus, MACs explicitly present themselves as counter to industrial mass production and to industrial modernity's hierarchical structures, promoting possibilities to open up participation in the design and creation of futures to non-experts in the spirit of doing it yourself, DIY. They operate as self-consciously self-organizing collectives working to ensure access to production technologies (for making tangible things as well as alternative media projects and software), seeking to build technological skills and literacy, but also focusing on how to produce and provide food, shelter, energy, and mobility while building generalized knowledge about a sustainable way to live. They may practice DIY smelting and casting using cast-off CDs or beverage tins as raw material, repairing electronics, canning, or fermenting food to avoid waste, which all politicize material issues. The projects they undertake are messy and highly imaginative, their reasons for doing them often vague. Throughout their spaces, we find situated and partial confusion in which thinking bodies extend to all kinds of stuff in transformation. Playful and militantly anti-productivist, their

activities draw in all the senses in an education of possibilities, sustaining them as loose collectives that nurture significant insights about unsustainability. These features impel us as researchers to keep going back to them, even as we recognize that they have precursors in a long tradition of prefigurative and repoliticizing initiatives to counter the damages of capitalist ways (Gibson-Graham 2008).

Our account is based on MACs in Helsinki, as well as on fieldwork carried out by Cindy with digital makers across northern Europe (Kohtala 2016). Diffuse, ebbing, and flowing as funding and sponsorship allow, rarely persisting for more than a few months in a single location, the experimental practices we have witnessed in Helsinki over two decades have nonetheless left a discernible trace on artistic, political, and socio-environmental life in the city. Libraries, for instance, have frequently supported MACs' activities both in one-off and in permanent services like workshop facilities, as have local galleries and private foundations. Individuals we know have shifted from precariousness to somewhat steadier lives as entrepreneurs, academics, and denizens of the third spaces proliferating around emerging creative and knowledge industries, and from time to time, we hear of ventures around the country that have a kinship with MACs we have known (orienting to a "circular economy," for example). Several are quasi-academic, funded, or partially hosted by formal educational institutions or not-for-profit arts associations while remaining open-access and experimental.

We render as a story of studying future worlds some of our experiences of participating (though very inexpertly a lot of the time) in activists' joyful research amidst equipment and people, animating and animated by objects only just taking form. Here are nebulous yet exciting concepts-things that stimulate new knowledge, just out of range, "epistemic objects" that are in the process—perhaps—of becoming sedimented into knowledge but "have no reference in the everyday sense of the word" (Rheinberger 2008). These things could be apparent as dirt, as tools or something utterly unexpected, or as habits and routines that are information. Elusive and unnamed, they nevertheless actively shape how we—activists, others—relate to the material world.

MACs render more-than-human and other-than-capitalist futures tangible and realistic, practicing futures that are difficult if not impossible for inhabitants of industrial and post-industrial worlds to imagine. Our own efforts are informed by a growing literature in anthropology

and design that draws on material-semiotic, new materialist, or more-than-human framings (Bennett 2004; Connolly 2013), but it is above all fed by our repeated but not systematic engagements with MACs, which we have both carried out as observant participants (Kohtala 2017, 2018; Berglund 2016, 2017). We have thought about these encounters as modes of ethnography, where partially and sporadically we have been learning their "vernacular doings and understandings" (Lanzeni and Ardevol 2017: 117). If our curiosity grew from what we knew about Helsinki-based groupings, MACs' cosmopolitan and digitally networked yet place-based character makes it easy for us to jump into conversation with them elsewhere too, learning from and with them. Ethnography at its best is always self-consciously dialogic as well as embodied, but, we argue, a "re-functioned" ethnography, as Douglas Holmes and George Marcus (2010) might have it, has even more to offer. This we understand as a forward-looking intellectual effort where our ethnographic sensibilities together with the sense-making efforts of our "subjects" generates a messy but not toothless way of working out what is important and why—both for researchers and for activists—and a device for making evident the improbability of what Leonardo Castillo has called sustainability-as-usual. We are not concerned with setting an agenda for what future-oriented ethnography should be (or whose) (Pink and Salazar 2017); rather, we want to build on the inspiration we find in critical ethnographic work in both design research and anthropology.

Though popular, it is not easy to encourage challenges to traditional notions of ethnography, those broadly based on the magic of "being there." In trying to account for what we both have learned alongside and with activists, we have encountered very varied responses, from sparks of recognition to strong skepticism that our findings—whether of valued ways of learning or imaginative and inventive ways of sharing—are valid. Yet we have both started from quite conventional understandings of ethnographic methods, ones which endorse that need for intimacy and which ideally unfold as committed, long-term, and necessarily open-ended engagements. This is more or less as forerunners in both design (Bjerknes et al. 1987) and anthropology (Strathern 1991) have taught us. The doctoral student's privilege of 13 months of anthropological fieldwork with busy professional people taught Eeva of the benefits of long-term immersion as well as the downsides of fieldwork by appointment, now standard but novel in the early 1990s. Cindy's experience in engaged fieldwork in a fab lab for her doctoral dissertation was likewise

foundational, and periods of fieldwork, observation, and engagement are core to her subsequent postdoctoral enquiries: visiting activists' events, staying on in European fab labs, and puzzling things out with makers as a kind of "researcher-in-residence."

Here, we draw on a combination of Cindy's long-term research with makers and Eeva's more unplanned but productive forays into Helsinki's activist spaces since 2010. Yet it was what we shared in our experiences that inspired us to think and write together. In our ethnographic work with activists, we have both been struck by people's capacity to learn to value diverse knowledges and transform themselves—and us. These engagements have felt messy, as we will explain, but not without value. Quite the opposite—for ethnography sparks potentially any kind of curiosity, just as it encourages care in description and analysis. This comes from attending to detail and trying to experience life from another "inside," both in design and in the social sciences. As with others wanting to renew ethnography (e.g., Criado and Estalella 2018), we have nurtured our own curiosity by learning with activists how to live with and against the troubles and discomforts of contemporary knowledge practices. Alongside them, rather than ignoring, cleaning up, or devaluing mess, dirt, and confusion, we have exploited ethnography to challenge the cleaned up sequence of research gap > research design > methods > data > analysis, which persists in design, anthropology, and beyond.

Furthermore, stereotypes of the temporal orientations of the two fields—future-oriented design working on what could/should be, presentist anthropology dealing with what is/was—are unhelpful and they hinder mutual learning. Besides, insightful ethnography in both design and anthropology has long grown out of embracing multiplicity, situatedness, and partiality and should not need referencing.[2] We want to supplement these long-standing insights with insisting on the power of collective imaginings as productive of knowledge, within MACs but also within our fields of research.

Our use of the phrase collective imaginings is anchored in the work of philosophers Moira Gatens and Genevieve Lloyd, specifically their scholarship on the seventeenth-century philosopher Benedict de (Baruch) Spinoza. According to them, Spinoza had a materialist philosophy of knowledge, in which the very idea of the future was bound up with the imagination. When materialist activists pursue their critique, they are above all engaged in a "refiguration of the capacities of imagination" that resembles the *Collective Imaginings* that Gatens and Lloyd identify in

their 1999 book of that name, as "ways that open up new questions and make possible new relations between philosophical thought and political reality" (1999: 11). This resonates powerfully with the way MACs reinsert material life in all its filth into politics together with reason and imagination.

The challenge we pose ourselves of capturing this work of imagining is considerable, but the task is helped by picturing a scene of mess, impurity, and ignorance, not just within MACs but everywhere. Aligning with critical design research and STS (Woodhouse and Patton 2004) on the one hand, and anthropology's tendency to focus on the "dark side" of neoliberal normality (Ortner 2016) on the other, we contextualize our own and MACs' work against the literal mess and dangers bequeathed by incumbent, Euro-American styles of global reasoning and acting (Fortun 2012; Granjou et al. 2017). In the next section, we introduce some illustrative examples of the messy but productive work that goes on in these spaces, noting work by other scholars that points to similar situations of imagining, knowing, and intervening in un/sustainable futures. We then return to the importance of collective imagining as a methodological principle, not only in relation to MACs, but as a way of conceptualizing and practicing better ethnography.

Technoscience in Spaces of Dirty Knowing

Researching ethnographically with activists is a dialogue, and it means collaborating at an epistemic level (Criado and Estalella 2018), learning from as well as with our interlocutors. As illustration, Cindy was walking in the garden of Barcelona's Valldaura Self-Sufficiency Lab, an experimental space hosted by (while running partially independently of) an architecture school, with its director Jonathan Minchin. Around them were forest, permaculture gardens, aquaponics systems, outbuildings, construction experiments and WikiHouse structures, and a villa with a fab lab, DIY-biology lab, and large rooms for hosting events, cooking, eating, and sleeping. They talked about the place, but also about a recent global makers' meeting, more of a showy conference than the usual counterculture assembly. The conference speakers had breezily proselytized asteroid mining and gene editing alongside humanitarian work in refugee camps. Jonathan asked Cindy about other workshops and activist communities elsewhere, and the talk shifted to how various communities discuss and enact what technology should be. Brambles caught on

their clothing; chickens fussed in the background. They talked about "appropriate technology." He said:

> There is another term, of technology *choice* … which is revealing when you're engaging with a student or discussion group or whoever. When we discover that we have a technology choice, we discover the reasons to choose. It's at that point that we can say: there are these two 3D printers. One of them, you have to buy the cartridges and the other one you don't. So we've got a technology choice. What's one? One is a free system, hackable, and the other one is not. When we're looking at material choice, one wood has formaldehyde in it and the other one doesn't. How would they make it? Let's track it back. A technology choice. Do we mine the moon for minerals? That we have to plug into our industrial model, or do we change the industrial model, so we don't need to mine at all?

The discussion, as discussions in MACs usually do, came back to taking systems and societies apart in order to mend or rebuild them. The discussions are informed by the many social worlds that surround MACs and feed their enquiries and mischievous disobedience: synthetic biologists making life, engineers making materials that self-program, scientists making machines that self-replicate, and hackers unmaking commercial products and remaking them. We, ethnographer and activist alike, read the same manifestos and argue about their meanings. Jonathan continued:

> When I was involved with the permaculture design certificate—one of the first courses that we did up here—it was very interesting to see the interaction between some of the people who signed up for that course and others in the fab lab, the programmers or engineers, and there was a real worldview collision. It worked itself out, but there were casualties along the way. But one of the founding principles and tenets of the permanent agriculture, permaculture, ideal is that you do nothing. Actually that's a choice. (…) How interesting is that: there is a choice to do nothing. And observe, rather than act.

> Then you've got the programmers. And Larry Wall, I think, who was the creator of Perl language. His mantra was laziness. Be lazy. Don't do anything. That was his mantra as a programmer. So at this point you've got a similarity between automization and doing nothing. It's, how do you say, it's only a tenuous link, but at the same time we sort of start to engage in conversation between these worldviews. Programmers are not evil. And permaculture guys are not just hippies.

"Naïve hippies," Cindy offered. "Yeah," he paused, then continued. "It's very interesting this, even just the idea of technology. You think it's always something advanced but it's often not." Cindy agreed, "Yeah, I think we learn a lot more when we consider what the real meaning of technology actually is. Like the technology of the [ancient] water system that you just showed me." "Yeah. Or the woods. All of this is here because we're here. All these trees."

We sympathize with MACs, but we do not always understand them. We are struck, however, by how they combine the political work of identifying and making choices (as in the vignette above) with a principled embrace of matter and materiality. They explicitly reject cognitive capitalism's standard disavowal of matter, the no longer pleasure-bringing stuff that the mainstream would prefer to discard and forget as "externalities" or, at best, deal with through waste management or recycling schemes that leave damaging structures intact. Activists bring the problem material—non-recyclable materials, "invasive" plants (Chinese knotweed), or unwanted animals (urban geese)—into the here and now. Doing this is to link things up rather than to keep them neatly separate, to pay attention to how matter flows (not smoothly) through everyday life, mingling with information and people. Making such connections is key to sustainability and foregrounded by many, many thinkers. Noortje Marres (2012), for example, makes the point by discussing the work of the artist Esther Polak, Spiral Drawing Sunrise, in a square in Amsterdam. In that 2009 artwork, Polak drew on the energy of the sun to power a robot car that then made traces in the sand. This is an analogous process to those undertaken by activists seeking to make important but hard-to-discern effects and relations apparent, to give distant things (the turning sun) "a tangible presence in the here and now" (Marres 2012: 88). Here it is Marres who spells out the link with technical definitions of sustainability dating from the 1970s, and the way the solar-powered art aligned with experimental social research. Similar spelling out is increasingly going on across many discussions, as artists, activists, academics, and others account for their doings. Through ethnography, we also find that alongside it, inside these spaces, is situated and partial confusion that, we argue, allows activists to imagine and practice—know—less unsustainable lives with a preference for humility and debris over hubris in technological practice (Jasanoff 2016). Their activities generate situations that are indeterminate, messy, and crazy. We argue that this is principled.

We have elsewhere proposed the "dirt way" as a concept to capture the situated confusion that emerges here (Berglund and Kohtala 2020) in contrast with sustainable futures discourses based on expertise developed in conventional Euro-American contexts. The "dirt way" is closer to what Sebastian Abrahamsson and Filippo Bertoni (2014) have dubbed the "dirty" side of the "green." Like them, we reject the idea that highlighting mess is merely a romantic reaction to profit-led and technocratic forms of expertise, since the route to knowledge and knowing necessarily goes through embodying, experiencing, experimenting with, and being entangled in the world. Beyond this, and inspired by MACs, our notion of the "dirt way" centers on non-formulaic ways to reach not "solutions" so much as to keep working and acting, using existing resources. It hence renders impossible grandiose future sustainability visions such as asteroid mining or giant space mirrors, as well as abstract techno-utopian imaginaries that culminate in machines that make machines that make machines (Gershenfeld et al. 2017; Kline 2015; Turner 2018), and where we are all "connected" by undersea cables, underground tunnels, drone ports, or the blockchain. MACs largely reject, even ridicule, such imaginaries, preferring to focus on how we are organico-technically connected in webs of life.

MACs are part of what geographer Noel Longhurst (2015) calls "alternative milieu." These are countercultural spaces that protect and nurture socio-cognitive directions that elsewhere would be experienced as impolite or ridiculous and so would not flourish. An alternative milieu offers security for people to pursue things unthinkable in other places. MACs and other alternative milieus contrast sharply with venues proliferating across corporate, political, and civic institutions that are not just overoptimistic and improbable by any scientific standards, but even refuse to imagine futures that differ significantly—apart from the gadgets as noted—from today. Given the uncertainties associated with planetary transformations underway, the "dirt way" works as a shorthand for elements of knowledge production that are hard to articulate yet probably particularly important in today's unsustainable and unimaginative context. It also echoes the Future Anthropologies Network's endorsement of "epistemological filth" (Future Anthropologies Network 2014). Above all, confusion is an empirical reality within activist gatherings—people do things without being clear about what they are doing or why.

Activist meetings can then operate like ritual, being a switch point between individual and collective experience. Something similar has been

noted by anthropologists of social movements attentive to how collective protest can (temporarily) interrupt the perpetual disorder and crisis of capitalist normality (e.g., Krøijer 2015, chapter 5). Also relevant for appreciating the allure of MACs is perhaps Victor Turner's work on rituals of liminality, where things that exist but that are structurally invisible like a "not-boy-not-man" (1967: 95) are acknowledged and, in some cases, worked up into some "primitive hypothesis, where there is a certain freedom to juggle with the factors of existence" (1967: 106). MACs also allow for alternative ways to reckon time, to inhabit something other than the linear, innovation-focused logic of cognitive capitalism, green-tinged though it may appear, which they perceive not as solution but as problem. We have argued that as these activist projects define and reach toward sustainability, they reverse social norms by reveling in "dirt" of all kinds, in an ad hoc, dialogic, and embodied way that parallels "a critical STS insight about how knowledge is 'purified' in order to give it power, but … also points to human bodies, substances and experiences that will not be contained" (Berglund and Kohtala 2020: 103).

MACS are as dependent on capitalism as they attempt to counter it, but this is hardly a finding: Anyone who seeks less impactful pathways must still rely on high-energy and globalized socio-technical infrastructures of computers, Internet, electricity, screens, components, vehicles, fuel, building materials, and exhausting daily routines. Nevertheless, activist camps and festivals do see participants sleeping in tents and on drafty floors, feeding themselves and having to deal with their own bodily wastes, extension cords snaking through rooms and trees to provide electricity to laptops, projectors, and other devices. Such contradictions are taken in stride and do not cause paralysis; in fact, they are debated openly as activists spell out the trade-offs and discuss alternatives. Embeddedness in a highly industrialized, globalized world is both fodder for narratives of resistance and for the imagination. The discomforts of this nurture humor and irony: Could the "community powerbank," a Pixelache project in which participants learned to remove lithium batteries from discarded laptops, test and turn them into portable USB power banks, also help beat melancholy? After all, lithium has been known to be a treatment for depression; workshop participants jokingly speculated about extracting the lithium and repurposing the unusable batteries as anti-depressants.

The complications of such embeddedness are never clearer than in the realm of synthetic biology, bio-hacking, and bio-art, which have featured highly in the Helsinki communities' recent festivals. In one Pixelache

event on taxidermy, led by internationally known biohacker Dusjagr, Cindy arrived to scenes of prone dead animals and birds with their organs removed, the air thick with a disturbing chemical odor. A woman was delicately painting the beak on a bird whose wings were spread out on a piece of cardboard. Several rats lay stretched out, unfinished; one was pinned open with pearl-top pins, its cavity covered with red velvet. Cindy commented that it looked rather royal. A mounted reindeer stood to the side near the sofas, perhaps a treasure found in one of the city's many flea markets? Dusjagr (his hacker name) had placed two LED lights in the eye sockets of a poorly stuffed mouse and kept repeating how "bad" it was. It reminded Cindy of the humorous photos of amateur taxidermy that spread on social media. "Why taxidermy?" she asked. He was simply interested, he replied, preferring it to bio-art that is clean and behind glass, the kind made for people afraid to spend a night out "in nature." Using the word haptic several times, he said he wanted the participants to have an active, haptic experience. Andrew, the coordinator from Pixelache, was also present, and both commented several times on how difficult the previous day's workshop had been, with participants skinning and removing organs. Though they joked about how disturbing it had become, bad enough that they had had to send someone out to get a bottle of brandy, Dusjagr felt they had had "really good discussions."

Cindy remembered dissecting a frog in biology class in school; the memory of it was stimulated by the smell in the room. She mentioned that as pupils they also did a rat, which was much more difficult. In response, Dusjagr made reference to the Anthropocene, the "fur thing," and added that "we have no problems with frogs." Cindy reflected that it might be the same with birds and feathers; fur is much more disturbing.

Such projects are undertaken with considerable technical skill and, we argue, collective imaginings that rely on familiarity with wide-ranging intellectual currents. In our analysis, MACs not only recognize power and complication in science, but they insist that it is also dirty and violent. Though their conceptions of science render it as something that isn't separate and isn't neat, even corporate-led techno-science is interesting to them. To illustrate, we draw on one particular open assembly where the science and philosophy of genome editing (CRISPR in particular; Broad Institute 2019; Cong et al. 2013) were being discussed. The conversation turned to medical self-experimentation and DIY fecal transplants. While medical science has not yet been able to fully explain the effects of fecal microbiota transplantation, it has been used to treat irritable bowel

syndrome and Crohn's disease, for instance. This involves a person being instilled with another healthy person's fecal matter (Brandt 2013). A biologist leading the discussion highlighted further mysteries of science regarding the "brain-gut axis": People's guts did indeed evidence a change in microbiome reflecting that of the donor after a stool transplant. Further, in cases where the donor had depressive tendencies, the transplant recipient subsequently showed a tendency to likewise experience depression. The talk here was about care in inter-species relations, about the impossibility of separating the human and non-human and about the "epistemological filth" hidden in purified conceptions of Western medical knowledge. When we share microbiomes with our life mates, other humans, pets, where do "we" end, and the other begin?

Present were also some (bio)artists who drift in and out of MAC spaces we know. Bartaku proposed launching a start-up. The enterprise would acquire (in some way) the stools of renowned technology personality Elon Musk and produce Musk "poop pills" that could be sold to aspiring entrepreneurs worldwide who idealize Musk and currently dominant imaginaries of innovation. That the proposal caused mirth is not to mask its intention: It was proffered up or in fact not articulated so much as worked out in the situation, as an imagining of a particular, alternative, future. Like all imaginings, it was about making present something absent, however vaguely. In this case, it activated a sense of a whole alternative world or way of being that is incompatible with the early twenty-first-century ontology of "ownership" and marketization. The proposal altered notions of what bodily entities are sacred, and alongside practical experiments, it helped make networks of relations between the human and more-than-human apparent and visible, open for plural futures and moments of choice. We see this as activists consciously imagining science differently. In part (and probably not accidentally given the intellectual and occupational experiences of many in community and participatory projects), activists were effectively using techniques of elicitation familiar from art and therapy-based practice that are also recognized in speculative design (e.g., Halse 2013) and even anthropology (e.g., Kazubowski-Houston 2017), techniques similarly designed to encourage wanderings where the actual and the imagined intersect.

We have shown that activism's critique of incumbent (conventional modern) notions emerge in processes that are intellectual and physical, but also necessarily collective. This is congruent with recent invocations of Spinoza's philosophy of knowledge, or collective imagining, for instance,

the influential work of Jane Bennett, whose Spinoza owes much to Gilles Deleuze and Felix Guattari. For Bennett, since "matter has an inclination to make connections," it also serves to cultivate "an enhanced sense of the extent to which all things are spun together in a dense web" (Bennett 2004: 354, see also 2010).

This emphasis on collective and embodied intellect may be gaining popularity, but it contrasts with most academic work, now characterized by impactful publications and narrowly conceived notions of accountability. Even in the realm of sustainability, science has been reduced to an exercise in "solving problems" and the contributions of activist groups and ordinary people, though presented as progressive alternatives, are quickly rendered unimaginative. Making sustainable futures becomes limited to novelties like carbon-light mobility, "smart" housing, flexible workplaces, and leaner everyday provisioning, almost always anchored in technological innovations and geared toward the efficient streamlining of a system. An example that coincided with some of the vignettes provided here is from 2017, the centenary of Finnish independence, celebrated by the national innovation foundation SITRA, in its *Ratkaisu100* ("solution 100") contest. It was won by an AI research team and an app to promote the creation of a "positive CV"[3].

Whether upbeat like this, or in anticipations of dire environmental futures (Granjou et al. 2017), future talk in Helsinki remains overwhelmingly stuck in fixing and then fixing the unintended consequences of the fixing, much as Ulrich Beck argued decades ago in his "risk society" thesis (1992). MACs meanwhile are moving away from fixing to the "elaboration of social relationships" (Corsín Jiménez 2013: 386) and "prototyping" possibilities. They appear to be rather serious and consistent—as consistent as is possible given prevailing conditions—in living as well as making different worlds. Though vulnerable to all kinds of criticisms (being all but forced to enjoy the unsustainable comforts of ordinary life in Helsinki), they do tend to prefer reused clothes and household items, low-carbon modes of travel, vegan or vegetarian, or dumpster-dived, diet, and these do not appear simply as marginal lifestyle choices or hesitant role experiments. Being performed all the time, these are practical and realistic ways to prefigure the less unsustainable. Through them too, it is possible to imagine what a post-capitalist future could be—not a frugal, ascetic, stereotypically new age or hippie "lifestyle choice" that assaults our admittedly middle-class sensibilities, but more as (or also as) a prototyping of a lifeworld without money, with precarity,

with repertoires of technological, scientific, and artistic practices to hand, with care for material matters, with some risk-taking, and with humor.

These efforts and ambitions also help us as scholar-activists to rethink what knowledge production might be. We turn then finally, to the power of ethnography, not to seek magic or romance in it, but as a suitably flexible and messy way to work out with interlocutors like MACs what is important and why.

Collective Imaginings

We have argued that MACs create a different everyday experience from a buy/consume/throwaway normality and that their knowledge practices build on the mixed repertoire that we have called the "dirt way." Among other things, this "dirt way" helps achieve foresight about how realistically to live with the environment "out there," which, as MACs' explorations indicate, turns out to be continuous or even identical with what is biologically generative and materially wasting "in here." Like designers always primed to make improvements, they make, through the imagination, what is missing from today, or wrong or somehow should be different. One of the key features of the imagination is its indeterminacy (Sneath et al. 2009), and indeed, this is consistently if vaguely involved, as design and anthropological research are aware, in anticipating and making futures. Something similar happens, we find, in ethnographic research, whether as taught as part of a classical anthropological doctorate in the 1990s (Eeva) or as an appropriate method of generating data as a doctoral student in a design department twenty years later (Cindy). Perhaps ethnography also has something of the "dirt way" of learning, not least the inelegant combination of participating and observing. At least from the most speculative design enquiring into possible futures (Ehn et al. 2014; Halse 2013), to the most conventional anthropology, the view from the ground up—the natives' point of view—is expressly sought because it changes the what and how of knowledge conditioned only by professional or disciplinary problems. This exploits the insight that comes from juxtaposing meanings and problems. Such juxtaposition in turn can promote and provoke better ethnographic practices wherever these are adopted and adapted. Furthermore, a refunctioned ethnography (Holmes and Marcus 2010) that is explicit about learning with ethnographic "subjects" can show it, and how the existing and the impossible are already being grasped

and partially materialized through collective imaginings, as Gatens and Lloyd elaborate.

Doing ethnography with MACs is to learn (about) their messy but principled ways of being curious. Like qualitative methods generally, ethnography has always built upon the commonalities of human bodies, inter-subjectivity, and situatedness. These qualities may court accusations of romanticism, but increasingly scholarship and activism have shown that ignoring the messiness and contingency of all knowledge production is utopian in a foolhardy way (e.g., Jasanoff 2016). Furthermore, as Thomas Hylland Eriksen's (2016) recognizably anthropological work on the overheating planet shows, the ultra-automated information processing possible with contemporary technology cannot satisfy society's needs for knowledge alone—the mess we are in requires ethnographic research just as it needs an understanding of the systemic features of globalization.

MACs share this starting point, imagining unprecedented futures through abstract information and place-based materials. Picking up on Gatens and Lloyd's account of Spinoza's notion of imagination, our ethnography has pushed us to emphasize how MACs expand on the mind's capacity to think what is not there, through the body in complex, even confusing, perceptions (Gatens and Lloyd 1999: 19). Certainly, the guessing and laughing and attending to one's own or shared physical sensations—of disgust, for instance—are central to what is intriguing about MACs and what brings activists (and us) back over and over even when there is little discernible to be gained.

Gatens and Lloyd draw on Spinoza to show how knowing is not best understood as something that is conducted by an autonomous individual, nor by a pre-given collective identity. Knowing is done by a body-mind but only as a composite individual, "a union of parts acting as a center of communicating and communicated motion" (an idea that hints at why so much scholarship using materialist and assemblage-derived language harks back to Spinoza). Further, an individual mind is a good thing, but the source of its "enhanced perceptual capacity is the body's dependence on the mediating force of all the other finite bodies which impinge on it" (1999: 13).

Parenthetically speaking, it is not a novel thing to seek anti-dualist vocabularies to conceive reason as embodied, collective, and imagined. Rather, what is remarkable is how resilient these dualist and individualist philosophies have been and continue to be, that disavow and vehemently oppose such ideas! As scholars of social movements, we know

that examples abound of different philosophies, of taking responsibility as individuals in consciously care-taking relationships with other people and things (Callén and Criado 2015) and of trying out, prefiguring, and prototyping alternatives to unsustainable ways (Gibson-Graham 2008).

An illustrative encounter with activists supports the argument: Cindy was at Dodo's *Kääntöpöytä,* the urban greenhouse. She was talking to someone involved in setting up their guerrilla gardening sites nearby. He had set up a Facebook group to share ideas and start experimenting with low-tech urban agriculture. She asked him why he had started it up. He replied, "Because it's kind of like the only way I can, there's so many things to do, things I would *like* to do, and I can't do it by myself, so it's better to get some people involved." Even with the immense amount of information available online, he had not found much information on worm composting or combining vermicomposting with hydroponics. "It's really experimental. It has to be tested."

This neatly captures the social, collective, dimension of imagining, where collective interaction strengthens the epistemological powers of the individual mind (Gatens and Lloyd 1999: 39). His comments and his wider projects at the greenhouse also aligned with the dirt way, where activists rehearse the links that connect the lucky to the unlucky, the material to the abstract, and so foster an acute awareness of sharing their world with human and non-human others and of affecting and being affected by many different time frames.

In hanging out and trying to figure out MACs in ethnographic ways, we too have been collaborating, learning, and making less impossible futures with imagination, collaborating with activists through a re-functioned ethnography (Holmes and Marcus 2010). As we have suggested, imagining is a generative and necessary human capacity that is not (necessarily) romantic or superior, nor does it need serve any ultimate or external function; it just is (Sneath et al. 2009). However, in the ethnographic work we have done, we may have engaged in collective imaginings, but through it, we have also instrumentalized activists for our scholarly purposes (academic papers, etc.). Herein lie potential seeds for further connections and imaginings (we hope). In this sense, we would like to believe that perhaps the ethnographic objectification that inevitably happens in academic writing is not necessarily inimical to responsible kinds of collective imaginings, even if we allow for likely misunderstandings and misrecognitions. For not in only anthropology but in design and other fields, ethnography must nurture imagination, traveling from

memories to futures, in body-minds in constant change. Even in studying future worlds, ethnographers objectify the present, as well as look backward in time to what has been observed and narrated. But ethnography by definition also leans forward in time to what is intuited, almost grasped, hinted at, and talked about. Ideally, it can do so over weeks, months, and years, processing things so evanescent that words and sometimes even images fail to capture their essence.

Through our efforts to know with the sustainable makers whose efforts fascinate us, our own confidence in a conception of reason that is embodied, collective, and imagined has grown. We have learned with MACs and their "dirt way" of knowing that the important thing in studying future worlds is not what we do or think, but what we are—shared substance. This emerges out of MACs' experience as swamped and dependent on slime, stuff, and unfinished projects. Through their collective imaginings, absent things become present and present things become absent, while the possible and the impossible keep swapping places.

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Notes

1. https://pixelache.ac/.
2. That said, classic references remain, e.g., Haraway (1988), Strathern (1991), Suchman (2011), and Simonsen and Robertson (2013).
3. https://www.sitra.fi/en/news/artificial-intelligence-shows-finland-can-positive-cv-reveals-hidden-talents-young-people-winners-sitras-100-million-euro-ratkaisu-100-challenge-competition/.

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