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DESIGNING FOR PARTICIPATORY VISIONING: HCI FOR RECONCILING SUSTAINABILITY VISIONS WITH EVERYDAY PRACTICE IN GRASSROOTS COMMUNITIES

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Abstract

Human Computer Interaction (HCI) has been engaging with ecological sustainability is-
sues for the past decade. Despite this, Sustainable HCI (SHCI) has primarily remained
unengaged with issues of social justice, marginalisation and longitudinal change when
looking at sustainable futures. My thesis responds to these challenges by engaging with
the practices of grassroots communities and their ability to address ecological issues
through local action. Now more than ever, designers must fully engage with the messy
side of these collaborative practices as we strive to support and sustain socio-political ac-
tions to foster more sustainable ecological futures. Taking grassroots urban food growing
as a context to interrogate the research praxis of SHCI, I argue for 'place-based' action
as local, small-scale initiatives running parallel to the mainstream. An understanding
of place-based action has the potential to influence sustainable practices, build commu-
nity movements and develop long-term situated change, but it also presents method-
ological challenges. The thesis asks, 'How can digital technologies support grassroots
communities in imagining and planning, meaningful and practical actions for grappling
complex and longitudinal sustainability challenges?' The work aims to tackle systemic
perspectives through case studies that respond to the material landscape of existing vi-
sioning practices in Auroville, a town in India and Research-through-Design community
engagements in Newcastle, England. By exploring bottom-up future thinking using par-
ticipatory speculation as a process that foregrounds citizen participation and long-term
thinking as experiments-in-living, the three empirical case studies delve into visioning
as an approach for community-led bottom-up food futures. Furthermore, I make three
contributions, theoretical, socio-technical and methodological, to the field of SHCI; 1)
theoretical: reframing visions as experiments in living; 2) socio-technical: the role of
technology in sustainable futures; and 3) methodological: participatory visioning as an
approach to grassroots sustainability. These learnings contribute towards the praxis of
participatory visioning as a reflective, iterative and situated process for SHCI practition-
ers and researchers to undertake community-led work for sustainability outcomes.

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It has also been a journey full of personal challenges and I would also like to thank my mental and physical health practitioners, who gave me a sense of wellness and grounded me whenever I was all over the place. I will not be honest if I do not talk about the great unrest and suffering during this period. We went through a global pandemic which caused immense anxiety and uncertainty. Curtailing citizen movements and human rights at many levels fed into systemic surveillance and disaster capitalism. It had also curtailed human connections and closeness, affecting - community meet-ups and face-to-face events that help build momentum and community engagement on the ground, thus affecting my research. I was also deeply affected by the past three years of suffering in India - my home country. Where during the pandemic government-run systems seemed broken and it was entirely up to ordinary citizens to fix them. India has also seen citizen protests against the Citizenship Amendment Bill in late 2019 and the brutal use of force by the regime. The mass displacement of daily wage workers due to the pandemic in 2020 and the farmer protests against the farm laws in 2021.

On a brighter note, I would also like to thank all my friends back in India and all over the world: Mona Gandhi, Valli San, Devyani Lal, Rajitha Vipparthi, Roli Aggarwal, and Clare Barton, who kept faith in me, offered criticism and encouraging words and bowls

Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

A portion of the work contained in this thesis has been published in the following conference publications/workshops:

1. Chopra, S. (2019) 'HCI for participatory futuring in sustainable communities: Reconciling visions with everyday practice', in Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems, pp. 1–6.

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3. Chopra, S., Clarke, R. E., et al. (2022) 'Negotiating sustainable futures in communities through participatory speculative design and experiments in living', in Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems, pp. 1–17.

4. Søndergaard, M. L. J. et al. (2022) 'Feminist Voices about Ecological Issues in HCI', in CHI Conference on Human Factors in Computing Systems Extended Abstracts, pp. 1–7.

5. Chopra, S., Clarke, R., et al. (2022) 'Infrastructuring ecological sustainability through multi-scalar speculations', in Proceedings of the Participatory Design Conference 2022-Volume 1, pp. 13–25.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the *Department Ethics Committee* .

I declare that the Word Count of this thesis is 94,329 words.

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Publications

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2. Bates, O. et al. (2019) 'Towards a responsible innovation agenda for HCI', in Extended Abstracts of the CHI Conference on Human Factors in Computing Systems, pp. 1–8.

3. Chopra, S. (2019) 'HCI for participatory futuring in sustainable communities: Reconciling visions with everyday practice', in Extended Abstracts of the CHI Conference on Human Factors in Computing Systems, pp. 1–6.

4. Heitlinger, S. et al. (2019) 'Co-Creating" Smart" Sustainable Food Futures with Urban Food Growers', in Proceedings of the 9th International Conference on Communities & Technologies-Transforming Communities, pp. 114–120.

5. Chopra, S., et al. (2022) 'Negotiating sustainable futures in communities through participatory speculative design and experiments in living', in Proceedings of the CHI Conference on Human Factors in Computing Systems, pp. 1–17.

6. Søndergaard, M. L. J. et al. (2022) 'Feminist Voices about Ecological Issues in HCI', in CHI Conference on Human Factors in Computing Systems Extended Abstracts, pp. 1–7.

7. Chopra, S., Clarke, R., et al. (2022) 'Infrastructuring ecological sustainability through multi-scalar speculations', in Proceedings of the Participatory Design Conference 2022-Volume 1, pp. 13–25.

8. Beniwal, S. et al. (2022) 'What is Participatory Design? Expanding Worlds of Participatory Design from India', in Proceedings of the Participatory Design Conference -Volume 2, pp. 269–270.

9. Chopra, S. et al. (2023). 'Bottom-up visions for future of food growing in cities', in International Journal of Food Design.

10. Chopra, S., Kirts, L. (2023) 'Food as a feminist issue', in Interactions (currently under review)

Chapter 1

Crisis of culture and imagination

Our society at large is facing crises at many levels, with the ecological degradation of the planet, which we call home being one of them. This ecological degradation is predominantly caused by industrialisation which influences the extraction of physical material and economic value from people and places. Through systems that create and uphold mass production, distribution and consumption of goods and services. In the last two decades researchers and practitioners have investigated and responded to the impacts of industrial systems on the environment. I narrow down the scope of my inquiry by drawing from and speaking to my own research community - Human computer interaction (HCI).

HCI community designs, develops and deploys numerous interactive technologies and systems and its multidisciplinary nature makes it difficult to succinctly define the field. HCI is one such discipline among many that reflect and perpetuate the mentioned industrial practices (Bardzell et al., 2021) and the responses towards ecological degradation have taken diverse forms which recognise it as a deficit of social justice, responsible innovation, climate emergency and life-threatening planetary changes (Barr and Pollard, 2017; Klein, 2014). However, these narratives within the rapidly developing disciplines of science and technology, green over (Shaw et al., 2018; Light, 2022) or overlook the subjugation of natural systems and phenomena.

1.1 Introduction

Sustainability has been a growing field of research in HCI for the last decade (e.g., Blevis (Blevis, 2007)). The research initially focused on technology-led interventions, applications and tools that focus on individual behaviour change, making consumers more aware of their own consumption and convincing them to alter their consumption patterns (DiSalvo et al., 2010; Brynjarsdottir et al., 2012). For example, energy use, food consumption, transportation and disposal of waste have all been areas that were in line with what designers or researchers understood to be *'green'* through the approaches of prediction, monitoring, feedback and control. The focus on the individual is based on the discourse of sustainable consumption or distribution of assets building on the moral choice of consumers (Dourish, 2010). These approaches frame sustainability as a problem of awareness and persuasion and tend to see the solutions to the current crises as predominantly technological, expert-led (DiSalvo et al., 2010; Brynjarsdottir et al., 2012), and inclined towards values of efficiency (Hobson, 2002) which are predominantly utilitarian. This individual, solitary, intervention-focused, and efficiency-driven paradigm of Sustainable HCI (SHCI) has been criticised by many for its limited capacity (Brynjarsdottir et al., 2012) to understand the scalar complexities of the system (Dourish, 2010) that entrenches individual choice and agency, thereby making citizens feel powerless. Moreover, researchers and designers who work towards sustainability and the impact of future technologies, invariably contribute towards unsustainability through the practice of *'greenwashing'* (Pargman and Raghavan, 2014; Light, 2022) - as academic research are often discursive and difficult to evaluate whether they contribute to sustainable outcomes. Therefore, many academic researchers intentionally and inadvertently describe projects and technologies as *'green'* or *'sustainable'* but in reality, they are not (Pargman and Raghavan, 2014).

Therefore, the field of SHCI needs to imminently and seriously look at sustainability as a value and take a turn towards critical thinking and design actions that contribute to systemic and transformative change (Norton et al., 2017; Knowles et al., 2018; DiSalvo et al., 2016; Silberman et al., 2014). This turn should focus on material and discursive practices of designing future technologies geared towards addressing social practices (Pierce et al., 2013). A recent review of the SHCI landscape by Bremer et al. (Bremer et al., 2022) critically looks at the field 15 years on and recognises the growing move-

ment in SHCI to address the need for systemic change (Easterbrook, 2014; Willis et al., 2020; Landwehr et al., 2021; Heitlinger et al., 2019b). The review presents the broad critical domains within SHCI that take a turn from persuasive computing - community and policy awareness instead of behaviour change, speculation instead of a prescription, holistic perspectives instead of simple metrics, and diverse explorations beyond resource consumption (Bremer et al., 2022). The review's authors call to break away from normative structures and acknowledge the importance of understanding sustainability within the context of everyday life but fail to understand it as a consequence of longitudinal social practices (Strengers, 2011; Pierce et al., 2011, 2013). Thus taking into consideration the long-term, social, cultural, political and more than human circumstances that impact sustainability (Bates et al., 2012; Liu et al., 2019a; Hazas et al., 2012). However, these research practices are also cautionary in nature rather than offering the community alternative methodologies or processes (Bardzell et al., 2021). Therefore, rather than sliding into the comfort of business as usual of *'sustaining the unsustainable'* whilst staying complacent with the logic of industrial development (Fry, 2009) we should be focusing on creating spaces for transformative thinking to move beyond a deeply rooted, shared passion for *'doing good'* (Bates et al., 2017).

Similarly, the field suffers from questions about the impact (Remy et al., 2017; Lundström and Pargman, 2017; Pargman and Raghavan, 2014) as Mankoff put it *'how much of an impact do sustainability projects really have, and does it justify the cost, time, and effort put into them?'* (Mankoff, 2012) . Speculative and qualitative research have been critiqued as decreasing our ability to measure impact with no direct path to driving change (Bremer et al., 2022). Bremer et al. propose *'Green Policy informatics'* where HCI has a clearer role in working towards and staying within the emission constraints set by policymakers through technology use (Bremer et al., 2022). Concerns about real-life impact are genuine drivers for change but by staying within the domain of experts, it may be constrained. Also, I argue that the field is now looking for ways to challenge the existing dominant paradigms and continues to build malleable, interpretive, human and non-human aspects of research which account for qualitative, speculative, and reflective ways of thinking. Therefore, rather than looking for ways to dismiss these and take a u-turn to look for solutions in technology again i.e. *'Green Policy informatics'* (Bremer et al., 2022), we should embrace its use as qualitative, speculative and reflective research to better address complexities and abstraction.

Blevis et al. indicated that *'the design of digital networking and interactive technologies that can help people at various levels—as individuals, small groups, governments, and global bodies—plan and prepare for the orderly adaptation to these effects.'* (Blevis and Blevis, 2010). Here Blevis et al. approach sustainability as a multi-level and multi-scalar issue that needs to be looked at in an intersectional and interrelated capacity to create impact through the use of technology. My PhD research aligns with these movements in SHCI that look towards systemic and scalar questioning, through future-thinking approaches such as speculation, longitudinal research processes and grassroots-led practices Participatory Design. My research is motivated by the desire to align towards renewal of ethics to build equitable and just ways to coexist - with humans and more than humans (Clarke et al., 2018; Liu et al., 2019a) which demands radical changes in lifestyle practices without the need to uphold current economic, social and environmental relations. To contribute to this discussion my PhD research directly responds to the call to examine social practices and to broaden the design space of SHCI by investigating new approaches to:

1. *Disrupt hegemonic, expert-led paradigms by creating space for grassroots community-led voices and ground-up understandings of transitioning towards sustainable practices.*

2. *Identify how these alternate understandings can influence the future-thinking design space for longitudinal ecological urban sustainability.*

My PhD foregrounds these considerations of acknowledging the importance of understanding sustainability as a consequence of longitudinal social practices (Knowles et al., 2018; Kuutti and Bannon, 2014; Silberman et al., 2014) which are participatory in nature, with increased recognition for grassroots ideas of sustainability and visions of urban futures. Thus this work is moving away from the domain of experts (Bourgeois et al., 2017; Prost et al., 2015), conventional development and *'business as usual'* (Light, 2022). Urban communities anticipated to be most affected by climate change are considered to be in a more informed position to articulate and imagine a more environmentally sustainable future for themselves (Dourish, 2010; McPhearson et al., 2016). Moreover, working with local communities is often perceived as more egalitarian for promoting viable long-term and embedded change. Community members share values and identify with particular sensibilities which create a sense of self, recognition and belonging

within a social setting (Gilchrist et al., 2010; Seebohm et al., 2009). However, little work has explored the challenges of effectively negotiating collaborative future visions in community settings

Community food growing, as an instance of research within SHCI, has predominantly focused on collaborative acts of growing rather than political frictions that may emerge through competing agendas and narratives. However, local food growing communities are important in engendering grassroots-led positive change (Blevis and Morse, 2009; Heitlinger et al., 2014) and there has been prior research to investigate and integrate community practices and values in developing future sociotechnical systems (Norton et al., 2019; DiSalvo et al., 2008; Heitlinger et al., 2018a). Moreover, McPhearson et. al identifies long-term thinking as a key to empowering grassroots communities in transitioning towards sustainable food systems (McPhearson et al., 2016). Also, community-led organisations and initiatives like *'Transition Towns'* and the *'Transition Network'* (Hopkins et al., 2008) have identified the potential for positive visioning and are successfully using visioning processes to envision, create and negotiate initiatives (Hopkins et al., 2008).

SHCI has considered speculative approaches and associated practices as important tools in challenging normative socio-technical systems to encourage more criticality (DiSalvo, 2012a; Dunne, 2008) and opportunities to think expansively (Tharp and Tharp, 2019). Increasingly, this involves engagement with stakeholders to imagine alternative futures (Soden and Kauffman, 2019), co-designing with grassroots communities and citizen-led initiatives (Baumann et al., 2016; Wakkary et al., 2013) and fostering resilience in the face of uncertainty about the future (Barr and Pollard, 2017). Subsequently, there are increasing interests in HCI to engage citizens and communities in creating ground-up community futures (Baumann et al., 2017) to create autonomy through hyperlocal solutions (Gooch et al., 2018), influence policy change (Thomas, 2017), create resilience to overcome existing problems and challenge normative unsustainable structures.

Moreover, the relationship between future thinking and daily practices is not well established, and slow community practices provide an opportunity to further research the interrelation of visions and practices. I use the context of community food growing in my PhD research, using Social Practice Theory to cast light on the importance of socially constructed meaning and the attached significance of practices. Long-term thinking,

social practices and issues of ecological unsustainability are interconnected and it is difficult to speak about one without considering the influence of the other. I grapple with the messy interconnectedness further through my arguments in various Chapters.

Transition from normative constructed practices are made possible through *'external'* (Douglas and Isherwood, 1996) ideas, arguments and rationales that support people's actions. However, as Shove explains, the practice-based rationales that people weave around their actions have the effect of reconstituting the bedrock of normality against which future alternatives are judged (Shove, 2003, pg. 153) (Comfort, Cleanliness and Convenience). Taking these considerations I question - *Can future thinking motivate or influence people's actions? Can future thinking influence external change?* These open questions motivate my research to question the relationship between future thinking and daily practices. This relationship is not well understood in HCI and I contribute to this design space by investigating the role of technology in ground-up visioning through my PhD. Therefore, taking my case studies (Chapters 4, 5 & 6) as building blocks I argue that future thinking and daily practices forge relationships with each other through created meanings in an attempt to create actionable change. New ideas, arguments and rations in the case of my research are sparked by thinking about how the present can be different by exploring multiple futures. For this, I develop and contribute Participatory Speculative Design (PSD) as a methodological approach for Participatory Visioning as a practice in SHCI.

Prior community-based future thinking work has used traditional design workshop methods (Baumann et al., 2017; Heitlinger et al., 2019b) and has been critiqued for not being able to continue engagement in community settings beyond the workshops. I argue in my work that making changes in sustainable practices takes time and this is also true for the materialisation of visions into practice. Therefore, thinking long-term should also be deliberated and co-created over a longer period of time. Digital technologies have been shown to enable democratic decision-making on social media platform such as Facebook (Bendor, 2012), and engages a large scale audience in the creation of an organisational future vision through the use of WhatsApp (Lambton-Howard et al., 2019). As well as increase modes of participation and representation through 'distributed qualitative data analysis' using messaging platforms (Rainey et al., 2020). Therefore, there is potential for the role of technology in scaffolding participatory speculative processes as seen in the latest HCI research, which focuses on the use of information and commu-

nication technologies to support emerging societal transformations. However, there has been very little attention paid to entirely ground-up future thinking processes mediated through technology which minimises structural hierarchies and move beyond facilitation by expert designers or researchers. Through my work, I present these views to the SHCI community and contribute to the Participatory Visioning approach, within which I offer methodological, theoretical and sociotechnical contributions, specifically for SHCI design research looking to engage sustainability communities in future thinking.

1.2 Research questions, aims and objectives

The aim of my PhD is to explore the design space in HCI for fostering and supporting long-term thinking processes and transitions to sustainable outcomes in grassroots communities, through co-constructing socio-technical visions and reconciliation of food futures with the everyday practices of the communities. I have conducted this PhD research with the following overall question in mind (see Figure 1 for an overview):

How can digital technologies support grassroots communities in imagining and planning, meaningful and practical actions for grappling complex and longitudinal sustainability challenges?

The overall question is extensive in scope which can lead to a lifelong inquiry. To narrow the scope of the research, I have opted to pursue three research objectives to contribute to the ongoing discourses in SHCI which are related to future thinking and longitudinal research, these objectives are mapped onto three case studies conducted during the PhD (see Figure 1).

Case Study 1 (Chapter 4)

What can SHCI learn from long-term collective negotiation towards a shared vision?

- **What is the role of visions in influencing everyday sustainability practices?**

- **What are the challenges faced by citizens or communities in reconciling static visions with everyday practices and vice versa?**

Contributes to learnings from long-term collective negotiation towards a vision to understand the material landscapes of existing visioning and long-term thinking processes

in a grassroots community.

Case Study 2 (Chapter 5)

How can SHCI researchers facilitate future thinking in urban food growing grassroots communities

1. **What are the possible methods to help scaffold the participatory speculative processes in bottom-up, grassroots community contexts?**

2. **What do food growing communities who are motivated by sustainability challenges think about their future and what are the tensions and barriers concerning these futures?**

Explores the processes of creating socio-technical visions by participatively negotiating future thinking processes for sustainability. Contributes towards methodological understandings, tensions and opportunities within co-imagined socio-technical food growing visions.

Case Study 3 (Chapter 6)

How does a local neighbourhood community experience interactive technology as a platform to support a situated participatory speculation process to promote transitions for sustainable outcomes?

1. **What are the experiences of people around opening up a dialogue using digitally mediated deliberation in participatory speculation processes?**

2. **How can technology support social cohesion and interaction in communities during participatory speculation processes?**

Develop an understanding of the role of existing digital technology in limiting or supporting collaborative future thinking processes. Contributes towards socio-technical understandings within SHCI.

My research questions and objectives have been partly affected by my personal objectives, which were to take a break from my corporate career, reflect on the extractivist nature of corporate research practices in a male-dominated industry. I also aimed to aptly apply qualitative social science methods, and build confidence and experience as an academic, while also reflect on my past engagement with activist grassroots commu-

nities, giving back to the community and personal art-based practice about the politics of food, in India which moves beyond evangelism. These objectives have influenced how, when and why I conducted my research, and drove me to choose a topic that I believe engages with all those objectives whilst creating space to gain new perspectives.

1.3   Research Approach

The food system is globalized and dominated by a few large organisations, which disempowers people from making changes to it (DuPuis and Goodman, 2005). Being aware of the global systemic issues with food and the inability to tackle a colossal wicked problem in SHCI, I make an attempt to tackle this in my research through four research strategies which inform each other. I describe them in a linear narrative but they are intimately interconnected, informing various aspects and approaches of the research.

Firstly, I have based my methodology on Participatory Design (Muller and Kuhn, 1993; Kensing and Blomberg, 1998; Bødker et al., 2000; Robertson and Simonsen, 2012) with a feminist positionality of care (de La Bellacasa, 2011) and environmental theories (Haraway, 2016; Tsing, 2015). I have included this methodology to include the voices from the margins, of citizens who will be affected by the future thinking processes and outcomes, and the developed future socio-technical systems. This strategy aims to tap into *'situated knowledges'* (Haraway, 1987; Akama et al., 2020) which is place-based and context-dependent whilst being engaged in community-based Participatory Design (DiSalvo et al., 2012; Healey et al., 2008). Such approach aims to bypass the alienation created by persuasive and individual-focused interventions in SHCI (Brynjarsdottir et al., 2012; Sengers et al., 2009), which is explicitly grounded in exploring *'how things could be otherwise'* (Mazé, 2013, pp. 83-110) through the use of criticality and speculative processes in design.

Secondly, I have chosen to work with small-scale urban communities because such sites provide theoretical and in-practice grounds for uncovering alternatives to the hegemonic systems of food growing while allowing for the study of interconnected social, economic and environmental factors which impacts the scope of sustainable outcomes at the local level. I see community-led urban food growing in small front and back yards, public spaces, community farms, gardens and allotments as sites for hope. These sites have relatively low barriers to entry, participation and openness to experimentation, making it

persuasible for widespread bottom-up discovery.

Thirdly, the work is situated within a local small-scale food growing community situated in Auroville, India and a neighbourhood in the North-East of England - the latter being deprived and local residents are exceedingly motivated to and are already practising, living minimally and sustainably. This brings in different nuances of lived experiences such as local expertise, socio-economic backgrounds, tacit knowledge, practice-based sustainability and understanding of the mundane everyday which build into future thinking processes implicitly. These perspectives are in resistance to the technology-led food futures and dominant visions of capitalist corporations and governments, whereas the community-led ground-up visions include voices from the margins and the subversive in the large conglomerate of SHCI work.

Lastly, I use the context of food growing to examine the long-term future thinking in communities for sustainable transitions. Within this context, I examined the role of SHCI research in creating and facilitating participatory spaces for possible local and ground-up interventions in response to ecological unsustainability. I did so by scrutinising a number of cases from my fieldwork both as sites where digital technology can support and extrapolate alternative ground-up futures albeit in a fragmented or imperfect way. My work is aimed at advocating for future socio-technical systems to reflect understandings of local and tacit knowledge of food growing, with designers and/or researchers working for and with the communities, rather than forcing them to adopt new approaches, methodologies and technologies.

1.4   Thesis Structure

Chapter 1, as seen above, I have discussed the problem area this research is tackling, the motivation, approach and contributions. As well as the thesis structure, and the development of my reflexive research practice.

Chapter 2 describes the background of the thesis with an overview of HCI and its evolution focusing on the development of the field, its connection to other fields and its predominant value systems. The Chapter then refocuses on SHCI and the development of the field's current literature and its many approaches, leading to its recent turn towards Social Practice Theory. With the foundation of SHCI in place, the Chapter shifts focus towards food as a context in SHCI research. I review visions as a domain and the

interrelation of the present and reality in defining future visions. I also elaborate on the use of speculative practices in SHCI and the newly developing participatory speculative praxis within the research community. Finally, the Chapter reviews the use of digital technologies in supporting future thinking processes.

Chapter 3, I elaborate my methodology with a feminist positionality of care and environmental theories by centring on marginalisation to include the voices of the citizens and communities (Haraway, 1987); and present the value of tapping into place-based situated knowledges (Akama et al., 2020, pg. 9). This Chapter presents the four key theoretical and conceptual threads that run throughout my thesis and inform my methodology, these are - feminist theory, living experiments, Social Practice Theory, and visioning. Within this Chapter, I also elaborate on my reflexive praxis and describe my positionality during the research, and my journey from an outsider to a member of the community. The methodology Chapter later explains the methods, positioning and reflexive praxis within the three case studies which are part of the feminist theory thread and commitment.

Chapter 4 includes an exploratory study of a food growing community in Auroville, South India which has had a longitudinal vision in place for more than 50 years. I build on SCHI's recent turn towards Social Practice Theory to study the interrelation and interpretation of an established community vision to its everyday food practices. The ethnographic study learns from the relationship of the future ideals to the daily practices of the place to build conceptual understandings of visions and their relationships with everyday practices before moving on to engaging a community in future thinking processes.

Chapter 5 describes the work with a grassroots neighbourhood community in Newcastle Upon Tyne. My engagement with the community started in January 2018 till date. However, the data collected for this thesis are from March to July 2018. The Case Study included the development of participatory speculative processes to create sociotechnical visions of future food growing in the local neighbourhood through a series of design workshops.

Chapter 6 presents Case Study 3 which was carried out in the same Newcastle community in Chapter 5, with data collection started in May and ended in October 2021. This study explores community visioning through co-speculation and participation with

the use of an existing digital platform that creates access to resources and space for future thinking. I argue that individual imagining, creation and sharing through the use of digital technologies can lead to collective interpretations and deliberation in digital spaces. The study contributes to considerations towards development of digital spaces for participatory future thinking.

Chapter 7 encapsulates the discussion and reflection on the thesis work. I draw together insights from the three case studies (Chapters 4, 5 & 6) to discuss how the approach and the empirical data provide inspiration and insights for the SHCI community. It places the overall contribution of the thesis in close conversation with the previous research in SHCI. It contributes theoretical, methodological and socio-technical contributions. Also, I propose Participatory Visioning as an approach to the SHCI community through which community-led work for sustainability can be looked at using a framework for future thinking.

Chapter 8 brings a conclusion to the thesis and discusses the way forward for me as a researcher and the SHCI community.

Note to the reader

For me writing this thesis has been a considerable challenge and I imagine it must have been for other PhD candidates before me as well. I have tried to engage the reader through a functional linear narrative while still incorporating an iterative and reflexive process which I developed through the PhD journey. This has been fundamental to the development of the thesis and I evidence and elaborate it further in the methodology (Chapter 3).

Also, the research process mattered to me; and it is why I pursued the research topic, the project scope and my supervisors. The descriptions of my field studies through notes, observational accounts, pictures and narratives are an attempt to weave and present the research process and my reflexivity throughout the thesis. I have tried my best to keep these narratives true to the descriptions of fieldwork and personal reflections on the future directions of the research in SHCI, but I am aware that at points it might go beyond these and I have tried to address these concerns throughout the thesis with clear indications.

I acknowledge my position of privilege which has enabled me to write my thesis and express my thoughts to the reader. I am also aware that my values, emotions and state of

mind will be projected on the thesis, and I would like the reader to be sensitive to it. All opinions are my own and do not shadow the opinions of others.

The thesis is an imperfect mechanism for discussing and incorporating my abductive, iterative and reflexive process but I have come to the conclusion that the thesis is an expression of the self and the discussions I would like to have with the SHCI and the wider HCI, design and research community. That is why the thesis is written in first-person narrative.

Case study 1

'What can SHCI learn from long-term collective negotiation towards a shared vision?'

1) What is the role of visions in influencing everyday sustainability practices?

2) What are the challenges faced by citizens or communities in reconciling static visions with everyday practices and vice versa?

Contributes to learnings from long-term collective negotiation towards a vision to understand the material landscapes of existing visioning and long-term thinking processes in a grassroots community.

Case study 2

'How can SHCI researchers facilitate future thinking in urban food-growing grassroots communities?'

1) What are the possible methods to help scaffold the participatory speculative processes in bottom-up, grassroots community contexts?

2) What do food-growing communities who are motivated by sustainability challenges think about their future and what are the tensions and barriers concerning these futures?

Exploring the processes of creation of socio-technical visions by participatively negotiating future thinking processes for sustainability. Contributing towards methodological understandings, and tensions and opportunities within co-imagined socio-technical food growing visions.

Case study 3

'How does a local neighbourhood community experience interactive technology as a platform to support a situated participatory speculation process to promote transitions for sustainable outcomes?'

1) What are the experiences of people around opening up a dialogue using digitally mediated deliberation in participatory speculation processes?

2) How can technology support social cohesion and interaction in communities during participatory speculation processes?

Develop an understanding of the role of existing digital technologies in limiting or supporting collaborative future thinking processes. Contributing towards socio-technical understandings in SHCI.

Figure 1: Research Questions

"Welcome to our hell, it is the best and only reality we can imagine, and we're sure you will like it too" (Andrew Simms 2013, 383)

The poly-crisis of the 21st century which entails climate change, anthropogenic ecosystem degradation, economic and political uncertainty, global pandemics and unsustainable food systems are not isolated but the intertwined manifestation of deeper unrest about the state of the world and social realities we live in today. The interconnected systems responsible for this degradation are part of normative social structures which are difficult to change.

Chapter 2

Approaching sustainability in HCI by envisioning futures

The literature review starts with the contextualization of the field of Human-Computer Interaction (HCI) within a larger socio-cultural or political context with an intent to make the reader understand its influences on Sustainable HCI. I argue that the understandings and definitions of sustainability within the field are too broad, misaligned and theoretical. In these formulations, sustainability is either a means to an end, individual intervention-focused or an abstract future concept.

In this Chapter, I build a discourse around issues and criticality in existing sustainability research to build a case for ecological sustainability as a transdisciplinary challenge. However, it is out of the scope of my thesis to include a comprehensive review of all related works, instead I have selected key concepts and present them in the literature that helped shape my work. In the larger work, I attempt to go beyond the definitions to present limitations within SHCI, the critical turn in the field which attempts to address issues of political complexity, scaler issues, long-term engagement, slow-changing social practices, and understandings of the lived experiences and tacit knowledge from the point of view of grassroots communities. Thus turning the discussion towards the role of communities in bringing about change, contextualising it within food practices and communities which grow food in urban areas.

The second part of the literature review looks at the framing of long-term thinking within HCI through visioning as an approach. I propose to frame visions as a progressive way

of approaching sustainability which goes beyond the limited framing of neoliberal solutionism. Taking into consideration the situatedness of visions within the everyday which is necessary for their negotiation with the everyday material realities of place. The section further looks at operationalising speculatory practices within HCI for approaching sustainability and further framing Participatory Speculative Design (PSD). I use PSD and build on it to create an iterative reflexive praxis in my empirical research engagements (Chapters 4, 5 and 6) with the communities, from which I build the contribution of the thesis as Participatory Visioning as an approach to sustainability research within HCI.

2.1 Understanding the roots of sustainability

The field of Human Computer Interaction (HCI) started with its research roots in the two distinct fields of engineering and cognitive science (Bødker, 2006; Harrison et al., 2007). HCI in its nascent stages, the concentration was on human factors and usability in coordination with the fast-paced development of technologies and computing systems for companies in Silicon Valley rather than the US military. Leading to an increasing call to design, evaluate and create new interactive computing systems for human use and the study of major phenomena surrounding it (Hewett et al., 1992). The dominion of the market or economy as a model of *'natural'* regulation is perhaps particularly potent in the context of neoliberal political ideology associated with the administrations of Ronald Reagan in the United States and Margaret Thatcher in the United Kingdom, amongst others (Harvey, 2005) that framed ecological concerns of the time. Population explosion, and air pollution, predominantly around the years 1960-70s became the foundations for green politics (Dobson, 2007), whereas the new communalism and the conservation movement, continues to influence the grassroots movements even today (Robinson, 2004). At the time, the discipline of Design was challenged to be socially and ecologically responsible by Victor Papanek, he criticised Design, saying it is central to the structures of unsustainability that hold in place the contemporary, so-called modern world through its intensive resource use and vast material destruction. (Papanek and Fuller, 1972)

With the further introduction of computers in the work setting and the interaction between well-established communities of practice at offices, the second wave of HCI

(Bødker, 2015a) emerged. It still had influences of cognitive science but was employing participatory methods to understand the context of work and create solutions with the users of technology. HCI was concerned with the need-based design, laying out usability principles for Pervasive and Ubiquitous Computing (Hewett et al., 1992). The motivation behind much of the initial Ubiquitous Computing (Rogers, 2006) research has been to make our lives convenient, comfortable and informed, following in the footsteps of Weiser's calm computing vision (Weiser, 1991). The three efficiency-based themes that forms part of UbiComp are context awareness, ambient intelligence and monitoring/tracking, while these avenues of research have been fruitful, their accomplishments do not engage people but rather use them as subjects for developing solutions by experts (Rogers, 2006). With convenience and efficiency as driving forces of development, ecology was not considered a factor. Moreover, the ecological side effects of development were ignored until it became sufficiently important for society, hence, moving ecological concerns within the domain of experts, policymakers and governments.

The United Nations set up the Brundtland commission which defined sustainable development as *'meeting the needs of the present without compromising the ability of future generations to meet their own needs'* (WCED 1987 – this is what is commonly referred to as the Brundtland report) (Burton, 1987). The term *'Sustainable Development'* was defined by the Brundtland report, which presented considerations for looking at possible sustainable futures through ecological preservation in tandem with economic development. The definition of Sustainable development is flexible-but-vague, based on modernist discourses around economic rationalisation and sustainable consumption (Robinson, 2004). Knowles et al. articulate it as the Triple Bottom Line construction of social, environmental and economic needs which dominates HCI research (Knowles, 2013).

The United Nations (UN) has set out sustainable development guidelines (UNSDG) for governments, organisations, businesses and policymakers to create change in what they do and how they operate. Sustainable development as an approach almost by definition is more attractive to government and business than a more radical one, as explained by Robinson

> *A more fundamental reason for this tendency to divide on terminological grounds is due to a concern, on the part of NGO and academic environmen-*

talists, that development is seen as synonymous with growth, and therefore that sustainable development means ameliorating, but not challenging, continued economic growth (Robinson, 2004, pg. 370)

These understandings have led to the development of policy, inter-governmental and academic frameworks, ideas, standards, protocols, agreements and visions, for example, the Kyoto protocol (1997), the Paris agreement, and COP 26/27. I would argue that these are ideas of control discussed and rephrased over a period within international centres of power, making policies not socially and economically just towards the deprived global south countries.

By the start of 2000, computing technologies moved from the workplace into other spheres of life, as technology was cheaper and more accessible to people, HCI emerged as an eclectic inter-discipline rather than a well-defined science with user-centred design considerations for socio-cultural contexts to devise experiences for people (Bødker, 2006). HCI is an area of research developed without a defined boundary with a mix of different disciplines, and the use of a variety of theoretical approaches and research methods. This eclecticism has become even more pronounced, as stated by Rogers in a review of theory in HCI:

(…) there is no longer a coherent set of aims or goals, or accepted classification of contributing disciplines. It seems anything goes and anyone can join in (Rogers, 2012, pg. 12).

The dominant paradigms of inquiry within HCI are the *'Interaction and Practice'* paradigm (Kuutti and Bannon, 2014). And the interaction paradigm has tended to focus on momentary and ahistorical HCI situations that are not crucially connected to a particular time and space (ibid). Instead it focused on interaction at the moment, particularly on the human-machine relationship to create and cater for personalised experiences (Bødker, 2015a). HCI also borrowed methods and frameworks from adjoining fields like social science, art and critical design to enhance experiences. Moreover, the role of research in HCI has expanded from scientific testing to include other functions such as describing, explaining, critiquing, and as the basis for generating new designs (Rogers, 2012). Moving away from the creation of technologies towards raising questions about the impacts of technology on society - Sustainable HCI (SHCI) emerged as part of the third wave with an increasing concern for ecological impact due to technology use and devel-

opment. The initial focus was on the individual to make decisions towards sustainable consumption (Brynjarsdottir et al., 2012; Dourish, 2010; DiSalvo et al., 2010) , this individual-focused structure is in line with the Neoliberal market capitalism driving Silicon Valley, creating rest of life or consumer technologies as part of the Third Wave of HCI (Bødker et al., 2017). Socio-cultural contexts, individual actors and interconnected systems are also some of the core values influencing the third wave of HCI.

The anthropogenic effect has been an active area of research for decades, and some researchers responded by asking to adjust our actions or behaviours expeditiously (Wackernagel et al., 2002), Jim Skea, co-chair of IPCC working group III, articulates that it would require unprecedented changes (Edenhofer et al., 2014; Adopted, 2014). Others lay emphasis on balancing natural capital (Daly, 1991) and warn about the cornucopian paradigm (Widdicks and Pargman, 2019; Pargman and Wallsten, 2017) of continuous accelerated growth, indicating the use of technology to overcome resource limitations, subsequently creating the fear of running up to and beyond the planetary limits or boundaries (Meadows et al., 2004; Pargman and Raghavan, 2014). There is also another perspective, the degrowth argument - which is anti-consumerist and anti-capitalist in nature (Tomlinson and Aubert, 2017) - focusing on the decrease in carbon-intensive practices, subsequently going back to nature as a solution to the problems of anthropocentric ecological impacts. These framings mostly tend to focus on the impacts created by individual people much in line with neoliberal understandings of *'power of the individual'* in creating change through behaviours and actions (Brynjarsdottir et al., 2012; Dourish, 2010)

These are mostly international, policy-led, top-down narratives towards addressing the challenge, some activists critically examine these points of view. These activists present a call for social movements and community action through an understanding of anti-globalisation and eco-feminism, and social and ecological justice through the creation of sovereignty and local abundance (Shiva, 2001). The activists suggest taking experiences from ancient sustainable food growing communities and recasting them as inspirations for the future of agriculture (Norberg-Hodge, 2013). There was also new emphasis on the importance of place and localisation through the fabric of local interdependence being rewoven with ethnic, racial, socio-economic and intergenerational values (Norberg-Hodge, 2010). Overall, these activists calls for resilient change within the masses which is anti-systemic and anti-capitalist (Klein, 2014).

There has been a similar call to action within HCI and Design academics to be ecologically and politically motivated (Blevis and Morse, 2009), whilst emphasizing autonomy, and to reinvigorate the concepts of ecological responsibility (Escobar, 2011). Similarly, philosopher André Gorz (1985) has said,

> *Technology can only create new material conditions. Those created by [computing] will encourage or jeopardize our development according to the social and political project underpinning their implementation* (Gorz et al., 1985).

Thereby, bringing emphasis on the social, cultural and political milieu under which technology and sustainability are defined and redefined within the larger HCI field. This is in line with the emerging fourth wave which articulates *'must push harder, beyond measured criticism for actual (e.g. institutional) change, taking political activism from the margins into mainstream HCI'* (Ashby et al., 2019). Therefore, fourth-wave HCI opens up new epistemological, ontological and ethical aspects of interactions with technologies. Frauenberger proposes these through *'entanglement theories'* such as posthumanism, feminism, and post-phenomenology to look at *'entanglement HCI'* as part of the fourth wave (Frauenberger, 2019). Here I argue the field has to acknowledge the interconnected social, economic, and political systems responsible for anthropogenic ecosystem degradation where economic and political uncertainty are not isolated but the intertwined manifestation of deeper unrest about the state of the world and social realities we live in today. Therefore, I, too, look to the margins for radically new ways of thinking about futures through a transdisciplinary approach.

2.1.1 Reviewing Sustainable HCI

Through the years of evolutionary development in HCI scholarship, the community has started to question how technologies affect anthropogenic degradation and explore the possibility of supporting sustainability. The HCI community has various subcommittees and my research primarily draws from and contributes to the sub-communities interested in Sustainable HCI (SHCI) and sustainable interaction design (SID), these first appeared in the ACM CHI 2007 conference (Blevis, 2007; Mankoff et al., 2007). It was a response to the ever increasing concerns on climate change, consumerism, and the environment. The sub-committees developed various arguments, debates and calls for action within a short period of time. CHI 2021, Critical and Sustainable Computing appeared as a

new sub-committee - ushering in a stage of maturity in HCI - with the goal to promote diversity, inclusion, and justice, specifically looking at global sustainability and social justice. For the thesis, I will be aligning with and using SHCI to position my work.

I will be discussing next, how the HCI community has examined sustainability issues to date and has proposed to navigate the uncertainty by engaging with some of the complex and multifaceted issues. SHCI calls to address sustainability through topics like more-than-human and post-anthropocentric-functionalist HCI, sustainable agriculture and food systems, energy efficiency and optimization, collaborative environmental sensing and citizen science, resource consumption and reuse, pro-environmental behaviour change and policy reform. Moreover, the field is now attempting to grapple with complex wicked problems with pressing scalar issues, not just through the development of socio-technical systems but by looking at the problem in a holistic, interconnected way. Researchers are doing so by asking : how can HCI help in addressing environmental justice, climate change, uneven resource distributions, declining global food systems, economic recession and political conflicts.

After sustainability was introduced by Blevis as an important focus for HCI (Blevis, 2007), the field of SHCI has seen an accelerated interest in the HCI community and a remarkable body of work has emerged since. Blevis proposed a rubric for understanding the material effects of particular interaction design cases in terms of forms of use, reuse, and disposal, and gives initial guidelines or values for HCI designers and researchers to integrate these for sustainable outcomes within technology development. Similarly, (Mankoff et al., 2007) proposed considering both sustainability in and through design - by suggesting reducing material impacts and influencing behaviours and decisions. Both framings (Blevis, 2007; Mankoff et al., 2007) approached contributing to and framing sustainability through technological interventions. SHCI as a field has seen multiple definitions, focuses and approaches being developed over the years, all attempting to create diversity within the already existing field (DiSalvo et al., 2009; Fogg, 2009; Choi and Blevis, 2010; Tomlinson et al., 2013; Pargman and Raghavan, 2014; Clemmensen et al., 2016; Raghavan et al., 2016; Knowles and Håkansson, 2016; Remy et al., 2018; Knowles et al., 2018).

However, this diversity has also led to the field suffering from a lack of focus or arriving at a single definition of sustainability (Pargman and Raghavan, 2014), or measurable

outcome (Remy et al., 2017; Lundström and Pargman, 2017). Pargman et al. argue this disillusionment comes from the ineptness of the field to define sustainability which is an effect of the definition of Sustainable Development itself (Pargman and Raghavan, 2014). The paper further adds, the definitions of sustainability in SHCI literature have become so broad that it risk becoming meaningless. They propose a concrete definition: *'sustainability is an absolute measure and an end-state in which the Ecological Footprint of humanity is below the regenerative biocapacity of planet Earth'* (Pargman and Raghavan, 2014). I would rather argue that the lack of definition is not only a result of Sustainable Development but also an effect of sustainability as a concept, as it is multilayered and heterogeneous. Thereby making it inappropriate to contain into a single definition or discourse, as it will limit the design space and reduce opportunities to create impact (Dourish, 2010; DiSalvo et al., 2009, 2010; Knowles, 2013; Silberman et al., 2014). My research does not attempt at defining sustainability but understanding the concept through the practices of my grassroots communities and how they make sense of it.

I am drawn to explore what underpins all the multiple definitions, focuses and approaches, particularly the idea of placelessness (DuPuis and Goodman, 2005; Goodman et al., 2012; Odom et al., 2014; Foth, 2017) and that technological interventions hold an important space within addressing sustainability. This is in line with the early mapping work done by DiSalvo et al. where they initially mapped the landscape of Sustainable HCI (DiSalvo et al., 2010) , Knowles et al. surveyed it in 2018 (Knowles et al., 2018), recent mapping done by Bremer et al. (2022) and Brynjarsdottir et al. investigated the field of persuasive sustainability (Brynjarsdottir et al., 2012); all of them acknowledge the involved multiplicity and complexity. These attempts of mapping sustainability research in HCI lead back to the expert-led paradigm of technological solutions which frame interventionist, behaviour change models focused on individual consumers as the way to approach sustainability. I am not contesting the role of technology within sustainability outcomes as I acknowledge that my work is within the field of HCI and design whose origins lie within industrialisation but I would like to present a new point of view that connects HCI to the subtler ways of looking at the world beyond the idea of sustainable development.

Changing a paradigm is not easy when a particular mindset has become the preoccupation of a group of scholars in a particular field, they are so reluctant to let go of it that

they become existentially attached to it. So a critical call on the paradigm becomes an attack on them and they vigorously defend it. Knowles et al. (2013) concur with this point, recognising the maintenance of the status quo, by the richest nations

> *Rather than exploring alternatives to what has been argued as an inherently unsustainable digital economy, or challenging the instrumentalization of the sustainability problem, computing seeks sustainability wins that can be found within the dominant ideology of our technological era* (Knowles, 2013).

However, as an academic, I do also acknowledge that knowledge is built on the shoulders of giants. One framework I found particularly useful in thinking about and addressing sustainability, particularly within the context of food, is a conceptual framework for building resilient futures as *'an iterative and evolutionary process involving interactions amongst people, place, and technology.'* (Choi and Blevis, 2010) . What is of great interest to me in this work is its recognition of the need for transdisciplinarity to address sustainability, as an opportunity and necessity within HCI and Design. As well as recognising and embracing the innate interconnecting threads across various scholarly disciplines, domains of research and practices (Dourish, 2010). The framework also gives importance to *'place'* which has been underplayed in other initial works. The framework also describes the potential of addressing sustainability via design, through an iterative approach over a long period of time. Choi and Blevis's framework builds a starting point, a foundation for me to explore in my empirical case studies. They give the example of participatory DIY and the slow food culture to emphasise sustainable impact is incremental and self-initiated rather than externally enforced as seen with persuasive technology.

> *significant transformations arise from large-scale consensual participation of individuals identifying with the value of a sustainable lifestyle both conceptually and pragmatically* (Choi and Blevis, 2010, pg. 3).

However, the paper looks at motivation and persuasion to sustain behaviour change in individuals and increase ideological impetus to enhance societal values. The dimensions of people, place and technology also do not consider scalar and political issues that overwhelm sustainability. It emphasises human-centred design for technology exploration focusing on location-tracking and tagging as considerations for the place. I argue

that SHCI needs to consider the complexity of scalar political dimensions and placemaking (Harrison and Dourish, 1996; Dourish, 2006; Crivellaro et al., 2016; Peacock et al., 2018), beyond the agency and control of the individual.

2.1.2 Critical turn from individual-focused persuasive sustainability

The focus on behaviour change of individual consumers within Sustainable HCI can be traced back to the ideologies of sustainable consumption, within the sustainable development paradigm (Hobson, 2002), which is linked to the problematic growth paradigm. Hobson explains - *"growth' is not in itself the problem – rather, when guided responsibly, it is seen as a solution'* (ibid). Researchers have been criticising this dominant techno-solutionist, individual behaviour change approach, as it fails to address the intermingled dominant social, cultural and political issues (Dourish, 2010; DiSalvo et al., 2010) like the issues of scalar politics which goes beyond the agency of the everyday citizen. For example, the invisibility of the actual cost to the environment due to the *'naturalization of [the] market'* (Hobson, 2002) by putting the onus on individual consumers, it absolves states and corporations of responsibility (ibid). Thus approaching the solving of the collective problems of sustainability through competition rather than cooperation (Dourish, 2010).

Everyday citizen and their motivations for living sustainably seem to be misaligned with what is necessary to bring about sustainable consumption. As Hobson writes, *'The project of sustainable consumption, through its prevailing policy framing, appears to fundamentally misrepresent what matters to individuals in terms of social and environmental concerns'* (Hobson, 2002). This is also in relation to the modernist approaches in which political, technological and corporate experts decide what constitutes an individual sustainable behaviour, and embody this as values in technology design that will judge users' behaviour. This approach of the expert paradigm rarely examines social justice, and the politics of who gets to use resources, for what, and why (Knowles, 2013; Brynjarsdottir et al., 2012). A good example is the SDGs or food growing policies which are made by experts and policymakers and leave the everyday citizen out of the decision-making processes.

These approaches in HCI seemed to be in line with the cornucopian paradigm (Widdicks and Pargman, 2019; Pargman and Raghavan, 2014), where progress is defined by the use of technology through the production of limitless resources, indicating mod-

ernist, consumption-based discourses in HCI (Brynjarsdottir et al., 2012). Furthermore, there is limited evidence that persuasive sustainability technologies actually work, especially in long term (Snow et al., 2013; Brynjarsdottir et al., 2012; Abrahamse et al., 2005). Brynjarsdottir et al. (2012) also argued the design space has been limited to such an extent that it is repetitive and lacks innovation. These persuasive sustainability technologies are driven by metaphors of *'control'* and *'correction'* to convince consumers to behave more sustainably. Prominent examples, are predicting and monitoring energy consumption (Costanza et al., 2012; Comber and Thieme, 2013; Schwartz et al., 2015; Mauriello et al., 2017) which are mostly short-lived (Bates et al., 2012) as these are based on *'modernist enterprise'* (Brynjarsdottir et al., 2012) and are therefore defenceless to breakdowns.

Through this thesis, I would like to bring to the fore problems of framing environmental concerns purely in terms of an individual's personal, moral choice, particularly linked to patterns of consumption. Secondly invisibility of the political discourse about the framing of sustainability futures and thirdly obscuring the responsibility and actions of other social entities most notably corporations and states. Touching on the broader cultural discourse which questions social justice and responsibility by bringing experientially and politically focused discourses into future-orientated perspective. It has been argued in SHCI, that to move beyond behaviour change from individual consumer focus,requires a fundamental rethinking of design, and an understanding and shift in cultural thinking (also academic) (DiSalvo, 2009; DiSalvo et al., 2009). For HCI to take sustainability more seriously it has to move away from greenwashing, of built technologies and research outcomes. Also, looking beyond the beneficial actions of motivated individuals. This has been furthered in HCI by designing for larger scales through systems thinking (Raturi et al., 2017; Norton et al., 2019), policy (Thomas et al., 2016), political activism (Nardi, 2015; Busse et al., 2013) and complex social issues (Talhouk et al., 2019).

However, I do acknowledge the diverse research within the field which has been carried out since the conception of SHCI which compel the field into this radical rethinking. For example, reuse, repair, repurposing, redistribution, slow technology, conservation of resources, collapse informatics, computing within LIMITS, simple living, critical computing, Social Practice Theory, and un-design (Huh et al., 2010; Wong, 2009; Jackson and Kang, 2014; Pierce and Paulos, 2012; Merritt et al., 2012; Hallnäs and Redström, 2001; Strauss and Fuad-Luke, 2008; Woodruff et al., 2008; Kuznetsov and Paulos, 2010;

Tomlinson et al., 2013; Remy and Huang, 2015; Remy et al., 2017; Håkansson and Sengers, 2013; Gui and Nardi, 2015b; Odom et al., 2014; Clear et al., 2016; Baumer and Silberman, 2011).

These perspectives have steadily created compelling new directions for the field and the perspectives have been increasing since. However, these approaches are criticised by Pargman et al. for being limited (Pargman and Raghavan, 2014) saying *'Sustainable HCI approaches are deeply and problematically 'presentist' (i.e. ahistorical)'*. There are others who look at this critique for example, designing for planned obsolescence (Odom et al., 2012; Pierce and Paulos, 2011), slowness and reflection (DiSalvo, 2009) and green lifestyle and simple living (Håkansson and Sengers, 2013), they attempt to understand and address the longitudinal nature of sustainability work and research. However, Pargman et al. (2014) also critique these by saying they are based on minimal changes to the current state of affairs, as well as mired in the belief that *'every little bit'* makes a difference.

Knowles et al. in their survey of SHCI talk about the recent shift that focuses on dimensions of justice and politics putting forth - 1) technology can support groups of people, *'often in their role as citizens to help them fight, to help them survive, to help them thrive'*; 2) a shift from focusing on designing improvements to designing for change (Knowles et al., 2018). This encourages potential areas in SHCI which build on the systemic nature of the problem (Dourish, 2010; DiSalvo et al., 2010; Dillahunt et al., 2010). It aligns with the early work of Hobson (2002) where he writes about alternative discourses that look at a sustainable society by linking environmental sustainability and social justice:

> *Sustainable living is no longer just about consuming products but about how social and environmental resources of the common good(s), spaces, networks, futures and relationships need to foster respect for each other and in turn, for the environment. In this sense, the environment is not [just] about 'nature', but about the total environment of lived spaces and daily experiences, the urban experience that is part of modern environmental histories.* (Hobson, 2002)

With this framing in mind, I look at the daily lives of the citizens but consider the multiple lifespans and future generations (Friedman and Nathan, 2010) that affect the building

of sustainable practices. Pierce et al. look at sustainable everyday practices, to *'allow us new means to investigate the dynamics of (un)sustainability'* and help to *'expand beyond human–computer 'interactions' to grapple with the complexities of sustainability in terms of how people go about their everyday lives'* (Pierce et al., 2013). Furthermore, there has been an increased call to extend the field through empirical studies on everyday life and practices. Helping to understand how people understand sustainability in everyday life to understand complex situated behaviours (Pierce et al., 2010; Morley and Hazas, 2011; Bates et al., 2012; Kuijer and De Jong, 2012) puts the focus back on the organization and reorganization of shared activities.

Practices are constructed in a social setting, Shove explains that resource use is intertwined with cultural assumptions about cleanliness and consumption (Shove, 2003). In line with this, Strengers claims that, even when given the correct interpretation of eco-feedback data, members of a household may not choose to act on it because of their existing practices which are thought to be non-negotiable (Strengers, 2011). Therefore, practices are conceived as *'embodied, materially mediated arrays of human activity centrally organized around practical understanding'* (Schatzki et al., 2001). Moreover, Shove et al. explain practices to be the fundamental unit of social existence which influences both social order and individuality. They also explain the relevance of social order by arguing *'Rather than existing in mental qualities, in discourse or interaction, the social exists in practice'* (Shove and Walker, 2007, p. 12). For example, Warde suggests consumption habits as part of practices (Warde, 2005), such as laundry (Shove, 2003), showering (Gram-Hanssen, 2007) and energy use (Strengers, 2011). Bringing to the fore that practices are complex bundles of activities that invariably involve human and non-human participation (Schatzki, 1996; Reckwitz, 2002; Shove, 2003) established over a long period of time through careful adaptation and negotiation. Reckwitz also frames practices as relationships between various types of elements including *'forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotions and motivational knowledge'* (Reckwitz, 2002, p. 249) .

Taking food practices as an example, the practice lens avoids seeing food as an element of isolated behaviour and connects food activities and experiences with sensory, physiological, psychological, socio-demographic and social factors. These are cultural norms, values and sociotechnical structures that can inhibit significant change (Shove

and Pantzar, 2005) making it difficult for people to think beyond. The food system is composed of complexly interlinked practices which are multiple and contextually layered within society (Ganglbauer et al., 2013; Clear et al., 2016). To look at how to construct practices we have to consider the practitioners as co-creators, taking into account their needs, desires, motivations and aspirations. Prior research has shown food practices can and do change through *'system builders'* (de Boer et al., 2009), which talks about practices that aim to actively create changes in the wider system. These system builders help translate niche practices into *'amenable form for the larger audience'* (Smith, 2007, pg. 447) who are *'locked in'* (Berkhout et al., 2002; Unruh, 2002) the system such as the global food chain. This is where I align my PhD research to look at the role HCI can play in supporting motivated groups of people who want to look at changing the status quo. I do not agree with the sentiment *'every bit counts'*, but I do believe that every bit adds to building practices towards the longitudinal nature required for approaching sustainability.

2.1.3   Food as a domain in Sustainable HCI

Food has been an important area in SHCI since the last decade, the initial focus was to look at the potential of technology towards monitoring the production and consumption of food or through tracking health and well-being (Zhang and Parker, 2020; Comber et al., 2014). Prior work within the production and consumption of food has been looked at through the design and study of technologies for growing (Odom, 2010; Lyle et al., 2015), shopping (Clear et al., 2015; Tukkinen and Lindqvist, 2015; Lawo et al., 2021), preparing (Clear et al., 2013b; Frawley et al., 2014), eating (Abbar et al., 2015; Clear et al., 2016), sharing (Ganglbauer et al., 2014; Gross et al., 2011) and disposal (Ganglbauer et al., 2013; Altarriba et al., 2017). These have been within the purview of optimisation and deficit with the use of *'persuasive technologies'* as the overarching theme to change and motivate behaviours. The scale addressed in these works within SHCI is primarily at the level of individual households (Clear et al., 2013a; Comber et al., 2013) or has recently addressed communities (Heitlinger et al., 2013; Wang et al., 2015).

However, these look at food as a problem to solve, whereas another perspective is the emerging field of Human Food Interaction (HFI) that looks at technologies that support pleasure, connectedness, creativity, criticality and self-fulfilment as progressive perspectives within these discussions (Khot et al., 2017; Dolejsova, 2018; Altarriba et al., 2017;

Deng et al., 2021). Celebratory technologies (Grimes and Harper, 2008), also within the same theme encapsulate various multisensory and experience-driven interactions and technologies (Deng et al., 2022; Dolejšová and Kera, 2017; Narumi et al., 2012; Obrist, 2017; Wei et al., 2014).

SHCI has shifted from its early focus on persuasive design to a systems perspective (Hirsch et al., 2010; DiSalvo et al., 2010; Raturi et al., 2017) attempting to unpack the role of technology and design in creating more sustainable food systems (Norton et al., 2017; Blevis and Morse, 2009). These framings still miss out on addressing issues of lived reality (Brynjarsdottir et al., 2012; Dourish, 2010; Maitland et al., 2009) and remain top-down and techno-centric (Manzini, 2014). I would argue this bifurcated view of looking at addressing points in the food chain will not address the problem which is complex and systemic in nature and that there is a need to understand and address the issue through the big picture of systems and systems thinking within the urban landscape.

The urban food landscape is rapidly changing and is beyond the control and perception of the everyday consumer. Industrial farming, climate change concerns, carbon emissions, and a burgeoning population are some of the reasons that make people feel concerned about the future of food and food security. Everyday food consumption, rather than being built on informed choice is built on the complexity of demand and supply, governed by the principles of consumerism, influenced by politics, economics and sociocultural constructs (Dourish, 2010; DiSalvo et al., 2010). Current food consumption patterns are unsustainable (Goodland et al., 2002; Lehmann and Crocker, 2013; Jackson, 2009), I believe it is an outcome of the failing urban global food system attributed to the fact that the food system is resource and oil intensive and is a significant contributor to greenhouse gases, deforestation and water scarcity [1]. For instance, in 2021, the UK imported 42% of the food consumed , 50% of which was from the EU, this import accounts for significant food miles and carbon footprint. [2].

Therefore, I argue that the global food problem is multi-scalar in nature and involves addressing geographical responsibilities (Massey, 2004) that are multi-layered. This implies that actions, relations and practices of individuals or organizations at a local or global scale are intimately connected. This reveals an impending need to instil a broader

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[1]https://www.ipcc.ch/srccl/chapter/chapter-5/, accessed on 27th February 2023
[2]http://bit.ly/3Z545FA, accessed on 27th February 2023

global consciousness (Black et al., 2017) towards reconnecting and re-politicising food within different scales, whereas initiatives that focus on individual behaviours should be connected to their global lineage.

Food and food systems have been a matter of concern for policymakers, governments and related bodies, looking at food systems as a constellation of activities involved in producing, processing, transporting and consuming food. These organisations approach it through national and global agendas of urban sustainability by looking at eco-cities and sustainable smart cities (Mullins, 2017). Moreover, the recent United Nations food systems summit 2021 acknowledges that *we all must work together to transform the way the world produces, consumes and thinks about food*. [3] These policy perspectives, essentially top-down, do acknowledge the role of local, small-scale agricultural players. Hirsch et al. bring to focus that small-scale food producers produce 70% of current humans' food, however, they are among the first ones to feel the impact of climate change (Hirsch et al., 2010).

Technological solution-led services and outcomes are increasingly critiqued for their approach to urban sustainability (Foth et al., 2015; Heitlinger et al., 2018b). They misrepresent and disempower citizens, taking away agency and political will to act (Gabrys, 2014) reducing them to mere consumers. Also, disregarding the real, messy complexities of cities (Mullins, 2017) where on-ground realities can lead to breakdowns in the techno-solutionist visions (Hollands, 2015; Mullins, 2017) they started out with. Therefore, it is essential to bring to the fore the problems of control related to access to infrastructures and data (DiSalvo and Jenkins, 2017; Antoniadis et al., 2015) arising from the socially questionable acts of surveillance, monitoring and censorship. This is a result of techno-solutionism (Lindtner et al., 2016) and algorithmic culture progressed by Silicon Valley corporations that hold the power to create technological solutions in terms of food production, consumption and sustainable city infrastructures. In this context, designers and technologists act as experts, imagining design and technological visions of future digital systems and city infrastructures. Therefore, creating inequalities and algorithmic injustices (Heitlinger et al., 2021) in participation, representation and access for citizens. These criticisms create a recent growing field of interest in design and HCI to rethink technological advancement through citizen involvement and dialogues (Foth et al., 2015; Thomas et al., 2016; Balestrini et al., 2017). Researchers are looking at

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[3]https://www.un.org/en/food-systems-summit/about, accessed on 27th February 2023

combining progressive and traditional practices, for instance, by embracing bottom-up movements of everyday food scientists (Kuznetsov et al., 2016). Citizens are seeking to regain control over their food production and consumption, engaging with digital technologies, increasing food literacy and reducing the environmental impact of their food practices. Similarly, urban communities are at the centre of such conversations through citizen involvement and established sustainable practices.

2.1.4 Resistance and resilience: Context of community food growing

My research is within the local scale, addressing support for local communities and infrastructures, in an attempt to use HCI as a means for communities to exert control over their locales and foster resilience (Nathan et al., 2009). Communities is the scale I believe can create the possibility of looking both ways (Ganglbauer et al., 2014) to create momentum for policy change (Gui and Nardi, 2015a) and create practices to motivate individuals to take sustainable steps (Lyle et al., 2014; Biørn-Hansen et al., 2018). The communities are motivated by their values, ethics and practices, these practices can be seen as a performance within the larger social setting (Kuijer and De Jong, 2012).

I define communities in my thesis through the framing of *'communities of practice'* (Wenger et al., 1998) however it moves beyond the restrictive framing of the workplace. I look at communities through common experiences, passions, interests, and political alignment to form organic and complex networks of people and organisations. This is in line with Disalvo et al. (2012) categories of community-based organisations and activist and hobbyist communities (DiSalvo et al., 2012). However, these two categories intersect each other without definite boundaries, and they are usually informal structures as they *'highlight the social constructs and relations of groups in settings that include, but go well beyond, the formal organisational structures commonly foregrounded in more traditional workplace studies'* (DiSalvo et al., 2012, pg.182).

Communities are often linked to identity and trust, and rely on building stronger social ties, I argue that urban communities gather citizen perspectives, cultivating spaces for equity and movement building (Gui and Nardi, 2015b; Biørn-Hansen and Håkansson, 2018; Lampinen et al., 2019). Additionally, offering significant insights into everyday sustainable practices such as food growing (Lyle et al., 2014, 2015) creating resilience and reclaiming the right to the city (Heitlinger et al., 2019a) through their practices. Agendas aligned to grassroots and community activities are inclined towards the posi-

tive effects of urban food growing, in having better food security and citizen health in the city (Lyle et al., 2014; Heitlinger et al., 2018b). For example, community gardens are said to have the potential to influence cities towards sustainable practices (Stocker and Barnett, 1998; Ferris et al., 2001; Hollands, 2004), promote social sustainability with inclusion, and community building (Saldivar-Tanaka and Krasny, 2004; 'Yotti'Kingsley and Townsend, 2006), food security (Garrett and Leeds, 2015) and re-connecting with food (Tan and Neo, 2009). Community food growing in cities is also said to have micro-climatic change (Turner, 2011) and a reduced heat island effect, through decreased food miles and carbon footprint of food (Pothukuchi and Kaufman, 1999). Local food systems are seen to be a logical and appropriate way to increase the environmental, social, spiritual and economic well-being of a community (Feenstra, 1997).

Although communities of practice promise self-sufficiency and sovereignty in local food systems (Norton et al., 2019; Prost et al., 2018) they still face difficult challenges that limit the possibilities for change, like restrictive local government policies, economic and infrastructure viability, and participation and inclusivity (Gui and Nardi, 2015b; Barr and Pollard, 2017; Biørn-Hansen and Håkansson, 2018). These communities or grassroots initiatives also face resource challenges including the availability of land, vulnerability to potential commercial development and competition over funding (Shaw et al., 2016). One would imagine that a cohesive action within the communities would be a solution but prior research has shown that the small local food growing communities do not work together in cohesion, the difficulty of working together is due to the shortage of resources and funding that sometimes leads them into competing with each other (Shaw et al., 2018).

Biørn-Hansen & Håkansson give merit to building an overarching representative organisation but it is also seen to have ongoing and unresolved tension about the representation of the diversity of viewpoints and multiple narratives (Biørn-Hansen and Håkansson, 2018). Therefore, communities can also be experienced as exclusive, restrictive or even divisive in maintaining longstanding biases, hierarchies, cliques and social norms (Carroll and Rosson, 2013; Light et al., 2013; Crivellaro et al., 2014). These are related to sustaining, growing and scaling issues within these organisations, pertinent to collective action, coordination, and recruitment needed for long-term impact (Biørn-Hansen and Håkansson, 2018; Gui and Nardi, 2015a). Scalar politics as a concept by MacKinnon illuminates the implications of scale associated with these representative organisations

(MacKinnon, 2011). So, local groups seeking to create environmental sustainability through effective strategies and practices have to keep in mind the scalar issues associated and be able to negotiate dominant agendas and actors across regional, national and supranational scales to be effective (Shaw et al., 2018). McKay puts it within the context of urban food growing

> *Climate change, peak oil transition, community cohesion, the environment, genetic modification and food policy, diet, health and disability – the garden is the local patch which touches and is touched by all of these kinds of major concerns, whether it wants that kind of attention or not.* (Mckay et al., 2011)

Community-based sustainability work acknowledges the importance of understanding sustainability as a consequence of longitudinal social practices (Knowles et al., 2018; Kuutti and Bannon, 2014; Silberman et al., 2014). As well as this, there is an increased recognition that for longer-term environmental change, ideas of sustainability and visions of urban futures should not only be developed by experts alone (Bourgeois et al., 2017; Prost et al., 2015). While specific expertise may have a role to play, urban communities anticipated to be most affected by climate change are considered to be in a more informed position to articulate and imagine a more environmentally sustainable future for themselves (Dourish, 2010; McPhearson et al., 2016). Longitudinal local knowledge can contribute key insights that bring into focus an appreciation of place (DuPuis and Goodman, 2005), intersecting histories, and fragile ecosystems (Dillahunt et al., 2009; Capaccioli et al., 2016; Baibarac and Petrescu, 2019) in this context. Furthermore, studying grassroots, urban and small-scale food growing communities presents opportunities within SHCI to move away from a focus on individuals to scale (Dourish, 2010; Raturi et al., 2017; Norton et al., 2017), and from models of competition to cooperation (Dourish, 2010; Boucher et al., 2012).

Recognised for their potential for bringing about citizen-led, on-ground change through sustainability practices (Heitlinger et al., 2019b) local grassroots initiatives involving bottom-up, citizen-led movements often lead to the establishment of long-term urban food growing communities (Heitlinger et al., 2013; Lyle et al., 2015) that operationalise sustainability values through their food practices. These ecologically inclined practices can be traced to small-scale or grassroots initiatives that run parallel to the mainstream food system (Blevis and Morse, 2009; Heitlinger et al., 2014). These surrogate systems

build on alternative land use and food culture (Blevis and Morse, 2009) . For example, urban farming (Odom et al., 2014; Choi and Graham, 2014), slow food (Born and Purcell, 2006) or permaculture initiatives (Liu et al., 2018b), foraging (DiSalvo et al., 2016), food co-ops (Renting et al., 2012) and locavorism. Choi and Blevis argue for the virtues of researching food production and consumption within HCI research, to focus on designing for more environmentally, socially and economically sustainable cultures (Choi and Blevis, 2010). Dourish and Disalvo separately argue that our cultural assumptions within the design can be examined through a focus on food as a research area (Dourish, 2010; DiSalvo et al., 2010).

Collective food growing is looked at as a response to the challenges or create resistance to unsustainable commercially intensive food systems (DuPuis and Goodman, 2005; Norton et al., 2017; Prost et al., 2018). Grassroots urban food growing has been implored in search of understanding(s) of communities working toward sustainability in everyday life (Blevis and Morse, 2009; Norton et al., 2017; Raturi et al., 2017). Work in this area has focused on environmental sustainability through agroecological system design (Raghavan et al., 2016), human-animal cohabitation (Liu et al., 2019b), urban food informatics (Choi and Graham, 2014), and the development of value-based socio-technical systems (Odom, 2010; Heitlinger et al., 2013). Such work in grassroots community-based urban farming, highlight possibilities for anticipatory collective action towards alternative futures that are more sustainable in the sense of participation, environment, and social justice. Norton et al. in their longitudinal engagement with two permaculture communities highlight the importance of value-elicitation in an action research initiative to design and develop information systems (Norton et al., 2019). They conducted workshops to understand the community's shared design future by guiding members through a co-design exercise. This co-created food growing future then informed the design of socio-technical systems for the community.

Furthermore, food growing in a way is an anticipatory collective practice towards alternative sustainable futures, where communities embrace participatory, adversarial, environmental and social concerns in response to present governments and commercial services. Therefore there needs to be an attempt to look at new philosophies and frameworks that work within the *'entanglement'* paradigm (Frauenberger, 2019) looking at urban food systems holistically through a framing of ethics and justice. Choi and Light bring to focus that marginalised and vulnerable populations face unfair exposure to life-

threatening risks, bear the harsher brunt of ecological crises, suffer economic dispari-
ties, experience disproportionate harms, and have fewer rights and resources to defend
themselves (Choi and Light, 2020). Prost et al. (2018) propose food democracy as a
theoretical framing for HCI work that engages with food systems, and frames citizens
as *'food citizens'* (Welsh and MacRae, 1998; Wilkins, 2005). Similarly, Liu et al. pro-
pose permaculture—a philosophy of sustainable farming which works with nature (Liu
et al., 2018b) and is looking at more-than-human (Clarke et al., 2019) and natureculture
(Liu et al., 2019a) as approaches for research. This human-nonhuman kinship encapsu-
lates and nurtures a multispecies perspective which is a post-anthropocentric worldview
drawing on scholars from feminist technoscience and posthumanism (de La Bellacasa,
2011; Tsing, 2015; Haraway, 2016). Approaching and reconfiguring design for collab-
orative survival (Liu et al., 2018a), racialised dispossession in digital agriculture (Liu
et al., 2019b; Liu and Sengers, 2021), and experimental farming practices which call for
*'HCI designers should factor land usage and interspecies relations into any considera-
tion of IT development and deployment'* (Bardzell et al., 2021). These new approaches
involve collective action, user-led innovation, and participatory processes; and focus on
creating more equitable food systems which are inclusive and just towards marginalised
populations (Leshed et al., 2014; Light et al., 2017; Steup et al., 2018; Oduor et al., 2018)
and the larger ecology.

The value of such new perspectives and participatory activities to design is clear, and is
valuable for surfacing and productively grappling with notions of sustainability (Good-
man, 2009; Bardzell, 2010; Bødker, 2015a; DiSalvo et al., 2016) considering the user to
be a part of the specification instead of being the sole focus. Furthermore, the participa-
tory process allows the users to surface, reflect upon and creatively respond to their own
unmet needs as in a simplified dialogue with the makers of new technologies (DiSalvo
et al., 2008). However, to go beyond this framing of food as a problem where the ad-
dressing of needs can solve the problem of sustainability, little research has attended to
longitudinal and methodological work. Envisioning futures with grassroots local com-
munities is a way of empowering them to create possibilities for change and for tran-
sitioning towards sustainable food systems (DuPuis and Goodman, 2005; McPhearson
et al., 2016).

My thesis attends to longitudinal and methodological work of effectively co-imagining
food future, involves eliciting community understandings and concerns, negotiating con-

tested ideas and values, and the struggle to find a sweet spot between short-sighted boundless speculation and the uncompromising realities of the situated every day (Dolejšová et al., 2018). Alternative futures of food beyond the expertise of the researcher and designer (Dolejšová et al., 2018) is difficult to imagine, this I argue, is because we as citizens are trapped in established food practices (Reckwitz, 2002; Choi et al., 2012) which are formed over a long period of time.

The thesis looks at urban grassroots communities and their slow everyday practices (Chopra, 2019; Chopra et al., 2022b,a) as ways to build approaches to collectively imagine sustainable futures with the communities. My work sits within this space of involving urban food growing communities in thinking expansively about the future of food within cities. In a way to incorporate grassroots voices into building understandings of sustainable cities, moving beyond the values of efficiency and neo-liberal agendas. Through the use of speculative and participatory ways of designing visions, I examine how design and HCI can incorporate complexities of urban spaces and contribute to the reimagining of socially just food practices. In turn, aiming to highlight how local grassroots community visions embed values of ecological and social sustainability, in an attempt to gain sovereignty and control over urban landscapes of future imagination.

2.2 Relevance and politics of futures and visions

Design and HCI as disciplines have been preoccupied with the notion of newness and futures, where design is seen as a normative act, a futuring discipline, a practice that is concerned with *'changing existing situations into preferred ones'* (Simon, 1969, p. 130). Design also provides essential modes of knowing, forms of thinking, and a powerful *'art of rhetoric'* (Buchanan, 1992) describing and defining, futures or futurity (Grosz and Grosz, 1999); where the world is constructed anew through active and conscious interventions by designers and technologists. This I would argue is a construct of modernity and neo-liberal capitalism affecting modern society which translates into the practice of design. This construction of the future gives an exhilarating sense of freedom, an experience of the new as well as anxiety about the openness of the future as described by Bryant and Knight (2019), towards its role in society and culture.

> *This openness to the future, moreover, was related to the way in which time*
> *is 'emptied' in modernity, based no longer on seasons and rituals but in-*

stead on clocks and calendars - esp. Giddens (1990). (Bryant and Knight, 2019)

Thus, this emphasis on progress is definitional of modernity and of anxiety regarding it and does not go along the lines of the future as a dimension of temporality. However, sociological literature on utopia may count as an important exception to this, Karl Mannheim interrogates utopian thinking as part of the historical trajectory of ideologies (Mannheim, 2013).

Here I would like to branch out, take a step back and look at the premise of time and temporality (Pschetz and Bastian, 2018; Mazé, 2020), where a homogenous conception of (modern) time evaluates and measures other *'traditional'* or indigenous ideas of times (Birth, 2012). I am not talking about the metaphysics of time as important as it may be, relating to the past, present and future but instead how design and HCI concern themselves with time and temporality, compromising the future. Ramia Maze puts these ideas of temporality and time within the field of Design by saying

> *Assumptions about time, progress and futurity underlie popular rhetoric concerning 'change', 'progress', 'transformation' and 'transition', and design, along with many disciplines, is affected by the increasing hegemony of values framed as 'newness' and 'innovation' (Wakeford, 2014). Beyond mere rhetoric, design research and practice must further develop its approaches to futurity* (Mazé, 2019, pg. 199)

This is in line with the critique by Dunne and Raby on how market-led capitalism had created a one-dimensional reality where political and social realities design could no longer align towards (Dunne and Raby, 2013). Moreover, design, HCI and other related disciplines rarely address the relationship between the collective past and anticipated futures, and thus the future is often represented as an unknown against which the person or the collective struggles to maintain stability, clinging to particular histories and trajectories.

In contrast, recently anthropology has taken a turn towards addressing futurity within the discipline and has suggested, orientations of the future through temporal trajectories - anticipation, expectation, speculation, potentiality, hope and destiny (Bryant and Knight, 2019). Each one of them represents varying depths of time and different, though often related ways in which the future may orient our present. Connecting here, to the classical

conceptions of design, premised upon preferred futures creates differences between the desired and the present (Simon, 1996). Such dominance of the future is also central to the field of Future Studies, originally developed in the context of policy planning (Bourgeois et al., 2017; Vervoort et al., 2015; Chakraborty, 2011) (eg. climate visioning for climate action), which can be understood as engaging the future to inform, understand and/or control the present (Wangel, 2012). Similarly, particular ideas or ideals of the future are mobilized by socially-and politically-engaged designers or policymakers (Ericson and Mazé, 2011). Therefore, the desired futures are thought to have *'the supervalence of the future'* (Grosz and Grosz, 1999, p. 7), or the future as having agency and wielding power over the present.

Much in line with the futures cone (Dunne and Raby, 2013; Hancock and Bezold, 1994) which starts from the present towards - possible, plausible, probable, and preferred futures, where the future is a discrete definitive location reached through linear pathways, supported through particular design and technologies which create a basis for human cultural and societal progress (Wangel, 2011). Following this trajectory, society is assumed to go on more or less according to *'business as usual'* (ibid), based on the notion of the modern western concept of time which is linear, singular and exists, therefore positions it as an achievable object of scientific study which can be known. This motivates a basic ontological and epistemological dilemma about futures debating what can be known, methods of knowledge production, issues of uncertainty and indeterminability, and knowledge politics and institutional histories (Svenfelt et al., 2010). Furthermore, concepts of *'the future'* as a singular narrative do not exist in some cultures (Inayatullah, 1990), as argued by futures researcher Sohail Inayatullah. Other philosophies of time instead explore notions of emergence, becoming and virtuality (Grosz and Grosz, 1999), and feminist and postcolonial theories counter universalising narratives of time (Mazé et al., 2017).

Furthermore, visions can range from personal, corporate, cultural, artistic, and political to technological. These are predominantly created by corporations, politicians, designers and technologists, the visions of the future are developed or associated with the domain of experts, for example, Weiser's vision for ubiquitous computing (Weiser, 1991). Therefore associating visions for the future with predictable knowledge structures, forecasts and planning, seen within the field of HCI associated with practices of futuring; with set expectations and goals, driven by corporate and government bodies (Pargman

et al., 2017; Bendor, 2012; Mullins, 2017).

However, these aren't new; they were initially introduced through corporate research design initiatives from the RED group at Xerox PARC (Wong and Khovanskaya, 2018). Through the years the field has also seen other forms of conventional corporate speculation eg. through corporate videos and scenario planning. Techno-centric scenarios and socio-technical visions related to cities' futures premised on neo-liberal logic continue to permeate HCI (Petkov et al., 2011; Costanza et al., 2012; Mauriello et al., 2017). This is predominantly dictated by the rhetoric of efficiency, growth and innovation governed by technological solutionism (Meadows and Kouw, 2017; Mullins, 2017). Taking smart city visions as an example, of top-down neo-liberal visions, these are dominant narratives for the development of future cities based on paradigms of managerial efficiency through technological solutions (Gandino et al., 2009; Erickson et al., 2013; Khan et al., 2013; Schwartz et al., 2013; Gabrys, 2014).

I acknowledge that there have been attempts made to include citizen-led voices within this mix in HCI (Thomas et al., 2016) and beyond, using planning consultations, scenario building and futuring (Pargman et al., 2017). The advantages of such research and initiatives are not obvious as they are not adequately reported and represented in the SHCI literature or taken up by funding bodies. These often include citizen assemblies and consultation sessions especially around planning for smart cities, although these are good intentioned examples, they result in limited success. These shortfalls occur due to: efforts still being top-down and non-inclusive, articulation is jargoned which suffers from issues of accessibility and visibility. The dominant reason is that these efforts are still being governed and directed in an expert-led fashion which by definition does not often include marginalised voices in the city, thus, producing restrictive perspectives and representation (Mullins, 2017). On the contrary my thesis aims to create sensitivity and inclusivity in perspectives around future smart city visioning and planning.

I would argue visions in HCI within these associations are: an abstraction of values or ideas; a set of principles; or maybe as well as socio-technical projections or speculations for the future held by the HCI research community. However, these framings of visions have been repeatedly called out for their rhetorical ambiguity (Wong and Khovanskaya, 2018; Purcell and Tyman, 2015). Some attempts have been made within HCI to understand visions potential, use and influence (Quigley et al., 2013; Reeves, 2012;

Feltwell et al., 2018), for example, Reeves looks at envisioning as a mix of fiction, forecasting and extrapolation (Reeves, 2012) but they fall short of grasping their ability to create change and stop at building scenarios for new worlds or development of future technologies (Quigley et al., 2013; Baumer et al., 2014).

Within HCI Speculative Design (DiSalvo, 2012b; Auger, 2013; Forlano and Mathew, 2014), Design Fiction (Lindley and Coulton, 2015; Baumer et al., 2020) and Design Futuring (Fry, 2009; Kozubaev et al., 2020) are among various approaches used by researchers and designers to construct visions of the future. These possible, probable and preferred futures are explicitly addressed in *'concept', 'critical' and 'persuasive'* design practices that produce powerful visions of the future (Mazé, 2019). Maze calls to be careful as visions of the future embody ideologies and, along with norms and priorities embodied and expressed, shape policy planning, market economies and cultural imaginaries (Mazé, 2019, 2020). On the other hand Bardzell invokes the concept of utopias in looking at visions within HCI, where she criticises design practices for their way of producing *'utopia-as-vision'* and *'utopia-as-cognitive act'* (Bardzell, 2018). She further carries on to say both design and utopia historically fail to deliver results and meet human needs, where designers act as world makers (ibid). I argue these failings are due to wanting to create perfect end states which are utterly divorced from the mundane everyday and as Bardzell puts it *'[utopia] doesn't offer any concrete social strategies or tactics to get from here to there'* (Bardzell, 2018). In continuation, I would argue visions should not to be conceived as design problems (Reeves et al., 2016) and when looked through the everyday, holds power to create alternates to look beyond the dominant rhetoric of change, progress, newness and innovation (Mazé, 2019), modernity & globalisation (Appadurai, 2013; Akama and Light, 2018). Inculcating temporality of uncertainty and ambiguity (Greis et al., 2017; Soden et al., 2020; Kimbell et al., 2022), reflexivity (Gaver et al., 2003; Bardzell, 2010) and materiality (Wong et al., 2020; Wakkary et al., 2015). Given that design praxis also has a long-standing engagement with ambiguity as a more deliberate form of inarticulacy, where design research can be invoked as a practice of inventive problem-making (Fraser, 2006). In line with Suchman's book *Plans And Situated actions* which criticises the planning paradigm in HCI and Interaction design (Suchman, 1987). Therefore looking at ambiguity as a value in design because it leaves space for dialogue and unexpected responses: *'The most important benefit of ambiguity, however, is the ability it gives designers to suggest issues and perspectives for consideration with-*

out imposing solutions' (Gaver et al., 2003, p. 240). Thus seen as a resource and an opportunity to be utilised, and designed into systems from the outset in order to support multiple and personal meaning-making.

> *If people are to find their own meaning for activities, or to pursue them without worrying about their meaning, designs should avoid clear narratives of use. Instead they should be open-ended or ambiguous in terms of their cultural interpretation and the meanings – including personal and ethical ones – people ascribe to them.*(Gaver et al., 2004)

Therefore looking at ways in which ambiguity can be induced in the research processes and what can be the possibilities within creating visions for futures that have this quality of invoking inventive problem-making (Fraser, 2006) for deliberation. In line with the dialectic approach, David Harvey in his book looking at cities and utopias argues to oppose utopias that are meant as models or blueprints – not so much because they are unrealistic, but because the realisation of a perfect ideal tolerates no objection and crushes everything that stands in its way. In the book Harvey recognizes the value of *'dialectical utopias'* – contradictory and incomplete images that express desires about the future, that challenge and make us reflect, that generate conflict with prevalent visions and open up new syntheses (Harvey, 2000).

In relation to this, visions are also associated with metaphysical imagination, creativity, supernatural or apparition. Visions are related to prediction, dreaming, and prophetic qualities which I do not cover in my work but these should not be discounted. I tap into the potential of visions through dreams, as anthropologist Charles Stewart in Heideggerian-inspired multi-temporality, explains that dreams bring past, present and future into coexistence (Stewart et al., 2012, pg 10-11), demonstrating it through the example of Maxiots, from the Greek island of Maxos. For Maxiots, dreams work through the constraints of village futurity, by harnessing histories, to activate the future and make the life in present tolerable. Within this, Stewart focuses on collective experiences of temporality placing individual imaginative processes within society and in relation to the historical process (Stewart et al., 2012, pg 210).

Rob Hopkins citing Susan Griffin puts into focus for our time, a message for looking at the potential of bringing change through imagining differently. Griffin says that a lack of hope is tied to many kinds of powerlessness which repeats patterns of suffering,

instigating philosophies of fear and hatred, and failure of dreams (Hopkins, 2019). On the other hand, Dunn and Raby say that the generation today doesn't dream but hopes - *'it hopes that we will survive'* (Dunne and Raby, 2013). I would like to bring here the idea of social dreaming (Dunne and Raby, 2013; Sanders and Stappers, 2014; McBride, 2005; Gosling and Case, 2013; Lawrence, 1991, 2003; Sargent, 1994) linking it to the power of community-led imagination. Rob Hopkins the founder of the Transition network [4] and Transition Town Totnes [5] explains how imaginations are stories of imaginary life, in the near future that the community can take as scenarios for the future to work towards.

> *we live in a time bereft of such stories - stories of what life could look like if we were able to find a way (...) to act in proportion to the challenges we are facing and to aim for a future we actually feel good about. I've come to believe we desperately need stories like this - stories of How Things Turned Out OK* (Hopkins, 2019, pg. 4)

These ideas bring into focus the power of visions as visceral, multi-sensory, multi-dimensional, experiential creations with their ability to create change. Transition network looks at creating change through community-led action using co-created visions, they articulate themselves as a movement of communities coming together to reimagine and rebuild the world. As part of their initiative to help communities transition they have built a guide which is available as part of their website and the transition network workbook, it lists 7 ingredients necessary to start transitions. Within it, visions are a necessary ingredient to imagine the futures the community wants to co-create. The website describes the vision as a call to action which reframes dilemmas, offering new information and potential. Within this section on their website, they list resources and activities that the communities can readily download and use from their site. The purpose of the activity as they describe is to provide focus to the group and create ways to present and communicate what the community wants to do, thereby inspiring others to get involved and ultimately encouraging people to think of new possibilities [6]. Within this they articulate visioning as a process which is inclusive and expandable rather than complete and narrow [7], this would align with the necessity for creating long-term thinking for a

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[4] https://transitionnetwork.org, accessed on 28th February 2023
[5] http://www.transitiontowntotnes.org, accessed on 28th February 2023.
[6] http://bit.ly/3ZqotRf, accessed on 28th February 2023
[7] https://transitionnetwork.org, accessed on 28th February 2023

sustainable outcome.

These ideas of community-oriented continuous forms of visioning I would say is in line with how Hopkins uses educational reformer John Dewey's description of human imagination as *'the ability to look at things as if they could be otherwise'* (Hopkins, 2019). Yet these domains of unstructured imagination and bottom-up future thinking are perceived as unpredictable, messy, uncontrollable, unprofitable use of time and childlike (Hopkins, 2019) , this is in contrast to the capacity for predictability, innovation and futuring which is highly prized and richly rewarded. However, HCI and design research is recognising this limitation of its long-term embedded values that create tools, objects, services, and technologies driven by specific goals and purpose, and therefore is looking at the potential of collective envisioning or addressing the politics of it (Mazé, 2019, 2020). Addressing these by inviting communities who are geographically and culturally diverse, marginalised, politically inclined or those who create everyday practices, as stakeholders (Chopra et al., 2022b,a; Yoo et al., 2016; Wakkary et al., 2015) to create a diversity of values to inform the future and design of technological use.

2.2.1 Placing visions in the everyday

I would argue that the practice of making and designing predates it as a professional practice and has always been part of everyday life. This places it as part of the everyday, vernacular and indigenous, human activity and process that departs from contemplating a situation, imagining a better situation and acting to give it form (Friedman et al., 2015; Ingold and Kurttila, 2000; Manzini, 2015). Thereby, leaning into the everyday as a way of making social connections and capital, where ideas, imaginations and their forms are powerful means of spatial production that enact relations, modalities of thinking, saying and doing (Foucault, 2005; Said, 2012). This brings to the surface the need to closely look at who participates in the creation of futures and what they become, the sort of futures they encourage or even make in the present (Galloway, 2010). Concerning, what or who can or should, be present, and how, should futures be developed.

I would now bring to the reader's attention that visions are often developed or associated with experts, for example, corporations, politicians, designers and technologists. A good example of a technological vision for the everyday future was Weiser's vision for ubiquitous computing (Weiser, 1991) or the smart city of Songdo (Mullins, 2017). Dunne & Raby in their book Speculative Everything citing David Kirkby say the role of the ex-

pert is not to prevent the impossible but to make it acceptable (Dunne and Raby, 2013). They position the expert as ethicists, economists, and scientists and give permission to experts to let their imagination flow freely, and designers give material expressions to insights generated, grounding these in everyday situations and providing platforms for collaborative speculation. *'Where futures can be used as tools designed for justifying the present in the interest of a powerful minority - designed debated and used collectively to create preferred futures'* (Dunne and Raby, 2013).

However, this expert paradigm I argue does not tap into the everyday life of the citizens and these associations further resurface political dimensions - the production of futures, knowledge, design and technology are not *'innocent'* endeavours (Haraway, 1987). Instead, they are influenced by and have significant effects on everyday socio-political, cultural and economic civic life (Beck, 2002) and in processes of placemaking (Foth, 2017; Peacock et al., 2018; Crivellaro et al., 2016). As Inayatullah articulates, *'every planning effort involves philosophical assumptions as to what is considered immutable and what is negotiable; the significant and the trivial. Thus, every effort to plan the future is submerged in an overarching politics of the real'* (Inayatullah, 1990, pg. 116). This connection of futures to the real is a contested and convoluted one, where the need to think about the future is to depart from the limitations and constraints of the present. In line with the framing of this dilemma, futures researcher Jerome Glenn suggests that the core question about futures should not be *'How well do you know it?'* but, rather, *'What difference does it make?'* (Glenn and Gordon, 2003, pg. 8), which articulates further political dimensions concerning intention and application. Thereby, creating a disconnect between the top-down technological visions or ideologies and on-ground everyday citizen life. However, this connection to the real moves away from the domain of experts and into the domain of everyday civic life where the local - which today is unavoidable, is also global (Massey, 2005; Soja, 2010).

Moving to the domain of everyday life means bringing in everyday common practices which include sociocultural interactions, technologies, material objects, and the ecological and built environment; where daily actions, everyday political practices and vernacular communicative exchanges are performed in daily life (Hauser, 1999) actively shaping interactions and the environment which includes socio-political, cultural and economic systems. Thereby giving back civic agency and the citizen's ability to reframe and reshape the world through stories. Hauser looks at these as daily communicative

exchanges for *'the symbolic enticement of social cooperation'* and the *'symbolic trans-action that affects people's shared sense of the world'* (Hauser, 1999, pg. 14). It has pragmatic value for the coordination of social action through everyday discourse which is reflective and constitutive: *'through discourse, social actors produce society'* (Hauser, 1999, pg. 113).

This everyday discourse I argue encapsulates values, experiences and desires, and can influence our understanding of the world and consequently our actions. Moreover, everyday discursive practices are material, situated and contextual, thus bringing the importance of place to everyday discourse, for shaping civic visions created by citizens. This connects to how people create places of associations, and attachments and make meaning of physical places through actions, which can be understood through placemaking. Placemaking is a set of social, political and material processes by which people make and re-make the places in which they live (Pierce and Paulos, 2011; Crivellaro et al., 2016). As Soja suggests, *'throughout our lives we are enmeshed in efforts to shape the spaces in which we live while at the same time, these established and evolving spaces are shaping our lives in many different ways'* (Soja, 2010, pg. 71). I would like to end this section by saying HCI and design need to look at the possibility of everyday futures by design (MacKinnon, 2011) as a way of approaching and exploring everyday sustainability and its association with placemaking through situatedness.

2.2.2   Speculatory practices for approaching sustainability in HCI

Design practice and research have been working to counter the ideologies of industrial processes that have led to the current ecological crisis. It's understood that the ecological crisis is a manifestation of unsustainable systems intermingled with social, economic, and political structures (Dourish, 2010) which entail social norms, values and institutions that are slow to change, making it difficult to imagine sustainable outcomes in the long-term (Knowles et al., 2018).

To look at these ethical, political, social and ecological concerns closely, designers have called for a relook at design (Papanek and Fuller, 1972), through the practices of *'design futuring'* (Fry, 2009). Recognising design's importance in overcoming a world made unsustainable and looking at climate change as a *'defuturing phenomenon'* (ibid). Asking designers to create ideas and ideals about the future through socially and politically engaged dialogues (Mazé, 2013), especially, to address sustainability through design,

for longitudinal timescales (Heitlinger et al., 2019b; Biggs and Desjardins, 2020). In addition, speculative and critical design practices have been operationalised to look at sustainability to create alternate futures and perspectives through provocations (Wakkary et al., 2013; Clarke et al., 2018; Pargman et al., 2017). Presenting the potential of challenging the capitalist market pressures in favour of emancipatory design practices with scope to consider matters such as alternatives to capitalism (Dunne and Raby, 2013). Therefore, framing the proposition of long-term sustainability is interlinked with temporality and the ideas of futurity (Mazé, 2019) rather than solutionism offered by design.

Speculative and critical design-related methods prioritise critical imaginations about socio-technical advancement over pragmatic problem-solving (Dunne and Raby, 2001). The Speculative Design has risen in significance within interaction design and HCI over the past decade. Designers and researchers who advocate for the value of speculation embrace a vast array of techniques and topics. Core elements of Speculative Design include the materialisation of particular future worlds through film, theatre, radio, imagery, exhibitions, installations and artefacts (Bendor et al., 2017; Briggs et al., 2012; Blythe et al., 2015; Wakkary et al., 2015; Candy and Dunagan, 2017; Elsden et al., 2017; Dolejšová et al., 2018; Baumann et al., 2017).

As a multifarious future-oriented approach, these methods can open up expansive visions of multiple possible near and far futures provoking fears and desires, alongside embodied and visceral future imaginaries that can disrupt perceptions of everyday realities (Candy, 2010). Through a range of experiential presentation formats, these evocative representations can further be used to encourage more political discussion across established and emerging publics on the often ill-conceived consequences of technology use for wider society.

The critical and Speculative Design has also been operationalised beyond Design, across a range of different disciplines (in reference to Future Studies, anthropology, geography) as a means to prepare for the consequences of an increasingly devastated environment in the near future (Biggs and Desjardins, 2020; Burnell, 2018; Tanenbaum et al., 2016). Defined as emancipatory, critical and reflective, they highlight a range of techniques and responses to design that works towards more sustainable collective futures (Kozubaev et al., 2020). It challenge normative socio-technical systems to encourage more crit-

icality (DiSalvo, 2012a; Dunne, 2008), presenting opportunities to think expansively (Tharp and Tharp, 2019), to imagine alternative futures (Soden and Kauffman, 2019), co-designing with grassroots communities and citizen-led initiatives (Wakkary et al., 2013; Baumann et al., 2016) and include marginalised voices (Chopra et al., 2022b; Bray and Harrington, 2021) fostering resilience in the face of uncertainty about the future (Barr and Pollard, 2017).

Moreover, these future-oriented approaches can open up expansive visions of multiple alternative futures which can readily provoke fears and desires, alongside embodied (Rozendaal et al., 2016; Biggs and Desjardins, 2020) and visceral (Elsden et al., 2017) future imaginaries that can productively disrupt perceptions of everyday realities (Bell et al., 2005). Through a range of experiential presentation formats, these evocative representations can further be used to encourage more political discussions across established and emerging publics (DiSalvo et al., 2016) on the often ill-conceived consequences of technology use for wider society (Dunne and Raby, 2013). Despite this disruptive, political and transformative potential, many have argued that the power of these approaches remain in the language of designers and experts (Haylock, 2019; de O. Martins and de Oliveira, 2016; Bardzell, 2018) or discursive rather than experiential (Dunne and Raby, 2013).

Such presentations of the developed futures by designers are often made public and shared beyond design studios (Dolejsova, 2018), audiences that are reached can often share similar values, familiar with the reading, and engage with future worlds presented by expert designers. Rarely do these discussions engage affected communities or create on-ground change, by working between the intersection of government services (Candy, 2010), policy (Pargman et al., 2017) and grassroots communities (Baumann et al., 2017). Approaches focused on celebrating hyperreal versions of reality like Speculative Design, act as critiques of the technology industry, which can be valuable. However, they also start from the position that the individual is a free agent who can make up their mind, to generate a plethora of micro utopias (Dunne and Raby, 2013). This neoliberal fantasy, however, makes it unclear how designers engage methodologically and more pragmatically and politically, to respond to and address systemic social issues at a community scale.

Participatory design has however engaged in these discussions since its conception through

future and situated workshops, town hall meetings, dingpolitic (Latour, 2005), and infrastructuring (Star and Ruhleder, 1996). Provocation has been explored in PD to problematise design and research objectives (Boer and Donovan, 2012) as well as to question broader socio-technical and cultural configurations (DiSalvo, 2012a), and to suggest alternative interpretations and possibilities (Hansson et al., 2018). Many have argued however that a significant challenge for PD is how projects remain in the here and now and how designers have a limited concern about sustaining relationships after specific projects (Bødker and Kyng, 2018; Iversen and Dindler, 2014). In more sustained projects to support such diversity, some have argued for a constellation of participatory activities to support engagement within urban neighbourhoods to engender long-term community change (Baumann et al., 2017). These indicate recent calls for revitalizing methodologies in PD to respond to complex societal challenges (Bannon et al., 2018) and anticipating the changing role of the researcher (Hansson et al., 2018) to longitudinally support urban communities, projects and relationships.

2.2.3 Participatory Speculative Design: an egalitarian alternative

Recent work in Design, and across the social sciences have suggested greater potential in understanding acts of speculation more broadly as material (Wakkary et al., 2015; Dolejsova, 2018), situated (Desjardins et al., 2019; Heitlinger et al., 2019b) and participatory (Lyckvi et al., 2018; Light, 2015) instances that allow for momentary imaginative events (Halewood, 2017). Here speculation is conceived as quite literally grounded in the everyday experiential and material realities of people's lives (Candy, 2010), offering the potential in creating experiments in new perspectives, and individual and collective transformations (Marres, 2017). Halewood reconceptualizes speculation as a situated and imaginative practice, modestly changing what is perceived to be possible in their lived and felt worlds, insisting that *'the jump doesn't come from nowhere'* (Halewood, 2017, p.58). Therefore, suggesting a more egalitarian way of configuring its potential, allowing for a more grounded focus on socio-material imaginative leaps and moving away from the pressures of expert-led knowledge.

In connection, Participatory Design research has predominantly foregrounded the situated, social and material embeddedness of design practice (DiSalvo et al., 2008) even during speculation and provocation (Le Dantec and DiSalvo, 2013; Haraway, 2013) . More recently participative approaches in Speculative Design that aim to disrupt the

perceived privilege and rhetoric of Speculative Design and its constituents (Baumann et al., 2016; Lepri and McPherson, 2019; McPhearson et al., 2016) have explored its experiential (Blythe et al., 2016; Steen, 2013) and situated qualities (Wakkary et al., 2015). Research in this space embraces speculation not just as the crafted skill of expert designers (Auger, 2013), but shifts attention towards real-life concerns and everyday contexts (Boer and Donovan, 2012; Desjardins et al., 2019), as collectively negotiated and contested imaginaries (Briggs et al., 2012; Lyckvi et al., 2018). One such example within this intersection is the exploration of using fiction to reimagine sustainable DIY practices - embodied experiences of DIY making (Wakkary et al., 2013). Wakkary et. al uses other successful or fictional works as visions to influence the practices of the green DIY community, asking them to reproduce the idea on a different scale and through radically different means (Wakkary et al., 2013). This reinterpretation inspires community action through the element of Design Fiction by creating their own versions of the concept. In particular, non-designers are engaged through the practices of active and collective making (Wakkary and Tanenbaum, 2009) of speculative futures through the arts and creative media (Ambe et al., 2019; Sanin, 2020), suggesting political agentive potential for embracing pluralistic visions and confronting historical oppressive narratives and limiting representations (Baumann et al., 2016; Boal, 1992; Yoo et al., 2016). The value of such approaches is important for groups and individuals who can often be marginalised and excluded from mainstream interaction design (Gatehouse, 2020; Tran O'Leary et al., 2019).

Participatory Speculative Design can, therefore, be considered as more of an integrative approach to achieving embedded and ethical political action (Light and Akama, 2018). Participatory speculative approaches, however, also need to be developed with care. Research has highlighted the need to pay attention to how particular environments (including props, materials and approaches to facilitation) (Andersen and Wakkary, 2019) frame speculation and participation as a provisional and fragile practice (Blythe et al., 2016; Elsden et al., 2017). Particularly when working collectively with groups who are considered marginalised or politically inclined. Further to this, differing agendas and expertise in practices of participation can unwittingly steer agendas through scenarios or material resources (Bratteteig and Wagner, 2012; Forlano and Mathew, 2014). Participatory Speculative Design can also require a significant investment of people's time, as well as forums for public collective debate (Bødker and Kyng, 2018) involving a lon-

gitudinal multi-generational process to ensure a diversity of perspectives and extended timescales for actions (Gerber, 2018; Yoo et al., 2016). There have been a few attempts to look at sustainability through these considerations in bottom-up community contexts (Chopra et al., 2022a,b).

Thus far, however, very little attention has been paid to future thinking processes that break structural hierarchies and the rhetorical nature of Speculative Design, into creating self-facilitation by communities for more egalitarian ways of thinking about futures. Moreover, speculation and related approaches in design are time-bound rather than temporal, where it is continuous and unconstrained. This is necessary for constructing place-based visions of futures linked to the possibility of on-ground action for reconciling these with the everyday practices of resource-deprived communities.

2.2.4 Use of technology for scaffolding participatory speculative visioning

Previous community-based future thinking work in HCI has used traditional design workshop methods (Baumann et al., 2017; Heitlinger et al., 2019b), mostly in small-scale grassroots community scenarios (Norton et al., 2019; Bray and Harrington, 2021; Chopra et al., 2022a). Also, grassroots communities are often run by or are volunteer-based where people may not be able to commit to long, time consuming, series of workshops (Redhead and Brereton, 2010). It also raises questions about large-scale engagement, longitudinal capacity to increase participation and inclusion of new stakeholders (Brereton et al., 2014), and what can be the role of digital technology in facilitating it (Bødker et al., 2017; Gooch et al., 2018). Redhead and Brereton explored one alternative considering these limitations by deploying an exploratory prototype in a public place within the community and then refining it based on observations and feedback from users (Redhead and Brereton, 2010).

HCI has started to question agency and modalities of participation in, through and with technology and design processes in order to support and illuminate different ways people and communities can, together, design their futures (McCarthy and Wright, 2015; Björgvinsson et al., 2012b; Light and Akama, 2014; Olander et al., 2011; Light, 2011). This is to explore how long-term thinking can be fostered and supported through the use of digital technology. There is an increasing interest in HCI to engage citizens and communities in creating ground-up community futures (Baumann et al., 2017), for em-

powerment through hyperlocal solutions (Gooch et al., 2018), influence policy change (Thomas, 2017), create resilience to overcome existing problems and to challenge normative unsustainable structures. To look at the design of digital tools for the purposes of democratic decision-making (Bendor, 2012), increase modes of distributed participation and representation (Lambton-Howard et al., 2019).

Prior work in HCI and design have shown a potential to create cultural practices and spaces for engaging with issues and matters of concern to support democratic deliberation and affect change (DiSalvo et al., 2008, 2014; Björgvinsson et al., 2012b; Olander et al., 2011). These have helped to facilitate opinion formation and interconnect particular values and beliefs with each other in community settings (Dourish, 2010; Le Dantec and DiSalvo, 2013). Similarly, there is prior evidence that grassroots communities can benefit from the field of HCI to facilitate openness, participation, and coordination in communities through the use of communication technologies, for example, social media platforms (Le Dantec and DiSalvo, 2013; Ploderer et al., 2010, 2012). These have also facilitated the formation of the publics, which draws attention to an issue, reflects on a present condition and acts upon it (DiSalvo et al., 2012, 2016; Le Dantec and DiSalvo, 2013; Lindtner et al., 2011). Thus, the assembling of publics, through the use of digital technology has transformative potential to engender such processes, for example, sustainability concerns. This can be through the exploration of issues, contestations and negotiations within communities to further define routes for action that can *'shape and contribute to public discourse and civic life'* (DiSalvo et al., 2012, pg. 12). However, within these engagements with digital technologies there is limited research within the domain of grassroots future thinking. Existing cases bring to the fore practices of participation for engaging with future thinking in large-scale, resource-intensive ways directed through controlled processes by experts, where the outcomes are centralised and top-down (Lambton-Howard et al., 2019, 2020; Celina et al., 2016; Prabhakar et al., 2017).

'Energy babble' by Gaver et al. was designed to playfully provoke, reflect and comment on the existing state of discourse and reports of energy practice in the UK. The Babble is an automated talk radio that can be considered both as a product and as a research tool, to highlight issues, understandings, practices and difficulties in the communities through the use of curated data from a variety of online sources like Twitter (Gaver et al., 2015). Also, the design of bespoke digital tools for the purposes of democratic

decision-making (Bendor, 2012) towards the planning of future systems within a city by involving citizens. There have also been instances of creating engagement with a large-scale audience through the use of existing social media technologies and practices (Lambton-Howard et al., 2019; Lambton-Howard, 2021). Another example is increasing modes of participation and representation through distributed qualitative data analysis (Rainey et al., 2020) by asking study participants to help. It is known as unplatforming (Lambton-Howard et al., 2020; Alhadlaq et al., 2019).

The term unplatforming is used to describe relying upon multiple technologies and loosely coupled media (in their case, social media platforms and audio/video communication tools) that are familiar to individuals. Unplatformed design utilizes the materiality of existing social media technologies rather than the creation of new platforms to sustain a process of participation (Lambton-Howard et al., 2019). Unplatforming creates new spaces and allows the use of more familiar technologies to initiate and build relationships, share content, and manage visibility. In this way, unplatforming advocates for developing frameworks on top of existing technologies that individuals readily adopt versus standalone designs (Alhadlaq et al., 2019; Lambton-Howard et al., 2020, 2019; Celina et al., 2016; Prabhakar et al., 2017).

Unplatforming makes use of the participants' digital space that they already occupy, rather than imposing a new space or platform on them. For example through the use of WhatsApp as a messaging platform for coordinated participation (Lambton-Howard et al., 2020, 2019; Lambton-Howard, 2021). Moreover, this approach examined the material qualities of WhatsApp which extends to morphology, role, externalization, and process using it to design a large-scale forecasting engagement called WhatFutures (Lambton-Howard et al., 2019). Lambton-Howard et al. explain that unplatformed design can be leveraged by organisations to work at scale, particularly in contexts that are resource constrained or where the barriers of participation need to be lowered (e.g. NGOs, developing contexts, and distributed populations).

Similarly, Bettega et al. look at creating digital commons in communities through the use of off-the-shelf digital tools proposing theoretical considerations and practical criteria based on the reflexive account of a Case Study in Europe (Bettega et al., 2022). They propose *'mixing and matching'* of these off-the-shelf digital technologies to work around limitations related to ease of use and accessibility. This allows directing resources on

participation rather than software development which is particularly valuable in contexts of limited resources like organisations that are constrained financially and technically (Bettega et al., 2022) similar to the one I was engaging with.

Additionally, relying on already existing tools disallows technology determinism, potentially fostering longitudinal retention of results when researchers leave the field, contributing to spreading and continuity of knowledge within the community through digital commons. Therefore, participation goes beyond representation and involves tackling the messiness of the engagement and practising reflexivity in an attempt to negate structural hierarchies, and move beyond facilitation by expert designers or researchers.

When looking at community contexts and participation, large-scale engagement as mentioned above is detrimental. Social media technologies are considered useful in helping to maintain community ties and continuity by supporting social bonds and providing bridges to explore, build and sustain community interest (Le Dantec and DiSalvo, 2013; Ploderer et al., 2010, 2012). However, it can also lead to communities being experienced as exclusive, restrictive or even divisive as communication moves between face-to-face and technically mediated communication (Carroll and Rosson, 2013; Light et al., 2013; Crivellaro et al., 2014; Gilchrist et al., 2010). This can often lead to maintaining longstanding biases, hierarchies, cliques and social norms within existing communities. Community engagement is smaller, situated, embodied, carries tacit knowledge and resource constrained. Considerations for unplatforming and mixing and matching (Lambton-Howard et al., 2019, 2020; Celina et al., 2016; Prabhakar et al., 2017; Bettega et al., 2022) also miss out on consideration of *'situatedness'* in connection to the local community as experts who hold more knowledge and agency than the researcher for placemaking.

Prior studies in HCI have shown to engender critical reflection and discussions for socio-political change in and about the place (DiSalvo et al., 2012; Björgvinsson et al., 2012b; Light and Akama, 2014; Olander et al., 2011). These digital technologies and design interventions show potential in creating spaces for political discussions, investigating further situated, embodied everyday practices and the interrelationship between space, place and technology (Dourish, 2006, p. 96). Thus looking at the potential of technology to help citizens shape and affect change in everyday life through the creation of publics and political towards Right to the City (Lefebvre et al., 1996; Harvey, 2012, 2008; Soja,

2010; Heitlinger et al., 2019a).

2.2.5 Summary

In my thesis, I look at the potential of visioning and long-term thinking in bringing different perspectives together to create shared, pluralistic visions that address underlying conflicts, trade-offs, and tensions (McPhearson et al., 2016), in reality, they can be restricted to the initial interests and visions of an exclusive group (Barr and Pollard, 2017; Gui and Nardi, 2015a) and can be quite static and inflexible. Also, visions have to be reconciled with the present by tracking their evolution and measuring their impact, while depending on unpredictable external factors like funding, infrastructure and stakeholder change. To overcome these limitations, I investigate how HCI might facilitate what DuPuis and Goodman (DuPuis and Goodman, 2005) term *'reflexive'* localism, which is concerned with *'articulating 'open', continuous, 'reflexive' processes which bring together a broadly representative group of people to explore and discuss ways of changing their society'* (ibid).

My work approaches the creation of visions in a bottom-up situated way using participatory speculation, not as a dialectic experiment or a concrete future vision. But as an ongoing embodied, material and social practice that is produced through the coupling of participation and future thinking, I explain it next in the methodology Chapter (Chapter 3), where I have engaged with speculation as part of my ongoing ethical commitment to responding to the dilemmas and complexities of present realities but also to imagine how this present could be reimagined and reconfigured within grassroots community contexts. Therefore, rather than aiming at generating consensus, these Participatory Speculative Design practices aimed specifically at the initiation of *'socio-material'* relations and agonistic spaces in which different and diverse voices can come to the fore and engender innovative solutions in and about the places we live in (Björgvinsson et al., 2012b).

I also look at the materialisation of visions into practices, by moving away from the domain of experts and into everyday life where the visions are contested and negotiated. I study this negotiation of the everyday in relation to the vision through the questions of temporality and scale presenting insights useful for HCI to understand the longer-term, collective nature of vision in relation to designing for sustainability. Taking the example of food growing communities my thesis is concerned with practices of *'futuring'* in

grassroots communities and how HCI can facilitate openness, participation, and coordination in constructing visions of the future, and in reconciling these with the everyday practices of the communities. Presenting Participatory Visioning as an approach to look at wicked problems such as sustainability and climate change, which I build from my three case studies and the methodical approaches I developed for understanding, and collectively creating and negotiating visions.

Ready to imagine another world. And ready to fight for it

(Arundhati Roy, 2020)

Every society constructs reality through agreements, understandings and meanings which help people imagine the world around them. Constructing narratives through symbols and identities that explain to people how to interpret what is real, why they are here, what is important, and where they are headed. At present society is in a phase of disillusionment with the present constructs of reality and therefore with the foundations of civilization built on top of it. Making it imperative to challenge the current hegemonic ways of thinking and living. To consider a radical redesign of imaginative spaces in the present to create possibilities for the hereafter. Abiding in a space beyond the constraints of time and thought.

Chapter 3

Methodological Considerations: Germinating Participatory Visioning

Concerns about the environment like climate change and anthropogenic degradation have sparked a body of work within HCI. In the previous Chapter (Chapter 2, Approaching sustainability in HCI by envisioning futures), I discuss sustainability as a concept and outline the field of Sustainable HCI research, marking out the different ways in which sustainability concerns have been tackled in the last decade since its introduction in HCI. In particular, projects and research in HCI, to ascertain the trajectory of the field, focus on critical viewpoints which move beyond the individual-focused interventionist technologies and are in opposition to techno-solutionism. The field is also realising the need for new approaches and methods, as Blevis has pointed out in his seminal paper,

> *HCI context is oftentimes construed as a notion of method in which engineering 'needs and requirements' follow from cognitive models of 'users', rather than a concern for human conditions, particular or global.* (Blevis, 2007).

Within this pretext, especially pertinent are discussions around the need to look at prevalent practices around the use of technologies and the long-term impacts of developed technologies on everyday practices also, looking at longitudinal ways of researching and approaching sustainability. In my thesis, I emphasise future thinking as an important

approach for tackling complex and wicked problems like environmental sustainability because it provides new ways of thinking about futures, which is more radical as it leans on imagining alternatives rather than incremental change. In the last Chapter (Chapter 2, section 2.2) I look at visions as a form of long-term, future thinking; however it is not well understood how alternate visions of futures can be negotiated, mobilised, and manifested in everyday practice. Thus, opening up questions about approaches and methods that can help frame such research within HCI.

Taking food growing as an example of a practice-aligned approach in SHCI highlights the need for exploring alternative futures to the hegemonic narrative of food and the food system, and the use of technology to address sustainability for on-ground action. Therefore, to move beyond behaviour change and embrace the practices of every day as a way to create incremental shifts within habits and habitats. Predominantly linking it to community-based contexts where practice-oriented tacit knowledge is generated and shared among members of the community. These shifts within HCI to look at bottom-up practices and grassroots communities to address climate change open up questions about engaging them in research work which is valuable to both researchers and the communities and is built on the principles of social justice.

Participatory design and its lineage take up these considerations of social justice and long-term engagement; however, to address wicked problems like the future of sustainability and sustainable living there needs to be a radical shift in the way things are framed to disrupt the status quo. To design for this, I have developed Participatory Speculative Design as an approach which looks at reflexivity and slow iterative engagement with communities that takes into consideration the everyday work involved in an attempt to address sustainability and to design for it.

As explained previously (see Chapter 2, section 2.1.3), urban food growing communities are one such example which approaches sustainability through grassroots situated action. The methodology is designed, with regard to this context, to understand the unique positions of the two food growing communities I engaged within this work, and their slow, grounded everyday work which is rooted in the praxis of observation, care and participation. Experiments in living (Marres, 2012) is a way to bring out these nuances of praxis where experiments of everyday life create varied understandings. These generate collective documentation which is shared and communicated as practices of learning by doing,

to be further worked on. Moving away from the experiment as a site where controlled variables can validate hypotheses as seen in HCI, this approach was more aligned with research *'in the wild'* (Chamberlain et al., 2012) where socio-technical or design interventions are staged to intervene in everyday life as a site for applying situated methods to produce alternative forms of knowledge. Taking the example of community-led food growing, in the context of my work - growing food is a collective activity rather focused on individual growers, both in Auroville (a small town in India) and the neighbourhood community in the North-East of England, where people coordinate and work towards the collective effort to grow.

Furthermore, participation, inclusion and engagement in a longitudinal way are essential in generating situated action. These are particularly important to consider when creating collaborations between researchers and communities to understand their perspectives on sustainability and for the design of future technologies. Researchers engaged in such collaborations face significant challenges when working with marginalised, political, cultural and ethnic sensitivities around diverse and evolving understandings of sustainability and concerns about the future. Moreover, connecting issues of marginalisation to the feminist lineage of partial and situated knowledge construction (Bardzell, 2010; Bardzell and Bardzell, 2011; Haraway, 1987) where I look at the *'everyday as data'* (Ahmed, 2016). I acknowledge the interconnectedness and interdependence of life (Haraway, 2016, 2003) through the recognition of cultural and political autonomy that supports radical pluralism for creating design spaces (Escobar, 2011).

To weave together these various strands, my methodology is underpinned by a range of approaches to inquire into future thinking for sustainable transitions and four main theoretical and conceptual positions for analysing the data from these - 1) feminist theory, 2) living experiments, 3) Social Practice Theory, and 4) visioning. In this Chapter, I unpack these threads epistemologically and then more specifically through each of the methods. I give details on how I have put these approaches into practice and address the ways in which I have engaged in my research that explores future thinking in urban food growing grassroots communities. To do this, I elaborate on my epistemological position, the approaches to data collection, design action, processes, and data analysis. My epistemological position is illustrated in the upcoming section - Approaching Sustainability through the Margins (Section 3.1); my methodological considerations in - Weaving in Experiments in living: Methodological grounding (Section 3.2); and later

details of my three case studies - Participatory visioning in the context of urban food growing communities: theory and practice (Section 3.3)

Within each of these sections, I address particularities around each of my methodological approaches, for example, ethnography (Dourish, 2007; Gunn et al., 2013), Speculative Design (Dunne and Raby, 2013) and Participatory Design (DiSalvo et al., 2012, 2008). In doing so, nuances of speculation as performing sustainable futures through everyday experiments, and Participatory Design with its qualities of community-based collaboration and dissemination, are woven together. These underpin the descriptions and analyses of the ways in which I have carried out the research to answer my questions for the three case studies as described in the final section of this Chapter, Participatory Visioning in the Context of Urban Food Growing Communities (Section 3.3). The thesis later draws out theoretical and conceptual learnings for approaching sustainable futures through empirical research (Chapters 4, 5 and 6) thereby attempting to create the analytical mode - Participatory Visioning, as the methodological contribution of the thesis, through which I argue SHCI research needs to operate.

3.1 Approaching Sustainability through the Margins

I am taking a critical post-modernist perspective where scholars adopt *'alternatives that encourage reflection about the* 'politics and poetics' *of their work. In these accounts, the embodied, collaborative, dialogic, and improvisational aspects of qualitative research are clarified.'* (Lindlof and Taylor, 2002, p. 53). My work attempts to decouple and decolonise comprehension of sustainability from the modernist ideas of development and to look at margins for creating pluralistic and alternate understandings. I start by elaborating on the interlinkages between Feminist HCI and Sustainable HCI. To start the conversation I draw on Shaowen Bardzell's feminist work in HCI (Bardzell, 2010; Bardzell and Bardzell, 2011; Bardzell and Blevis, 2010) where she presents feminism as an ally to interaction design with commitments of agency, fulfilment, identity, equity, empowerment, and social justice (Erete and Burrell, 2017; Dombrowski et al., 2016; Irani and Silberman, 2013; Borning and Muller, 2012; Schlesinger et al., 2017; Ogbonnaya-Ogburu et al., 2020; D'ignazio and Klein, 2020; Baumer, 2015; Sultana et al., 2018).

To explore these commitments within Sustainable Interaction Design - a conversation between Shaowen Bardzell and Eli Blevis observes that feminism can serve *'as a poten-*

tial counterpoint to 'dualistic and hierarchical modes of thinking' that set humankind in opposition to nature' (Bardzell and Blevis, 2010). Linked to the idea is that environmental oppression is manifested through capitalistic monocultures (Shiva, 1993) as explained by Vandana Shiva an Indian environmental activist and ecofeminist, she further explains these structures of capitalism in return create conditions for social injustices which predominantly affect women and various marginalised communities. This is also, portrayed and highlighted in popular dystopian works by prominent feminist science fiction writers such as Margaret Atwood, Ursula le guin (Atwood, 1986; Le Guin, 2012), where every current social injustice is going to be exacerbated by the climate crisis — for example, those in poverty or ones who are disenfranchised, being the most vulnerable, are the hardest hit as their modes of life and means of livelihood are threatened. In contrast, Octavia Butler, a black feminist science fiction writer starts from the position of marginalisation and oppression to move towards better alternatives, so her narratives are more utopian and offers hope when approaching the future (Butler, 2012b).

I further outline my epistemological position for approaching the transdisciplinary challenge of sustainability predominantly through relational thinking practices propagated in feminist ideology. I focus on participatory modes of visioning which encapsulates long-term thinking and practice-led approaches within the context of urban, community-led food growing. Food is a feminist issue (Shiva, 2009; Olufemi, 2020), and I would also add to this argument, by saying food practices are socially gendered, premised on deeply-rooted gender stereotypes and roles, intertwined with the ideas of care, nourishment, right to resources, reproductive rights and being able to live a fulfilling life. Thus, this work is at the intersection of feminist and ecological issues with a priority towards the well-being of people, a theoretical position that takes a non-essentialist view of what humankind is and can aspire to be (Light, 2015). Influenced by eco-feminism, feminist ethics of care and other feminist literature which are interested in finding new ways to make our lives worth living through a gentler, more considerate way of being is beautifully and repeatedly described as - one of respectful coexistence, where interdependencies of life are fully acknowledged (de La Bellacasa, 2011; Haraway, 2016; Tsing, 2015). Ecofeminism, coined (1974) by the French writer Françoise d'Eaubonne, has shown how feminists have taken up ecological concerns in recent years (Slicer, 2014), and are calling for an egalitarian, collaborative society (Merchant, 2012, pg 193–221). I build on feminist ideas of relational ways of thinking and doing where concerns on power, voice,

and public discourse are agents of change and resistance within the domain of ecology interlinking it with the well-being of people who are historically disenfranchised and socio-politically marginalized.

Similar to Ferguson et al. (1992) work, I build upon feminist theorist bell hooks' notion of marginality as *'much more than a site of deprivation [that] is also the site of radical possibility, a space of resistance, a central location for the production of a counter-hegemonic discourse that is not just found in words but in habits of being and the way one lives [that] offers the possibility of radical perspectives from which to see and create, to imagine alternatives, new worlds'* (hooks, 1990, p. 341–343). This is also in line with Octavia Butler's work, which approaches marginalisation and oppression to critique present-day hierarchies, remaking humans and creating alternate communities as themes to reframe futures through her black feminist science fiction novels. Her work is said to be an essential influence on the Afrofuturism movement to look at African-American futures (Butler, 2012a) which tries to distance itself from Western tropes of science fiction writings.

Jane G. Mowat creates an examination of marginalisation through the lens of scale and resilience, where a more nuanced and complex understanding of marginalisation and how it may be experienced is created through the *'integration of the macro and micro at the level of the institution and individual perception, whilst also taking account of the political context'* (Mowat, 2015). Building on this idea, Kannabiran uses the term *'dirty resilience'* to bring awareness to the 'quagmire of the present' while simultaneously maintaining hope for and insisting on creating better collective futures in relation to ecological issues in HCI (Kannabiran, 2021).

Therefore I am aligned with the idea of everyday resistance as a way of life. Critical race theorist and postcolonial feminist Sara Ahmed describes this everyday resistance in the home through the notion of the *'feminist kill joy'* (Ahmed, 2016). Lola Olufemi uses the context of indigenous grassroots organising and describes *'[Indigenous] resistance to the climate crisis, land grabs and the destruction of dams, wells, clean water supplies and harvesting fields is central to indigenous ways of living. Listening to the land, under-standing its history and refusing to subordinate land to human interest are ideas that are deeply embedded in feminist indigenous resistance movements that oppose the destruc-tion of lives'* through the act of existence and resisting to perish (Olufemi, 2020).

3.1.1 Developing reflexive practice and early experiments

I build on these ideas towards key methodological positionings while recognising the multiple dimensions of an issue is also an attempt to recognise the interconnected and overlapping elements of our own lives. I acknowledge that work was developed through an iterative process of reflexivity where a methodological position was not just applied but created a critical dialogue of how knowledge is constructed in this space which is also informed by my own position highlighting how epistemologies are always culturally contextual. Anchoring the thought that my methods of enquiry should be shaped by cultural and societal values and biases while framing the ontological, epistemological and ethical considerations of my work. I would give more details about my reflexive journey with the following sections touching on each of the case studies (see section 3.3 and sub-sections 3.3.2; 3.3.3; and 3.3.4).

I am writing this thesis from the perspective of a coloured woman, an Indian citizen and an immigrant in the UK, living as a student. A creative practitioner, food equity advocate, guerrilla gardener and community food growing volunteer; illustrating partial accounts (Haraway, 1987) of my work which has defined my journey of becoming a researcher committed to making my work more participatory, accessible and political. I try to do so by making my research a site of mediation for change in the everyday politics of future thinking and creating visions for ecological sustainability. This section is to help the reader make sense of where my understanding of sustainability is coming from and where I position myself as a researcher.

It became increasingly compelling to me through my PhD journey that STS and feminist literature offered resourceful modes of thinking critically, for making HCI research more sustainable, resilient, and inclusive to look at interconnected ways of approaching sustainability. It did not start with these interconnected understandings, it was not an easy task to learn to pick apart and critique dominant narratives in HCI. Sustainability brought into HCI as a matter of concern with the individualistic behaviour change and persuasive models with techno-solutionist futurity (de La Bellacasa, 2011) predominantly embedded in approaches were difficult for me to adopt in my work. I was not able to align with these principles as they did not make sense to engage with long-term approaches to explore sustainability within HCI. Therefore, I took to design-based future thinking approaches using Speculative Design and Design Fiction to explore the design space for

creating alternate future imaginings for sustainable living.

In the first experiment (see Appendix), I developed a fictional artefact which automated an individual's food consumption through a novel implant device - *'Essen'*. It illustrated a future where food did not have to be externally produced and people were not required to eat anymore. The purpose of the artefact was to facilitate speculation through provocation and questioning current food practices. It was to gauge *'How will people react to a speculative, techno-scientific radical solution to solve current problems associated with food sustainability?'*. The paper and artefact with related material were presented in the Student Design Challenge at Tangible Embedded Embodied Interactions Conference (TEI 2018) and it won the best presentation award at the conference. The provocation did seem to create questions in the audience's mind, having led to intense discussions - such as the instance when I received an email which criticised the fictional device in terms of human physiology. Though the traditional Speculative Design was proving to be successful in gathering responses from the viewer and were valid understandings about the future, however, they were centred around (me) the designer as an expert and was limited in creating counterarguments. Extending the creation of the futures to the participants seemed a relevant way to move forward.

My second experiment was influenced by Kristina Andersons' magic machine workshops (Andersen, 2013), to look at how future technological visions can be created by participants through the use of creative materials. This workshop used Haiku style poems as provocations and the materials used for building the technological visions were vegetables, procured from local grocers. Vegetables were chosen as a building material to further provoke discussions around the production and consumption of food. This visioning exercise was to encourage participants to build their future technological visions in 3D around food production in cities. The Haiku(s) were based on nascent food technologies that are bound to influence urban food futures and were written by me as a way of narrating an abstract scenario in the future, open to multiple interpretations. The four lines of the poem could be interpreted individually or as a whole to be translated by the participants in groups of two into a 3D model made of vegetables.

These early experiments, as I understood and experienced them, were critical in framing my research and moving beyond the initial methodology concerned with Speculative Design and Design Fiction. Bringing in the possibility of examining the limitations of

the approaches through reflexive practice. Reading was not seeming to be helpful to me as the predominant work was done by HCI scholars, whose background I did not share and it was not an easy task to see or learn the applicability of theory to create real-life change. Thus the readings also introduced an epistemological and methodological challenge: how was my future thinking approach not falling into the same modes of thinking which were reductive, where wasteful practices are perpetuated? I remember reading papers one after another, and at one point after feeling bottle necked I told my advisors that I could not see how technology or smart cities can influence people to live more sustainably, be able to grow a portion of their food or be in sync with nature or go beyond the superficial sharing of information for any kind of actual change. At that moment, I was facing an existential crisis as a junior first year PhD student and was asking questions such as:

Is my approach towards looking at sustainability work within HCI supporting neoliberal capitalism? Was it adding to the status quo by contributing to dominant knowledge structures? How can an individual be at the centre of change? How can I question individual and collective assumptions, beliefs, and practices around food and its relationship with the body and the earth? Am I asking the right question or perpetuating the problem? How can the undertaking not predicate any kind of moral superiority nor be rabidly evangelical?

These questions took me back to a conversation I had with my late grandfather, on the detrimental effects of the policies of the Green Revolution [1] in India. My grandfather was a key official in the Economic and Planning Department in the Haryana Government, a former United Nations fellow, qualified as an agriculturist and was one of the many officials who helped introduce and implement the Green revolution policies in India. I vividly remember the conversation. I had asked him if the Green revolution policies did more harm than good referring to the socio-economic and ecological impacts green revolution policies have created in India. His reply to me was: *"after Indian independence, we had to feed the population, by any means necessary"*. His reply has since been an anchor to my thoughts and work, in an attempt to look at structural violence, detrimental effects of top-down policy, future thinking in tandem with evolving practices and the need for integrating citizen perspectives.

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[1]The Green Revolution was a period that began in the 1960s during which agriculture in India was converted into a modern industrial system by the adoption of technology, such as the use of high yielding variety (HYV) seeds, mechanised farm tools, irrigation facilities, pesticides and fertilizers.

After my first year of struggles and failures, I could see a way through to developed my own way of overcoming the self-doubt and existential crisis. It was to move from reading endless papers to doing, engaging and creating. This was to resist the impulse of knowing everything before experimenting (and failing) but to stay with uncertainty as I tried different approaches. In the attempt to move into the mode of doing, I started to map grassroots food growing communities and initiatives around the larger Newcastle area. Being an outsider it was to try and understand the landscape of community organisations in the UK. To grasp sustaining, coordinating, collective action and issues faced within the context of urban food growing in the UK. It started with desk research leading to snowballing, through volunteering, observations, questions and conversations at a subset of organisations. Engagements with multiple local urban farms, volunteer organisations, Transition Towns, the Transition Network, Permaculture Association and related local organisations, food-saving organisations and various other related events and smaller organisations gave me access to volunteers, communities and local community experts, which helped me draw on their experiences and knowledge. These engagements were mostly through my individual capacity, interwoven into my lifeworld in the new country, when documented for my PhD, my position as a researcher was explicitly stated within the contexts. This also included my own practice of food growing. I started my growing practice in the UK adapting what I had been doing in India. However, it required learning native knowledge such as weather, seeds, supplies, and local vegetables and plants in order to be successful. This self-initiated practice was also helpful to understand the context of food growing, starting conversations, sharing knowledge and volunteering. All of it was helpful in engaging and transitioning into a member of the communities I was working with.

This reflexive feminist positionality is useful for the necessary sensitizing, being aware of my own status, positionality and other biases, as a researcher, however, I felt it required constant self-examination (see details for each Case Study in sections 3.3 and subsections 3.3.2, 3.3.3 and 3.3.4). As an individual I evolved from the point I started during the research. Looking back, the approach that I am taking in writing this thesis is deeply influenced by my own design background, my earlier work and the culture where I come from which will always be part of my work.

After the first year of my PhD, I reflected on my earlier work in India, with my Master's thesis commenting on the politics of food through an interactive installation enti-

tled *'Story of the urban food chain'*. Also, my previous work as a grassroots art-based practitioner, where I approached food sustainability using critical conversations around technology through installations and community engagement. The action-based work engaged people in dialogue, reflection and knowledge sharing about growing organic food. This was mostly to resist dominant structures and understandings of food, politics, history and nutrition. In my worldview, I looked at resistance as a form of care for the self, in protest against the established order of society, as well as care for others and the earth. These kinds of resistance needed ordinary, everyday, and often painstaking work of looking after nature, ourselves and each other - thus forming praxis and bonds of care. In the process building community with people who share the same cause and are painstakingly working towards similar values.

The community of people in India and one built during my PhD in the UK, involved within the domain of food as a site of protest were key in establishing and navigating my understanding of food, politics and on-ground sustainability. I draw on these understandings and continuously attempt to connect these with my PhD work. After many conversations and critiques by these people, who I consider friends, mentors and activists (involved in art-based work, farming, food activism, and part of various on-ground movements; involving citizen-led activism, environmental policy, urban foraging and growing, food equity, farmer rights and mindful consumption) led me to deeply question my work at various points in the PhD (especially within the third year during the pandemic as it stirred new conversations). These critical conversations made me consider the importance of social (Manzini, 2015, 2016) connections and peoples' life experiences, networks of support, and at times, people's willingness to be researched (Choi and Light, 2020).

Therefore, the way people interpreted my initial Speculative Design probes, created valid understandings about futures. However, traditional Speculative Design positions the designer as the expert and the viewer interprets, adding to the understandings already created by the designer, rather than getting people to think participatively in the process of knowledge generation. At this point I considered Participatory Design within my methodological lineage as the knowledge collected is cocreated with the participants. Thus changing the orientation of research in the second year of my PhD, from being interventionist to one where the future orientation is not forecasted but built through collective creation and discussion.

I do acknowledge that Participatory Design is demanding, time-consuming, takes considerable facilitation work, requires established connections within the community even to begin and it is also highly political. However, co-designing with participants has a particularly modest quality as its outcomes are based on the hard work of participants (Søndergaard et al., 2022; Choi and Light, 2020). This to me takes precedence over the need to create technological interventions as solutions, examine the need for technology agnosticism for the design of future technologies, and the accumulation of wealth to move towards community-based participation. Social connections, mutual learning and knowledge exchange are other things the community and researcher gain from these interventions. Also, it brings to the fore the importance of engagement between the researcher and the participants through the creation of caring relations where the researchers' ethical obligations (Light and Akama, 2014) come into play. Therefore the inclusion of designers or researchers as mutually constituted and entangled within the research processes (Agid, 2016b) is emphasised. Most importantly, navigating the uneven power dynamics and political complexities in terms of what is rendered visible, invisible, or indeed relatable in and through these co-constitutive acts of design (Agid, 2016b; Bødker et al., 2017).

3.1.2 Structuring relations to participatively imagine futures

Feminism and Participatory Design (PD) within the discipline of HCI and Interaction Design approach the need for creating alternative futures at and from the margins. Participatory Design (PD) has a long history of working with communities with the aim of supporting broader social actions that respond to issues of concern in different domains (DiSalvo et al., 2012; Karasti, 2014). Many PD projects are motivated by an underlying commitment to political design. These commitments are understood as the first critical step to construct political spaces to advocate for the involvement of designers in the *'bigger picture'* of what it means to do socially and politically engaged design (Crivellaro et al., 2015). This is to respond to complex social issues that necessarily demand collaborative responses (Mazé, 2019; Karasti et al., 2010; Bødker et al., 2017) and involves participation from diverse stakeholders and competencies (Björgvinsson et al., 2010, 2012a,b; Manzini, 2015).

Participatory Design with its work in messy, political settings with marginalised communities is dedicated to design coalitions and build actionable futures (Le Dantec and

DiSalvo, 2013; DiSalvo et al., 2012). Within these contexts, it recognises how communities are socially constructed and are considered much more open than more formally constituted groups. Thereby, requiring different approaches to facilitate participation in responding to the open, dynamic and heterogeneous way in which they are socially and flexibly constituted. In this respect, PD looks to design processes, situations and structures to support social relations as the scope of their practice (Manzini, 2015, 2016; Björgvinsson et al., 2012b,a; Light and Akama, 2014) and has moved away from its initial focus to co-design technological objects.

HCI and co-design have moved beyond design for use (Star and Ruhleder, 1996); the discipline is now more concerned with the creation and support of the public (DiSalvo et al., 2014; Hansson et al., 2018), design for adoption and appropriation of socio-technical systems beyond the initial scope of the projects, and to include participants throughout the research processes (Le Dantec and DiSalvo, 2013). This new direction looks to develop methods and processes to support - community building (Olander et al., 2011), and the formation of agonistic spaces (Björgvinsson et al., 2012b; Le Dantec, 2012; Le Dantec and DiSalvo, 2013) that aim to make social and political issues and shared struggles visible. It also aims to imagine alternate futures interrelated to the conceptualisation of future technologies (DiSalvo et al., 2012; Light and Akama, 2014; Light, 2011).

In this respect, PD navigates HCI and Design's inherent position as a future-oriented field towards opening spaces to imagine social action and change both creatively and collectively (Manzini, 2015; Light and Akama, 2014). Here futures are not created by experts and *'[design is] no longer owned by the designer but becomes a co-articulation of concerns and issues in a highly mediated and mediatized world'* (Light and Akama, 2014, pg. 153). As discussed in the literature section (see Chapter 2, Section 2.2 and subsection 2.2.3) - Participatory Speculative Design (PSD) is an approach for looking at sustainability where PD is intertwined with the practice of Speculative Design and related fields to instigate future imaginations and debates (Baumann et al., 2016; Wakkary and Tanenbaum, 2009). Moreover, PSD overcomes Speculative Design's limitations of creating *'individual micro utopias'* (Bødker and Kyng, 2018; Nardi, 2015) and art gallery settings which do not account for the participants' needs and worldview. Provocation has been explored in PD to problematise design and research objectives (Boer and Donovan, 2012) as well as to question broader socio-technical and cultural configurations (DiSalvo, 2012a), and to suggest alternative interpretations and possibilities (Hansson et al.,

2018). Through a process of discovery and inquiry, employing *'tactics'*, of *'projecting'* onto the future and *'tracing'* from the past to facilitate the discovery and articulation of issues in the present in relational ways (DiSalvo, 2009). This is in line with Sciannamblo et al.'s argument that *'cultivating the inseparability between knowledge-making and world-making practices is a promising and primary concern for any design research committed to fostering alternative futures'* (Sciannamblo et al., 2018).

3.1.3 Addressing the need for longitudinal sustainability

Participatory design as discussed has responded to and addressed systemic social issues methodologically and more pragmatically, and politically, through e.g., future and situated workshops, town hall meetings, dingpolitic (Latour, 2005), and infrastructuring (Star and Ruhleder, 1996). Recent PD literature has raised issues of methodological fit for engendering participation with diverse communities (Karasti, 2014) and focusing on long-term sustained outcomes (Whittle, 2014). There have also been concerns about revitalising participation to innovate on PD approaches for addressing big issues and challenges to ensure designers support empowering political outcomes (Bannon et al., 2018) as early PD interventions previously aimed to do (Bardzell, 2018; Bødker and Kyng, 2018; Ehn, 2014). Others argue the focus of PD should be on a scale and reach of learning for and with participants (Halskov and Hansen, 2015); with this in mind, Gooch et al. point to key challenges of using PD at the urban scale, drawing attention to collaboratively codesign the city and the increased use of technology to gather dialogues and ideas (Gooch et al., 2018). Gooch et al. (2018) citing Gidlund (Gidlund, 2012), further highlight the lack of clear processes for undertaking citizen-driven activities in urban space and suggest outcomes are hard to determine amongst diverse stakeholders and note the importance of amplifying quiet voices.

A significant challenge for PD is how projects remain in the here and now and how designers have a limited concern about sustaining relationships after projects have come to an end (Bødker and Kyng, 2018; Iversen and Dindler, 2014). Researchers are required to think about these relationships and the challenges of design as an ongoing endeavour of the performative staging of collectives of humans and non-humans (Björgvinsson et al., 2012a). Also, in more sustained projects concerned with further supporting diversity, some have argued for a constellation of participatory activities to support engagement within urban neighbourhoods to engender long-term community change (Baumann

et al., 2017). These indicate recent calls for revitalising methodologies in PD to respond to complex societal challenges (Bannon et al., 2018) and anticipating the changing role of the researcher (Hansson et al., 2018) to longitudinally support urban communities, projects and relationships. Moreover, inquiring into methods to longitudinally support urban communities and provide infrastructures to explore within the community its capacity for change by thinking about the future through alternatives. Therefore, Bannon et. al call for an evolution of ideas through reinterpretation and reexamination of PD through a range of approaches or constellations in order to reach diverse stakeholders, scales, and interests to sustain engagement over time (Bannon et al., 2018).

In this regard, the concept (and practices) of infrastructuring has played a key role in the design and theorising of longitudinal engagements aiming to support community-based interventions for the last two decades (Star and Ruhleder, 1996; Karasti, 2014; Poderi and Dittrich, 2018). Designers and researchers have drawn attention to the need to address different stakeholder demands (Greenbaum and Kyng, 2020; Light and Akama, 2018; DiSalvo et al., 2012), and have developed diverse methods and tools (Simonsen and Hertzum, 2012) to advance understanding of the long-term impact of PD work in socio-political settings through the relational mode of practice (Agid, 2016b; Akama and Light, 2018). Crivellaro describes how infrastructuring *'as a design practice is used to designate the ongoing processes and activities required to develop and strengthen socio-material relations and better support people working together in different areas of social life'* (Crivellaro et al., 2019). Karasti has further highlighted the different ways infrastructuring practice occurs within PD and social innovation (Karasti et al., 2010). This includes finding ways to surface what constitutes the *'installed base'* of existing communities of practice to further support critical engagements with the range of constituent *'things'* and factors that together shape future action. These *'things'* can form part of a meshwork that includes the material resources available and required, access to information, people, networks, skills and values that can be brought to bear for embedding and building support for future community action. Further to this, infrastructuring has been discussed in relation to managing global-local nexus when looking at technology (Star and Ruhleder, 1996; Bødker and Kyng, 2018; Vlachokyriakos et al., 2018), addressing grassroots movements (Le Dantec and DiSalvo, 2013) and creating social innovation infrastructures (Manzini, 2014; Prost et al., 2019; Vlachokyriakos et al., 2018). It has also been considered within the context of sustaining engagements through iter-

ative processes and looking at addressing issues at larger scales (Lindström and Ståhl, 2020; Iversen and Dindler, 2014; Simonsen and Hertzum, 2012). However, there has been limited work that looks to explore how PD infrastructuring efforts might support the needs of communities of interest, developing tools and processes that can help address the complexity of ecological sustainability, an issue that necessarily brings together local and global efforts and multiple stakeholders. Indeed, addressing ecological sustainability demands moving between different scales of actions and their consequences (local/global; micro/macro), and the engagement of diverse stakeholders with different expertise and concerns (e.g. local politicians, policymakers, citizens, consumers, etc.). It also demands the development of design strategies for the creation of *'frictions'* in infrastructuring civic engagement in order to create alternatives (Korn and Voida, 2015).

3.2 Weaving in Experiments in living: Methodological grounding

As discussed in the related literature (see Chapter 2) my research closely relates to the emerging fourth wave in HCI with its primary focus on politics, values and ethics (Blevis et al., 2014; Frauenberger, 2019) which looks to tackle pressing issues such as climate emergency and growing inequality through large-scale, values-driven systemic changes to the way we live (Ashby et al., 2019) while still retaining methodological precedents of the second and third waves, through criticality, individual experience of technology use, and shared development and appropriation of technology (Bødker, 2006, 2015a). The research is grounded in the practice-led approach of Research through Design (RtD) (Frayling, 1994) for its value in driving interdisciplinary inquiries (Zimmerman and Forlizzi, 2014). The use of practice-based design research to generate knowledge is part of the recent *'practice turn'* in HCI (Kuutti and Bannon, 2014) resonating with the *'third wave'* (Blevis et al., 2015; Bødker, 2006; Harrison et al., 2007) which brings material practices to the fore which emphasises a shift to pluralistic knowledge generation carried out in everyday public spheres *'in the wild'* (Chamberlain et al., 2012; Rogers et al., 2013) which is in contrast to the prevailing mainstream - *'interaction'* perspective. In recent years HCI has begun to study technologies *'in the wild'* (Chamberlain et al., 2012) where designers and researchers work outside research labs and place their developed

prototypes, technologies or probes in various everyday settings that are socially and culturally constructed.

HCI defines *'the lab'* and *'in the wild'* as sites for applying different methods and producing different kinds of knowledge (Rogers, 2012). The 'lab experiments' as seen in HCI are experiments in controlled environments where experimental setups are designed to validate hypotheses, conduct usability testing and measure experiences. There has been an increasing call to develop systems which can be applied in real-world contexts, away from the design lab, known as *'in the wild'*. However, Chamberlain et. al point out the concerns with designing research in the wild as evaluation which involves observing and recording usage within people's lives and how this changes over suitable periods of time. An important consideration is how people behave, adapt and integrate interventions or technologies into their everyday lives (Chamberlain et al., 2012).

A critique of the work carried out in the *'wild'* is its colonial framing with regard to nature and ethnographic work (further explained in section 3.3). In HCI, research in the wild often focuses on the use of the technologies deployed rather than the context they are deployed within. There has been a move towards information ecologies (Nardi and O'Day, 2000) exploring different ways in which information interactions can be facilitated within particular contexts and experiences (Bødker et al., 2017; Woelfer and Hendry, 2009), however, most research in the *'wild'* does not lay importance on the contextualisation of the research in *'place'*. I do so through my reflexive process which can be categorised as Research through Design (RtD) practice where my artefacts or interactions are created iteratively in a participatory manner. My work orients the *'wild'* as research embedded in a geographical place that is politically contextualised and situated within the everyday.

Therefore, HCI is moving towards the recognition of the role and practices of everyday (Desjardins and Wakkary, 2013; Wakkary and Tanenbaum, 2009; Wakkary and Maestri, 2008, 2007), in particular looking at everyday designers, DIY enthusiasts and practice-based communities. Within these considerations, researchers have also explored the context of the *'living lab'* (Mitchell Finnigan and Clear, 2020; Schwartz et al., 2015; Björgvinsson et al., 2012b), taking into account the site of everyday practice as a lab. I place this with a new perspective from Liu et al. as they describe *'the wild'* as one of humanity's earliest labs focusing on the farm and earth as a lab. Here, they talk about

experiments like soil optimization, seed hybridization and creative recycling as examples of processes carried out in *'natureculture'* (Haraway, 2003; Latimer and Miele, 2013) which comes with considerable knowledge and technical vocabulary (Liu et al., 2019b). They later go on to credit bottom-up communities, as they invent and test practices that blend technological, biological and agricultural knowledge. Carrol and Rosson join the discussion by putting forth that local community can be a living laboratory for HCI in the wild (Carroll and Rosson, 2013). This is also in line with Arturo Escobar's approach of reconfiguring current design practices through the view of the decolonial efforts of indigenous and Afro-descended people in Latin America which could lead to the creation of a more just and sustainable social orders. The political struggles of indigenous, Afro-descendant, peasant, and marginalised urban groups in Latin America who mobilize with the goal of defending not only their resources and territories but their entire ways of being-in-the-world, do so in the name of their collective alternative *'Life Projects'* (Escobar, 2011). I position my approach, and that of the communities I have worked with and are discussed in the thesis, in close approximation with Lui et al's suggestion of *'in the wild'* but through the framing of *'the sustainable living experiment'* (Marres, 2012).

The sustainable living experiment builds on the idea of *'experiment in living'* (Mill, 2002 (1859). John Stuart Mill, a nineteenth-century philosopher, used *'experiment in living'* to make the case for the affirmation of social and cultural diversity, as something that is distinctive of liberal societies and proposed that they *'embrace the variability of human life'* and believe that *'the worth of different modes of life should be proved practically'* (Mill, 2002 (1859). Building on this, Noortej Marres describes *'the living experiment'* as a notable device of social and cultural research: *'it provides a format or protocol for exploring and testing forms of life, which is today widely applied across social life. And because of this, these experiments also present a useful site for sociological research in a more narrow sense: they can be used to explore collective practices of researching social and cultural change, as engaged in by actors who do not necessarily identify themselves as 'social researchers''* (Marres, 2012). Marres explains the undertaking of the sustainable living experiment as an explicit attempt by the individual or the sustainability community at modification of habits and habitats according to a fixed procedure of changes in everyday routines and living spaces through meticulous recording and reporting of everyday practices in various media (ibid.).

This fits with the practices in the two communities engaged in my PhD research within the three Case Study Chapters of the thesis. Using the sustainable living experiment as an underlying guideline to position the research work in symbiosis or association with attempts made by the communities to move closer towards collective embodied resilience, food sovereignty and living life more sustainability. And the researcher's and the community's work are interrelated in more ways than one to build collective knowledge. Here the everyday citizen's motivations and experimenting towards living more sustainably aligns to Social Practice Theory. Therefore, sustainable living is performed through practices, rather than by making policies, strategies or plans. Also, specific instances of experiments in living can be framed as performances of niche practices. Social Practice Theory approaches this by looking at how new practices are brought about through innovation and experimentation, new performances are made that might be adaptations of existing practices or fundamentally different ways of doing. Sometimes these take off and become established as shared ways of doing, other times they do not and cease to be performed. In any case, the necessary elements – materials, meanings, and competences – must exist or be developed and come together in performances for niche practices to be established. Therefore, practices are conceived as *'embodied, materially mediated arrays of human activity centrally organized around practical understanding'* (Schatzki et al., 2001). Moreover, Shove et al. explain practices to be the fundamental unit of social existence which influences both social order and individuality. They also explain the relevance of social order by arguing *'Rather than existing in mental qualities, in discourse or interaction, the social exists in practice'* (Shove and Walker, 2007, pg. 12) where practices are complex bundles of activities that invariably involves human and non-human participation (Schatzki, 1996; Reckwitz, 2002; Shove, 2003).

The three-part practice framework by Shove et al. (2012) defines practices as consisting of materials, competences, and meanings. They argue that practices emerge, persist, shift, and disappear when connections between these types of elements are made, sustained, or broken. Moreover, when aligning to experiments in living these practices are deliberate because people are trying to change them through continuous tinkering thereby, building niche practices that influence change when taken up by other people through the ethos of experimenting and subsequent communication of the outcomes (Marres, 2012). Therefore, Social Practice Theory when aligned to experiments in living provides a means of representing and explicating the collaborative and purposeful

experimental activities for more sustainable ways of living that take place in communities united around this common cause. This includes evaluations and sharing of results which ultimately leads to the (re)negotiation of elements of practices and sometimes the establishment of new practices in the community. This process of knowledge production and communication forms the basis of longitudinal acts of creating meanings together among the community members. These symbolic meanings are socially constructed ideas and aspirations linked to the practices. These co-created meanings form the basis of future visions to work towards collectively. However, these should not be related or mixed with values held by the communities. Individuals and communities can create their own meanings by associating their values with the practices which I evidence through my case studies. Placing these conversations in relation to value-sensitive design in HCI which implores designers and researchers to shape technology through moral imagination (Friedman and Hendry, 2019). Friedman and Henry explain that humans envision alternatives to the status quo by actively engaging with values in the design process for improving the human condition. Value-sensitive design has worked in relation to sustainability by considering various ways of engaging with long-term thinking. For example, through methods such as multi-lifespan timeline, multi-lifespan co-design and envisioning cards (Friedman and Hendry, 2019). However, there have been critiques of Social Practice Theory (Tan and Tan, 2023; Säävälä and Tenhunen, 2017) and of value sensitive design, pointing to its lack of consideration of complexity and a tendency towards universalisation (Borning and Muller, 2012; Le Dantec et al., 2009) for example, not responding to racial inequalities, political hierarchies and everyday lived realities of people.

Therefore, I centre these interrelated theoretical concepts of Social Practice Theory and visions towards that of living experiments, to guide my methodology for engaging with urban food growing communities that work at the margins of society and are resistant to hegemonic ideas of food production and sustainable cities. Thus, taking inspiration from the feminist ethics of care, *'situated knowledges'* and feminist ecological perspectives I propose and develop the idea of *'Participatory Visioning'* as a model of enablement for emboldening marginal voices and cultivating a more holistic approach to understanding food, ideas of future and everyday practices.

3.3 Participatory visioning in the context of urban food growing communities: theory and practice

I take a transdisciplinary approach with the intention to look at future thinking practices. The methods I incorporated in my thesis are manifold and include design-based methodologies and ethnographic approaches. I describe this in more detail within this section. My approach combines participatory forms of design research with ethnographic methods (DiSalvo and Lukens, 2009; Marres, 2015), situated in ordinary places such as people's homes, farms and various community venues providing contextual grounding. This aligned with the speculative approaches I aimed to understand the relationship between vision and practice by engaging grassroots communities meaningfully and collectively to think about sustainable futures for urban food growing.

As a professionally trained designer, having worked in various design and research studios, being accustomed to various design practices inspired a significant portion of my work involving design-based research activities. My PhD research within the field of HCI focuses on critical and speculative aspects of practice-based design research, in line with Research through Design (RtD) (Zimmerman et al., 2007). RtD differs from mainstream commercial or affirmative design approaches by emphasizing *'generating new knowledge'* and imagining alternative futures (Zimmerman and Forlizzi, 2014). This is in line with RtD's constructive, critical, and theory-building capacity (Zimmerman et al., 2007; Zimmerman and Forlizzi, 2014; Gaver, 2012; Koskinen et al., 2011; Bardzell et al., 2015) by engaging with critical epistemologies to identify hidden assumptions and reframe problems. Thus, opening up the RtD as a speculative and reorienting design practice for future making toward creating alternates, rather than re-enforcing business as usual.

Design is a future-oriented field, embodied with a focus on understanding and creating material culture through specific products and solutions. Design processes may start from "wicked" or ill-defined problems (Buchanan, 1992; Gaver, 2012), integrating processes of observation and reflection similar to anthropology, geared towards transforming reality. In this sense, design is similar to HCI, which also looks at the need for integrating human values into critical and reflective approaches towards the design of technologies (Bannon et al., 2005; Dourish, 2007; McCarthy and Wright, 2004; Sellen et al., 2009; Sengers et al., 2005; Zimmerman, 2009). Anthropology-oriented ethno-

graphic methods on the other hand, bring contrasts and relations typically taken for granted into the foreground, (Gunn et al., 2013) by focusing on the lived experiences of individuals or communities through various engagement and communicative acts between the participants and the researcher (Hesse-Biber; Ogden et al., 2013; Gunn et al., 2013; Otto and Smith, 2013; Clarke and Clarke, 2011; Hamilton and Taylor, 2017; Kohn, 2013).

Thereby, anthropology-oriented ethnographic work engages with people as a form of correspondence, grounded in processual, holistic approaches that realize the agency of the participants (Gatt and Ingold, 2013) where the situated nature of theory is generated during collaborative engagements between the researcher and the participant. Therefore, using everyday life as data (Ahmed, 2016) to capture what people do and *'how they experience what they do'* (Dourish, 2014). However, ethnographic methods have been critiqued for their positivist approaches to knowledge and explicitly normative ideas of progress (Mosse, 2011) and the role they historically played in colonialism and imperialism (Gunn et al., 2013; Tunstall, 2013; Smith, 2021; Blakey, 1991) where many indigenous, minority, migrant, and other marginalized communities have been *"coded into the Western system of knowledge"* (Smith, 2021, pg. 43). This is in parallel to the critiques which design, design innovation and HCI faces, where success is measured through the relevance it has in people's everyday lives, leaving behind *'unintended consequences'* (Tunstall, 2013), as Tunstall ponders, *"Are designers the new anthropologists or missionaries, come to poke into village life, understand it and make it better—their modern way?"* (Tunstall, 2013). Another example of such extractivist act is converting data gained from field research into *'specifications for end-user requirements'* (Anderson, 1994; Dourish, 2006, 2007, pg. 151) which is popular in HCI research.

Taking inspiration from the late M.P. Ranjan (a trailblazing Indian design scholar whom I had the opportunity to be mentored by, during my Masters degree) articulated the role of culture and context in Design:

> *design action takes into account the structure of society along with their macro aspirations, their histories and cultural preferences as a starting point and from here build imaginative approaches for products, services and systems that would include the meta-system, the infrastructure, the hardware, the software and the processware to ensure a perfect fit to the*

circumstances and requirements of the particular situation. (Ranjan, 2011, sec. 1, par. 4)

Similarly, Suchman mapped out workflows, plans, and situated action and showed how cultural conceptions had effects on the design and reconfigurations of technologies (Suchman, 1987). She looks at approaches to move from a technology and system-focused design practice to a more radical practice of design as co-creation that addresses a larger context of social relations, experiences, values and ethics. Thereby, she shifts the focus on the everyday behaviour and imagination of people as they appropriate technology to suit their daily lives (Suchman and Suchman, 2007) affiliating to the practices of Participatory Design. As designers create these collaborative processes it feeds into the need for critical reflexivity and dialogue about the human experience more generally (Hunt, 2011). Dourish (2006, 2007) makes the link between design and critical reflection, and the potential of ethnographic practice for understanding relations between people and technologies by engaging in the lived and felt lives of their participants' worlds, (Dourish, 2006, 2007; Dourish and Bell, 2011; Crabtree et al., 2009) providing specificity, richness and criticality. In this sense, technology is not just understood within people's imagined and desired identities, communities and cultures but also how technology already embodies social theories that point to a network of intersecting ideologies that are involved in its production and use (Dourish and Bell, 2011).

This is in line with the emerging field of design anthropology which is concerned with how people perceive, create, and transform their environments through their everyday activities, making implicit understandings explicit (Otto and Smith, 2013; Gunn et al., 2013). Design anthropology goes beyond observing and documenting social change and people's imaginations of the future, developing tools and practices to actively engage and collaborate in people's formation of their futures. This supports my research's aim to look at envisioning alternate futures by questioning and bringing to the surface the socio-cultural engagements and interactions influenced by dominant social and political systems. I combine a number of qualitative research approaches for data collection and analysis, aligned with ethnographic approaches or related social science methods like contextual inquiries, interviews, notetaking and observations. As well as participant observations, which involves immersion in a social setting with the aim to observe and document everyday practices comprehensively and in detail. I take this as a form of *'observant participation'* (Otto and Smith, 2013) which is dialogically constituted, as

correspondence between me, the place and the communities. The inquiry is situated in a place to understand the context, the nature of engagement and the community itself by making embodiment and place-making part of the investigation. Therefore, taking community members as co-authors of the knowledge that result from personal relationships built during my fieldwork, by making participants engage more seriously in speculative, comparative, and synthetic thinking (Murphy and Marcus, 2013) and moving forward with people - their desires, aspirations and stories. The key part of the ethnographic inquiry is engaging with people's stories and narratives, making and sharing meaning. The engagement, however, sits within a narrative of time, seeing communication in chronology, analysing narratively the situatedness and anticipations of everyday experiences.

Stories are imaginative social re-constructions of experience and narrative is considered the means by which stories become socially meaningful, shared and analysed. As Haraway says:

> *matters what matters we use to think other matters with, it matters what stories we tell to tell other stories with, it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories.*
> (Haraway, 2016).

These stories form constructed narratives which are *'partial'* and truthful fictions that form the data collection and analysis for researchers to understand details and aspects shared within communities (McCarthy and Wright, 2004; Clifford and Marcus, 1986; Turner and Oakes, 1986). Narrative inquiry brings to the fore how meaning is made rather than how facts or information is communicated, highlighting the everyday nature of sharing stories as a common way to communicate experience (Chase, 2003). Therefore, narrative inquiry pertains to coherence, probability, fidelity and events that make sense or are resolved within a story.

This thesis draws on thematic analysis (Braun and Clarke, 2019, 2013) and narrative inquiry approach (Frank, 2010; Lucius-Hoene and Deppermann, 2000; Lyons and La-Boskey, 2002; Hones, 1998) to account for complex, marginalised, political and multi-scalar experiences that coalesce in practices of food growing and sustainability. These stories become important through researchers reflexively sharing, learning and creating

forms of continuity between the fragments of experiences that are understood through situated exchanges of socially constructed meaning.

Subjective and collaborative meanings are rich and complex accounts of experiences with particular attention to tensions, moral, ethical dilemmas and aesthetic moments of fulfilment or struggle that occur (Connelly and Clandinin, 1990). This includes tensions that arise through the production of research texts in the *'midst of uncertainty'*, created through engagement with the complexity of the lived experience (Connelly and Clandinin, 2000, pg. 144). These sharings are possible through specific kinds of relationships developed between storytellers and listeners and these relationships only develop over time. In this sense, stories are highly situated and localised rather than abstract pieces of information without a teller or listener. Within the narrative inquiry research context, the kinds of stories shared are enriched through close and long-term relationships characterized by care (Connelly and Clandinin, 2000, pg. 145).

Therefore, these dialogical engagements were important in building my reflexive practice during the design of the engagements, data collection and analysis. My positions as a researcher, a participant immersed in the action, a volunteer or as an observer in community settings are all key to the inquiry. I actively build into the *'reflection in action'* (Schön, 1987) based on the intrinsic relation between knowing and doing (Dourish, 2001; Sennett, 2008) which is part of my ethnographic accounting of the experience. As the inquiry developed over time, I took on different roles and voices, as a critical observer and a reflective practitioner, who intellectually and emotionally, through the senses, critically engaged with the inquiry (Lucius-Hoene and Deppermann, 2000).

This also has ethical entanglements and consequential contexts beyond my PhD engagement, I am aware of my responsibilities of what is produced after fieldwork towards the academic community but also to relationships formed in my own life. I see this responsibility as *'invisible work'* (Star, 1999) towards the place, my participants and informants with whom I have engaged, represent, and for whom I write. These relationships I built during the fieldwork re-anchored my reflexivity throughout the process and have repositioned my work as a researcher, driving me to think of ways to be co-constitutive with the place and community rather than being extractionist. Hence, looking at ways to stage these encounters between people, place and technologies within HCI.

My reflexivity developed during the process and with each engagement, my positionality

changed. As seen during early pilot work which I carried out to understand appropriate data collection and analysis methods, made me acknowledge that methods of inquiry are shaped by cultural and societal, values and biases. This led to an understanding that epistemologies are always culturally contextual. The different disciplinary methods I include in my research have their own focus and goals, and also when approached collectively offer different ways of knowing and responding. By practising, experimenting, and combining methods, my aim is to develop *'Participatory Visioning'* for researchers and practitioners in Design and HCI looking to engage with bottom-up ways of engaging with sustainability issues. Furthermore, keeping with the commitment towards creating alternates through constant adopting and reimagining, to respond to new ideas, perspectives, assemblages of technologies and social actors.

3.3.1 Motivation for the Three Case Studies

In the previous sections, I shared my disciplinary research approaches which were important in cultivating my own research sensibilities. This section introduces the three empirical case studies, which as a collective were important starting points towards exploring and developing a Participatory Visioning approach, and also the contributions it offers to HCI.

What unify the case studies is not the objective facts (e.g., culture, geography, population, and material reality) but rather the contextual nature of this work and its focus on the practice of food growing in grassroots communities. In conducting the fieldwork for my PhD, I did not have the three studies laid out from the start. It was rather an iterative and reflective process based on inquiry with an initial phase of testing pilot explorations. The course of the three case studies designed after the initial explorations were disrupted. My original plan was to engage Auroville (Chapter 4) [2], Green-West (pseudonym, see Chapters 5 & 6) and Transition Town Totnes [3] at different working, temporal, geographical and generational scales. However the plan to engage with Transition Town Totnes had to be abandoned due to the Covid pandemic.

Transition Town Totnes is the first Transition Town within the transition initiative, established around a decade ago in an attempt to tackle peak oil. These days, it is a community-led and local charity which helps communities establish transition initia-

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[2]https://auroville.org, accessed on 26th February 2023
[3]https://www.transitiontowntotnes.org, accessed on 26th February 2023

tives that work to strengthen the local economy, reduce environmental impact, and build resilience for a future with less cheap energy and a changing climate [4]. Transition Town Totnes functions at the scale of a small British town integrating different organisations, communities and businesses. However, it does not have a shared vision for the town but there is a shared understanding of the motivations towards living a sustainable and socially cohesive life. The transition network [5] started and established within Transition Town Totnes provides and supports interested communities and individuals with tools they can use to create these social and material transitions towards sustainable outcomes. The transition network runs visioning exercises as part of their transition protocol, to support the community in imagining the transition initiatives and bringing these imaginations to fruition. After attending a few Transition events by the network I discovered the mature and established nature of these practices, however, they were focused on addressing particular needs rather than devising a broader vision with themes like food, transportation, and housing. The research with the Transition Town Totnes community would have led to co-designing socio-technical systems for community-led actionable visioning. It would still be fruitful to run the study involving members of Transition Town Totnes and Transition Network as they have been conducting community-led visioning for sustainability for the past decade and can be considered as experts. Therefore, it would be constructive to imagine and co-design with them, to get insights into the values, needs and barriers for designing future socio-technical systems, contributing towards guidelines for the design of a digital platform for community-led actionable visioning. However, now the thesis is aligned towards the use of existing digital technologies and looks at how an existing community experiences collective future thinking with its support.

The three case studies still encapsulate thinking about situated futures and how they can be translated into practice. The empirical studies are distinctive from one another, the first and the latter two differ by geography, infrastructure, culture, and the composition of actors. The first Case Study is at the scale of a town - Auroville, in India (Chapter 4). The second and third Case Study (Chapters 5 & 6) is at the scale of - a neighbourhood, associated with the Green-West project in Newcastle upon Tyne. The third Case Study is (Chapter 6) set within the same contextual background as the second, which explores the experiences of the neighbourhood community in the use of technology to scaffold

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[4] https://bit.ly/3ZqotRf accessed on 28th February 2023
[5] https://transitionnetwork.org, accessed on 26th February 2023

place-based future thinking approaches. The sequence of case studies (Chapters 4, 5, 6) employs different methods to engage the two communities with the overarching approach and contribution of Participatory Visioning. Each study informed the next one, through the learnings from the last one and the reflexivity of the researcher. Each study surfaced complicated and diverse data sets which are iteratively analysed, to progressively build up knowledge and tools to participatively explore future grassroot visions within the context of community-led urban food growing. Also, addressing the barriers and opportunities for developing socio-technical systems linked to sustainability in future cities. In the following sections, I present why I was drawn to the sites, an overview of the methodological underpinnings of the three case studies within the thesis, the background of the communities, and why it was conducted in a particular way. However seemingly trivial and disconnected, the three distinctive studies and their sequence and combination provide me with a starting point to answer the question:

'How can HCI support local, grassroots communities in transitioning to sustainable urban food systems?'

Therefore I investigated and explored the material landscapes of current visioning or long-term thinking processes used by local food communities and the roles of digital technology. To see how I collected data for different case studies, refer to Table 1.

3.3.2 Case Study 1: Understanding interrelation of visions to sustainability practices

The first Case Study considers the underexplored and nebulous idea of visions to inform the Sustainable HCI community of how they are associated with everyday practices. Previous work in SHCI has engaged with sustainable living (Håkansson and Sengers, 2013). These present potential for looking at everyday practices, however, they are also critiqued (Pargman and Raghavan, 2014) for their incremental capacity for change when engaging with multi-scale complex issues such as climate change. Recently researchers have asked to look at long-term thinking (Raturi et al., 2017; Knowles et al., 2018) for tackling wicked problems like environmental sustainability and provide radical ways of approaching it. Especially, focusing on imagining alternatives rather than incremental change, thereby challenging the *'locked in'* (Berkhout et al., 2002; Unruh, 2002) nature of everyday practices and demanding better ways of living sustainably rather than busi-

	Case Study 1	Case Study 2	Case Study 3
Recruitment	Snowball sampling and word of mouth	Word of mouth, drop-in format invitation through posters put up in community spaces	Recruitment through door knocking, acts of kindness, word of mouth and snowball sampling
Field notes & Observations	Conversations and engagements Everyday life, working as a farm volunteer, visits to farms, cultural and social events	Notes taken after each workshop Multiple community events during and after the workshops, continuing to work as a volunteer	Multiple board and planning meetings, and conversations Multiple community events, continuing to work as a volunteer
Designed engagements	-	4 Participatory Speculative Design workshops	Situated speculative walks and WhatsApp engagement
Participants	18 participants	12 participants	18 participants
Approximate age range	18 - 90 years	25 - 70 years	19 - 65 years
Data	15 audio recorded face to face semi structured interviews with 18 participants, field notes and observations from the 20 days on field	Audio and video data from the 4 workshops, 1 interview with owner of the local micro-business	11 audio recorded face to face or zoom interviews which corresponded with 14 participants WhatsApp conversations of 2 groups with 18 participants
Analysis	Thematic analysis of 13 interviews as some people did not give consent to use their data and 2 interviews were conducted as couples	Thematic analysis of future thinking or speculative instances within the 4 workshops Narrative analysis of the 4 workshops	Thematic analysis of the 11 interviews Narrative analysis of the WhatsApp conversations

Table 1: The diversity and complexity of the data within CS1, CS2 and CS3

ness as usual (Wangel, 2011). Visions are a form of long-term future thinking that has permeated HCI since its conception. Grassroots communities are known to engender positive change from the bottom up and long-term positive visions are a way to empower them (McPhearson et al., 2016). However, it is not well understood how alternate visions of the future can be negotiated, mobilised and materialised in everyday practice. I argue visions constitute meanings, ideas and ideals which are part of practices and are key in influencing long-term change. Therefore, to open up the design space around visions and visioning practices it is important to understand the everyday work involved

in the negotiation, mobilisation and materialisation of visions. Auroville, a small town in India provides a unique opportunity to understand a multi-generational Case Study of negotiating the everyday practices of a town and its food growing community around an existing shared vision.

The exploratory research engages with an urban and social experiment, the international township of Auroville, situated in the south of India in a peri-urban setting. The peri-urban nature of the town inspires its eco-village setting, however, the place is also cosmopolitan in terms of its residents. This research in *'the wild'* (Chamberlain et al., 2012) was an attempt to understand the town's static top-down spiritual vision which has been in place for the last 50 years, and how it influences sustainable living and associated practices around food. The town has a multi-generational population and also attracts tourists, volunteers and new residents from all over the world which makes for a transitionary population. The residents of the township are multiethnic and diverse, and aligns with the town's spiritual vision, living and working towards its realisation and consciously choosing to live a more ecologically sustainable life. This Case Study is a significant part of the thesis to answer the overarching question about the relevant tools or approaches that can support longitudinal urban sustainability.

I chose to work with Auroville as a site for research as the residents of the town are motivated towards living a holistic sustainable life. The spiritual vision of the town brings in qualities of self-transcendence (Knowles, 2013) beyond behaviour change models (Brynjarsdottir et al., 2012; Hobson, 2002; Dourish, 2010; DiSalvo et al., 2010) as a way of approaching sustainability. Also, community-led governance and sustainable everyday living lend themselves the socio-material complexity to understand at a local, grassroots community and their efforts in transitioning to sustainable urban food systems. Also, taking Auroville as a mature community with knowledge and lived experience of the last 50 years can inform how other communities can develop similar practices and sustain themselves over a long period of time. Therefore this Case Study is important in understanding the material landscape of visioning praxis in communities which includes negotiation, mobilisation and materialisation of visions. Overall, this Case Study was primarily guided by the following questions:

'What can SHCI learn from long-term collective negotiation towards a shared vision?'

- What is the role of visions in influencing everyday sustainability practices?

- What are the challenges faced by citizens or communities in reconciling static visions with everyday practices and vice versa?

The materialisation of the vision is an attempt to interpret and bring into practice the interpretation, this forms the basis of the work done in Auroville to live a sustainable life. The spiritual nature of the community brings out the practice of consciously growing, consuming food and living out the vision as a way of life which is different from the next two case studies (Chapters 5 & 6) which deal with community engagement in an urban setting.

The research is carried out through immersive fieldwork, using ethnographic praxis (Gunn et al., 2013) of semi-structured interviews, field notes and observations. Ethnographic methods were used to immerse in the peri-urban, eco-village setting by participating in the daily activities of the residents. Prior to the research, I reached out to all the farms and on field associated myself with a small volunteer-run farm, whose steward took me in as a volunteer and acted as a gatekeeper connecting me to other members of the community, residents and Stewards of different farms. During my stay at the farm, I experienced the daily life on the farm. The day began at the break of dawn when everyone at the farm was assigned a task which included planting and collection of products in the morning with the shift ending after a few hours till the sun got harsh followed by sorting, packing, labelling and sending the produce to the central food distribution organisation. The farm gave accommodation to volunteers, however, charging them small fees for their stay and offering one freshly cooked collective meal. The charge I felt was unjust as the volunteers were working on the farm for the stay, and were offered limited amenities and resources. This was later echoed by other volunteers who I met in Auroville over the period of my stay. The community living compound had huts and shared public spaces boasting of a functional wifi and electricity. At night it only had solar-powered lamps, bedding and a mosquito net. Everyone was handed a solar-powered torch on arrival and told to be careful of insects, snakes and frogs at night. After a few days of the hardship of farm life and being used to urban life, I urged the steward of the farm to help me find a place which was more conventional. They helped me get a place at a dormitory at a local school where I stayed for the rest of my time in Auroville. I carried out observations to record interactions, conversations and experiences on the field,

supporting them with field notes and more in-depth semi-structured interviews. The interviews were thematically analysed to give themes pertaining to answering questions around the interrelation of vision and practice.

These methods helped me participate, embed myself in the setting, embody daily practices, and appreciate the complexity of the place, the diversity of the residents and their viewpoints. With this participation, I could appreciate the point of view of a resident invested in the aspirations of the place and what makes Auroville special. Thereby, understanding the conceptual underpinnings of the established visions and their influence on the town's sustainability practices, to answer my question about the reconciliation and negotiation of future visions with everyday sustainability practices carried out by the community.

The town of Auroville

Auroville is an experimental universal township in the south of India. It has been referred to as *"radically transformative and futuristic initiative'* (Kapoor, 2007). Auroville is backed by UNESCO and the Government of India, established in 1966, on 20 square kilometres of barren wasteland which is estimated to accommodate a population of up to 50,000 people from around the world [6]. The name *'Auroville'* has its origins in the French language, *'Aurore'* meaning dawn and *'Ville'* meaning city, it is named after Aurobindo, an Indian revolutionary leader in the Indian movement for independence from British rule, who later became a spiritual reformer and philosopher [7]. Auroville was established by Mirra Alfassa, a follower and spiritual collaborator of Aurobindo, known as *'the Mother'* in Auroville. As stated in Alfassa's first public message in 1965, *"Auroville wants to be a universal town where men and women of all countries are able to live in peace and progressive harmony, above all creeds, all politics and all nationalities. The purpose of Auroville is to realise human unity"*[8] . When the town was established a few people started to live on the land assigned to be Auroville and build the township, these initial settlers on the land are called pioneers within the community. They are full of stories of their travel, initial days of Auroville, communion with the mother and how they built the town with their own hands. To get a sense of the built infrastructure at Auroville refer to Figure 2.

[6]https://auroville.org, , https://auroville.org/page/vision-of-the-city, accessed on 26th February 2023
[7]https://auroville.org/page/sri-aurobindo-visionary, accessed on 26th February 2023
[8]https://auroville.org/, accessed on 26th February, 2023

Auroville is recognised as an ongoing experiment in human unity and transformation of consciousness [9] while also researching sustainable living and the future needs of humans. It currently houses close to 3300 people from 60 nationalities [10], different age groups, and a considerable Indian population. The town is surrounded by multiple small native villages which also forms the workforce of different establishments in the town. The residential population of the town is predominantly English speaking and most of them also speak the local regional languages. The official website of Auroville is in English and the town presents itself as a social experiment working towards the realisation of the Mother's dream, using the dream as an invitation to welcome others to join the journey in helping realise it - *"Auroville steadily grows, and its residents continue to carry this same ideal and vision in their hearts and minds, gives hope. The challenges are enormous and daring. When this dream touches you, don't hesitate to join us"* [11].

The dream presents the Aurovillian life as an alternative way to live and build a society which is balanced, just, harmonious and dynamic. The town with its surroundings is best described as an ecovillage with mud roads,limited technological and infrastructural access planned by a French architect as an ecological cosmopolitan oasis. The city is in line with the modernist architecture and city planning of the time where towns and cities are divided into sections. It reminds me of Chandigarh in India, my hometown and the similar modernist vision of the government of India in the 1950s for the lives of the people displaced by the partition of India and Pakistan as a result of the British rule. These thoughts also invoked the ideas of smart city visions which exist today, like the city of Newcastle where I live now which is supposed to be a smart city. The aforementioned visions are created by experts in a top-down manner, leaving the citizens to make sense of the vision as they carry on living their lives. However, in the case of Auroville, the city is shaped by the efforts of citizens as they realise the vision for the city through their actions.

Mother's Vision for Auroville: A Dream

> *"There should be somewhere on earth a place which no nation could claim*
> *as its own, where all human beings of goodwill who have a sincere aspira-*
> *tion could live freely as citizens of the world and obey one single authority,*
> *that of the supreme Truth, a place of peace, concord and harmony where all*

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[9] https://auroville.org/page/auroville-charter, accessed on 26th February 2023

[10] https://auroville.org/page/frequently-asked-questions-on-the-city, accessed on 26th February 2023

[11] https://auroville.org/page/a-dream, accessed on 26th February 2023

Figure 2: Auroville - Built Infrastructure

the fighting instincts of man would be used exclusively to conquer the causes of his sufferings and miseries, to surmount his weaknesses and ignorance, to triumph over his limitations and incapacities, a place where the needs of the spirit and the concern for progress would take precedence over the satisfaction of desires and passions, the search for pleasure and material enjoyment.

In this place, children would be able to grow and develop integrally without losing contact with their souls, education would be given not for passing examinations or obtaining certificates and posts but to enrich existing faculties and bring forth new ones. In this place, titles and positions would be replaced by opportunities to serve and organise, the bodily needs of each one would be equally provided for, and intellectual, moral and spiritual superiority would be expressed in the general organisation not by an increase in the pleasures and powers of life but by increased duties and responsibilities.

Beauty in all its artistic forms, painting, sculpture, music, literature, would

be equally accessible to all, the ability to share in the joy it brings would be limited only by the capacities of each one and not by social or financial position.

For in this ideal place money would no longer be the sovereign lord, individual worth would have a far greater importance than that of material wealth and social standing. There, work would not be a way to earn one's living but a way to express oneself and to develop one's capacities and possibilities while being of service to the community as a whole, which, for its own part, would provide for each individual's subsistence and sphere of action.

In short, it would be a place where human relationships, which are normally based almost exclusively on competition and strife, would be replaced by relationships of emulation in doing well, of collaboration and real brotherhood.

The earth is certainly not ready to realize such an ideal, for mankind does not yet possess the necessary knowledge to understand and accept it nor the indispensable conscious force to execute it. That is why I call it a dream. Yet, this dream is on its way of becoming a reality. That is exactly what we are doing on a small scale, in proportion to our modest means. The achievement is indeed far from being perfect, it is progressive, little by little we advance towards our goal, which, we hope, one day we shall be able to hold before the world as a practical and effective means of coming out of the present chaos in order to be born into a more true, more harmonious new life."[12]

Aurovillian Context: Community and its interlinkages

The town is surrounded by a green belt as a zone for organic farms, dairies, animal husbandry, orchards, forests, and wildlife areas. The belt provides a variety of habitats for wildlife, a source of food, timber, medicines and recreation. The present green belt is an example of the successful transformation of wasteland into a vibrant biodiverse ecosystem by the citizens. It is a remarkable demonstration site for soil and water conservation, groundwater recharge, and environmental restoration. However, the green belt

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[12]https://auroville.org/page/a-dream, accessed on 26th February 2023

faces several issues related to land preservation, land annexation, scaling, economic viability, farm labour, intergenerational passing on of land for the purposes of farming and water shortages.

Figure 3: Auroville Agricultural Infrastructure and farms

Most farms are organic and function autonomously, being a microcosm within the larger food system in Auroville. Every farm has a Steward who manages the farm and its needs along with representing it within the farm group (See Figure 3, for an example of a farm). The farm group consists of members from 12 functional farms that are the backbone of the food growing community in Auroville and meet the basic needs of the town for food. The group had devised a five-year plan in 2011 supported by a consumer survey which failed drastically. The five-year plan was not able to accommodate the ever-changing on-ground challenges that arise within farms. Also, it was not able to meet the needs of the consumers, who come from all over the world and desire to eat vegetables which are non-native (such as potatoes, tomatoes and carrots) and difficult to grow in Auroville. Some farms run their own restaurants, farm tours and educational programmes to educate and encourage people to cook and eat local vegetables. The farms also supply to the community kitchens, restaurants and residents what they grow,

like regional grains and seasonal fruits and vegetables. The food link is the intermediary between the farms and consumers, who manage the relation, prediction, collection and selling of the products serving as the central distribution organisation (See Figure 4, for images of Food Link).

Figure 4: Central food distribution center

Volunteers play an important role in driving the economy of the town and also serve as a workforce for farms. The main volunteer and tourist season coincides with the dominant growing season from December to March. The volunteers are mostly ethnically white or from western countries wanting to engage with either the town's spiritual or sustainability ethos. The town has recently seen an influx of local Indian tourists, these are mostly IT professionals looking for a weekend getaway. The incoming volunteers have to apply to the internal intern service to register with a farm or other organisation which organises their placement, visa and resident cards. Some organisations provide volunteers free food, accommodation or credits on the resident cards to use within Auroville. In some of the farms the volunteers have to pay a small fees to stay on the farm, and some volunteers think of it as *"minimal exploitation"*.

The governing of the town is predominantly community-controlled, without any law enforcement, with minimum intervention by the central Indian government which only appoints a directing body. The bottom-up governance is directed through an appointed administration which any resident can become part of through nomination. All decisions are presented by the administration to the residents and are deliberated through town halls and other open forums, where interested residents come together to agnostically deliberate, most of the residents complain about the process being too open-ended and agnostic, making it impossible to come to a consensus and move forward with a decision.

Sometimes the vision and other accounts from the Mother are important in navigating these decisions. However, residents who have joined the community at a later time period and tend not to completely align with the spiritual vision. Thus the governing and deliberation process is immensely ground up and complex. At the time of my research the government of India was planning to build a highway cutting across the city, this was a matter of urgency for the residents and resulted in the community banding together quickly to organise protests to oppose the construction.

Each resident receives a maintenance by Auroville and it depends on the number of members in the household. The economy of the town runs on barter, products and services are exchanged within the community with an underlying understanding of their value in the Indian currency. Community kitchens, restaurants and consumer outlets in Auroville operate without money. A resident can walk in and buy what they want with their resident number. The primary co-op and distribution service in Auroville is the primary consumer outlet. They define themselves as an experiment in a *'kind'* collective economy. It is only open to residents and members and does not accommodate the transient population such as volunteers and tourists. The co-op's aim is to meet everyone's material needs in Auroville and it encourages everyone to take as much as necessary as participants not as consumers. The participants contribute in kind or a fixed amount towards the co-op through their monthly maintenance which they get from Auroville, or they can contribute above this, which can even out their own expenditure or of other members. There are no price tags or restrictions on the residents' shopping, however, a monthly resident list is displayed publicly with the amount of contribution, monthly spend and the annual end balance. These lists display the amount by which the resident exceeded their monthly or annual expenditure. This is an example of the social, community-centred feedback and control systems which are in place within the city and predominantly from the social and cultural governing systems. However, Auroville also has other mainstream markets, outlets and shops where people can buy food in Indian currency.

Auroville is surrounded by small local villages and farms. Mother had defined the local villagers as the first Aurovillians, however, the local population is not considered to be Aurovillians in a proper sense. They consist of primarily local residents of different small villages surrounding Auroville but they play an important role in the functioning of the city. Auroville is culturally integrated with the local population through food,

celebrations, cultural events, partnerships and employment. During my research, I had the opportunity to witness and engage in the Pongal celebrations in the city which saw many local and Auroville-organised events like a native food festival, a music and a youth festival etc. Pongal is a local harvest festival, and the town was in a holiday mood for 5 days of the festival, and each day of the festival celebrated different aspect of agriculture, such as a day to honour the cow, the rice etc. Each farm also held its own celebrations and took days off. See figure 5 to get a sense of how fresh produce is grown and packed.

Figure 5: Packaging of grown produce

The recent socio-economic shift in the local population due to factors such as the influx of tourists is seen to be an economic and social threat by the Auroville community. As the locals have started opening restaurants, Airbnbs and other establishments which are taking its toll on Auroville. The villagers are the prominent workforce for the city and its various establishments including restaurants, farms, shops, organisations and work-shops. The bigger farms employ them as regularly paid farm workers with benefits rather than seasonal workforce. The surrounding villages also consist of small local farms which Auroville considers as the larger bioregion. Auroville has been trying to in-

clude these farms within their larger bioregion, so as to become part of the food system in Auroville in an attempt to create resilience.

However, these farms are mostly non-organic, receive government subsidies and use mainstream food production practices. This brings them into contestationswith the Auroville farms. Their organic proclamation comes under threat, as organic recognition and certification require the surrounding areas to be organic as well, to negate the possibility of cross-contamination. Auroville has been trying to create its own local organic certification between the farms rather than subscribing to the one offered internationally or by the Indian government. They had tried earlier but failed as the dominant recognised organic certification is resource intensive and costly, some of the larger farms still retain these certifications so they can sell their products outside Auroville. The idea of a local certification is to be self-reliant and create resilience also, attempting to include the local village farmers within this to be able to manage contamination in organic food growing. Auroville has engaged the local farmers in multiple dialogues, projects and skill-sharing endeavours to help them realise the opportunities and profits of becoming organic. However, these engagements are slow, sometimes non-fruitful and demand high individual investment. There are non-profit organisations that support these endeavours, who conduct such engagements with funding from international and local government partners, and collaborations from Auroville farms.

The community however, functions as an ecovillage with minimal infrastructure is very forward in its use of technology. Almost all farms have electricity and internet even if they don't have proper accommodation and roads. The Auroville website has been around since the early 90s as a repository of information, from the past and present. Giving information about its vision, process, journey, the different establishments, guesthouses and farms. It also sells Auroville products nationally and internationally ranging from consumables, non-consumables, craft and clothing. The website also has links to various farms, giving details about them and the email addresses of the Stewards. Auroville has a newsletter called news and notes through which the residents share information within themselves, it has been translated digitally recently and also operates as an online forum. Most of the farms have their own youtube channels or websites where they share details about the functioning of their farms, attracting subscribers and volunteers from all over the world.

My positionality

Within the setting I engaged as a volunteer, sometimes an onlooker or a tourist. Although I am of the same ethnicity - and Indian within the setting - I stuck out like a sore thumb. I was not a western white person who was a resident or visitor interested in knowing about Auroville nor a volunteer who wanted to immerse myself in sustainable living practices. Moreover, I was different from the native South Indian populace, who knew the local language and from the same cultural context. I was not even a North Indian tourist but a non-resident Indian PhD researcher from the UK engaging with the people and place. Yasmin Gunaratnam in her work within black African care homes with European carers puts into perspective the dangers of engaging as a researcher through the predisposition of ethnicity (Gunaratnam, 2013). Keeping this in mind I was aware of myself standing out in the setting, however, taking it in a positive light to ask difficult questions that might have been part of the cultural fabric and taken for granted. For example, some residents used the term *"the (local regional) problem"*, which I was comfortable inquiring about as I didn't have the Aurovillian or the regional context.

I was even met with hesitation, suspicion, hostility and sometimes curiosity. The community mostly saw me as a researcher inclined towards extractivism, who would leave after data collection. Auroville is a site of interest for many tourists, researchers, visitors, journalists etc and Aurovillians experience research fatigue. There are many accounts of university and organisational collaborative research being conducted in Auroville like on farms for the use of drip irrigation, solar panel, reviving of wider ecology and wildlife etc. However, the town predominantly being run on volunteers capacity and the act of giving back to the collective therefore, sometimes these acts of academic self interest standout as acts of extractionism (Spiel et al., 2019; Liang et al., 2021). There have been calls in HCI for researchers to give back to communities they engage with, like in Participatory Design contexts (Le Dantec and DiSalvo, 2013).

This was mostly true in my context although I was on the site for a short duration of time. There were many difficult encounters, sometimes with uneasy verbal exchanges where I felt I had to defend and explain myself. Nevertheless, there were instances where people wanted to share their life stories, and journeys and explain Auroville as an urban social experiment and what it means to them. Most of my interviewees were older, some were pioneers who have been in Auroville since its conception and my key role was to engage with their life stories and capture their intergenerational richness. Also, I realised my

interview questions about the future did not make sense to them and were bordering on being insensitive. Furthermore the residents could not connect to my questions about sustainability as for them it was an everyday negotiated lived experience.

During the field trip I was focused on gathering my information and finishing my data collection, however, upon my return to the UK I felt torn as I did not do justice to the complexity of the place and it needed a longer and in-depth engagement. I also realised my engagement captured a truthful narrative however partial (Turner and Oakes, 1986; Clifford and Marcus, 1986) in nature and informs a time-bound account which I construct through my reflexivity. Also, these time-bound restrictions meant a shorter engagement with low trust, inability to navigate and capture complexity, and incapacity to help residents gain out of my research. This reflexivity paved the way for the following two case studies and the commitment to work with a single community over the next 3 years, to be able to relate and create the capacity to help the community gain from my research as they work towards sustainable outputs. In the next two case studies, I set out to investigate what design approaches and how technology use can meaningfully support communities in their infrastructuring process for future sustainability envisioning.

3.3.3 Case Study 2: Facilitating future thinking through participatory speculation

The second Case Study (Chapter 5) further explores the conceptual underpinnings of visions through co-creation as opposed to the top-down static one as seen in the previous Case Study (Chapter 4). The exploratory study asks: How can SHCI researchers facilitate future thinking in urban food growing grassroots communities? This was important in being able to understand the facilitation work involved in supporting communities to think expansively and critically about futures. These understandings would complement those from the previous Chapter, sensitising us to the overall design space of negotiating future visions: from imagining or conceiving the visions and living them out in everyday life. Taking learnings from the last Case Study, it is set within the context of urban food growing which is a well-researched site for studying sustainability in action. Grassroots urban community food growing initiatives run parallel to the mainstream food system creating progressive alternative spaces as they move towards collective resilience and food sovereignty through their practices.

As an example of sustainability research within HCI, community food growing has pre-

dominantly focused on collaborative acts of growing rather than political frictions that may emerge through multiple competing agendas and narratives. Limited attention has been paid to the challenges of effectively negotiating collaborative, sustainable speculative futures in this context. With my work, I want to bring to the surface these tensions and negotiations that occur between people and scales (geographical, temporal and systemic).

As discussed in Chapter 2, future thinking or visioning within HCI is primarily top-down, expert-led, and driven by corporations, technology companies, policymakers, government bodies or academics without participation from citizens. The traditional Speculative Design places the designer as an expert and provokes responses from the viewer. These interpretations by the audience are valid understandings about the futures, after my initial pilot work I critically looked at the pitfalls of existing future thinking approaches which are individualistic and consumeristic in nature (Dunne and Raby, 2013; Wong and Khovanskaya, 2018). I wanted to look at civic approaches for creating bottom-up visions which would engage everyday citizens, giving voice to marginalised communities as they endeavour to create change within their lives and the lives of others connected to them. Work within Sustainable HCI has started to look at engaging grassroots communities through speculative activities or longer-term participatory projects to counter the local effects of climate change and support more viable change.

Moreover, I wanted to negotiate future thinking processes and methods by opening up the Speculative Design space with the local community. This was aimed at examining the intricacies of co-creating visions by highlighting the underpinnings and particularities of the community's food growing practice which in turn influenced the socio-technical visions. This was to meaningfully and collectively think about the neighbourhood's future through these co-imagined socio-technical visions. In this case, the research aligns with the sustainable living experiment (Marres, 2012) and research in the wild (Chamberlain et al., 2012) through an iterative inquiry process by integrating it with the community's everyday practices and knowledge. The research also takes a technology-agnostic approach as in the workshops do not use technology nor engage with explicit mention or contextualisation of technology within future thinking. This decision was made due to technology aversiveness seen within sustainability communities with considerations around resource intensiveness, mismatched understandings of technology between researcher and community members, and also to be inclusive of different age groups and

technological literacy. These considerations defined the focus of my analysis of the broader research towards the following question:

'How can SHCI researchers facilitate future thinking in urban food growing grassroots communities?'

- What are the possible methods to help scaffold the participatory speculative processes in bottom-up, grassroots community contexts?

- What do food growing communities - motivated by sustainability challenges - think about their future and what are the tensions and barriers concerning these futures?

I naturally turned to design practices being a trained designer, looking at research through design, also, considering participatory and speculative approaches as a way forward for co-creating sustainability-oriented visions. Therefore, the research was carried out through design-based methodologies (i.e., research through design). First I looked at prominent works within HCI to identify concrete tactics and speculative approaches. Correspondingly, this work applies the method from (Clarke et al., 2021) paying particular attention to the imagined grassroots futures, their inspirations, and trajectories. Later iteratively integrating them with the participatory ethos and insights from the engagement with the community. I attempt to answer *'How can participatory approaches engage grassroots communities meaningfully and collectively to think about sustainable futures for urban food growing?'*. This translated into four Participatory Speculative Design workshops to meaningfully and collectively think about sustainable futures.

The researcher involvement and reflexivity within the field played an important role in devising the activities for each workshop as relationships with participants and the neighbourhood and observations from prior workshops became the inspirational material for subsequent workshops. These relationships influenced my design decisions and facilitation process for the workshops. For example, the design of the activity, the coding framework, or the facilitation to increase positive sentiment in a workshop. Each workshop included a different activity, mapping the area, walking the neighbourhood, playing the futures game and world-making, as ways to instigate creative making, discussions and reflection.

The value of such an exploratory iterative work is to help elicit community understand-

ings and concerns, negotiate contested ideas and values, and struggle to balance between boundless speculation and the uncompromising realities of the situated everyday. Moreover, it scaffold the participatory process and surface methodological insights. Thereby answering the questions around the tensions of collaboratively working towards socio-technical alternatives and the constituents of community food growing futures.

Also, the research is part of a long-term project involving academia and a local community interest company (CIC) based in an economically deprived neighbourhood in Newcastle, England. Additionally, the research process was focused on understanding the everyday practices of the community and their future socio-technical visions for food growing and how these are positioned within, and constrained by, the local and larger socio-political contexts of the neighbourhood. Therefore, the research acknowledged the infrastructuring process (Star, 2002; Karasti et al., 2010) that has and is taking place in the community, which has shaped how the community imagines, negotiates and changes everyday habits and habitats (Marres, 2012).

Contextual background of the neighbourhood

North-East of England is one of the most economically deprived parts of the English local authority with the highest number of deprived areas in the whole of the UK [13]. Furthermore, 20% of Newcastle's population lives in areas that are among the 10% most deprived in the country [14]. The area is also experiencing the damaging effects of austerity cuts to local government funding. Newcastle City Council reports shows that reductions to public spending and the damaging effects of funding cuts are disproportionately distributed in society, with minority and ethnic groups more likely to live in deprived areas. For instance, local spending cuts have also reduced local services and many households rely on social care, public transport and services for children. In 2018, Newcastle was also the first city to use the Universal Credit system [15], the city also hosts the largest food bank in Britain [16], and ironically was also declared to be a smart city in the same year [17]. This disparity and inequality paints a grim picture of a wide array of social and economic injustices. Many grassroots initiatives are working to safeguard socio-economic rights however the inequality suggests that public authorities are not making use of all

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[13] http://bit.ly/3ZoZZrI, accessed on 26th February 2023
[14] http://bit.ly/3ZoZZrI, accessed on 26th February 2023
[15] http://bit.ly/3EE5KcX, accessed on 26th February 2023
[16] https://newcastlewestend.foodbank.org.uk/ , accessed on 26th February 2023
[17] https://www.newcastle.gov.uk/our-city/smart-thinking-smart-city, accessed on 26th February 2023

available resources to ensure an adequate standard of living for everyone [18].

My research is situated in such a neighbourhood where poverty and inequality go hand-in-hand. It is located in the west end of Newcastle upon Tyne which is located in the North-East of England. The neighbourhood engaged in this project has a number of active citizen initiatives and has been part of earlier research done by the universities in the area. Engagement with the neighbourhood began at the end of 2015 by Newcastle University researchers, as part of a pilot-scale citizen science project designed in response to concerns raised by the community regarding the effects of traffic pollution on the quality and safety of edible plants grown in front gardens. Another project initiated in 2016 sought to map air quality using regular foliage samples taken from mint plants hosted by participants in the neighbourhood and finished in March 2017.

My early visits to the neighbourhood was prompted by house-hunting in 2017 after I moved to Newcastle from India. I found the neighbourhood to be dirty and unsafe compared to where I was living at that time. There had been incidents of assault being reported in the neighbourhood. Also, people generally discouraged me to find a house in the area, describing it to be rough and directing me to the Northumbria police website to look at the crime rate. However, the neighbourhood promised a familiar Asian community, food and culture which also comes with its issues and limitations. My first impressions of the neighbourhood changed as I engaged with the residents and continued to visit the place during and after the initial research project *'Connected Urban Food Growers'*.

The neighbourhood is divided into parallel streets, with some streets looking visibly better than others. The neighbourhood has a predominantly transient immigrant population and homeowners. There are also landlords or property developers in the area who own multiple properties and rent them out to the transient resident. They keep the quality of housing low by hardly maintaining it. There have been multiple conversations around reaching out to these landlords to get money or support to help maintain the neighbourhood. There is also a large student population in the area. The residents are multi-ethnic with many originating from South Asia, the Middle East, Africa, and Eastern Europe. This diversity is reflected in local food shops on the high street adjacent to many of the houses. These food shops in the neighbourhood were one of the attractions compelling

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[18]http://bit.ly/3m40n0e, accessed on 26th February 2023

me to revisit, explore and buy Indian groceries. However there are also tell-tale signs of austerity faced by the residents, people buy in bulk mostly because of their large families. Asian women can be seen negotiating with other buyers to share half or one-third of the box of fruit or vegetable or spice they want to buy. On many occasions I have been approached by such women. These shops also employ local residents, mainly fresh immigrants paid at lower than the minimum wage.

Residents in the neighbourhood work as taxi drivers, cleaners and other unskilled or lower-wage jobs. Many have expressed concerns about not earning a minimum wage. This is also due to the unregulated job sector in the neighbourhood, for example the food shops employ women to make Asian savouries. In this instance, typically a South-Asian woman gets five pounds an hour, working without breaks for making Samosas twice a week. With many residents deprived of a living wage, people desperately seek advice about benefits, and for some households, a food bank is the only means of survival. There are also instances of theft and debt reported in the neighbourhood.

Despite these grim circumstances, there is a lot of sharing and gifting between the residents, primarily an effect of the culture they belong to, these comprise food, resources and services. In my continued engagement with the food growing community, I have also received multiple gifts like jars of jam, Indian food, sweets etc all made by the residents themselves.

Food growing context within the neighbourhood

Many residents in the neighbourhood live in renovated 19th-century terraced houses and flats with limited growing space and sunlight. Some residents grow plants in small walled front entrances and concrete backyards that lead onto communal back lanes. The neighbourhood is located alongside a large public park which has a community orchard, and a fenced garden used for communal food growing next to allotments (See Figure 6, images of the neighbourhood and the community).

There are residents that are increasingly concerned about food sovereignty and food miles alongside families experiencing food poverty and malnutrition, who access resources such as local food banks often. There are many different community organisations operating within the neighbourhood. One of these is *'Green-West'* (pseudonym), which describes itself as a movement to empower residents in the area to bring about positive change. Green-West is involved in many environmental initiatives including

Figure 6: The community and the neighbourhood

maintaining the public park, local food growing schemes by local micro-businesses, litter picking, community events, fundraising, and knowledge exchange, while keeping people informed through a local magazine, Facebook page and website.

There were many different ways that people in the neighbourhood were involved in local food growing. These included micro-businesses, allotment growers, community organisers and professionals, park and community garden volunteers, small third-sector organisations (e.g. women's centres) involved in growing food for healing and skills exchange, local schools and people within the larger neighbourhood attending public events where they were invited to plant seeds and try local food growing. Participation in these different schemes was predominantly volunteer-driven or part of a time banking scheme where taking part in food growing activity meant taking the grown food home or was used as a means of exchange for other services available in the community (e.g. having your hair cut or learning carpentry skills).

More recently, however, there have been significant funding cuts where projects and infrastructure have been taken away due to austerity measures and project-specific funding from large funded projects coming to an end. This had also coincided with the closure of a local allotment site. Unsurprisingly, many residents were unhappy with these developments voicing concerns regarding the proposed use of the allotment land for grazing cattle for local farmers.

One of the micro-businesses, *'Grow-in-Containers'* (pseudonym), that supports local residents in their food growing endeavours was asked to contribute sessions for non-growers as part of a larger Green-West project between 2013-2018. With funding no longer available, Grow-in-Containers in 2019 decided to continue with a programme of events including knowledge sharing and food growing meetups supported by a core volunteer group. Members continued to share tips and tricks, seeds, excess produce, equipment, recipes, preserves and prepared food, during face-to-face community meetups. Due to negligible funds, this group had moved to self-organising these meetings on the streets or at members' houses.

Communication within the group was largely done through the use of social media, emails, word-of-mouth and flyers to inform people about the events and to stay connected, and share queries and videos. Many members had highlighted ongoing challenges of access to infrastructure, limited financial resources, council support, growing space, uncertainty about growing food, wider engagement in the area, and time constraints as key challenges in their endeavour.

My positionality

This project documents my journey as a researcher under development and the phases this journey has taken for me to develop my point of view, defining engagement with participants and their role in co-creation of futures. My PhD was initiated in October 2017, and *'Connected Urban Food Growers'* project was in the works with email exchanges between community gatekeepers, Sara Heitlinger and Adrian Clear. Adrian, my primary supervisor at the time invited me to be part of the project which had a mix of researchers from different backgrounds in computer science, design and business - Adrian Clear, Sara Heitlinger, Rachel Clarke, Ozge Dilaver and me. The first project meeting which I attended as a PhD candidate was in December 2017 at Newcastle University's Open Lab with Adrian and Sara. In the initial meeting, we discussed the project's predisposition towards smart cities, the use of technology in mapping pollution levels and looking at possibilities of future technologies for urban food growing. Also, to include other researchers and community stakeholders in the project such as Rachel who lived within the neighbourhood and engages with Green-West activities. She was also closely involved with the food growing community, thus giving the researchers exclusive access, reliability, and convenient recruitment of participants. Also, John (pseudonym), the director of *'Grow-in-Containers'* contacted Adrian in early 2018, saying he is interested

to explore the use of technology within the community to support more self-organised activity and increase his online community. However, we weren't successful in getting funding for this. Sara later got some funding to work with Green-West and we asked John if he would like to run the learning events as part of the free offering for attending the workshops. We proposed that he would get paid for running the sessions, and these future thinking workshops might also provide insight into the design of his website and online community interactions.

At the time I had just finished developing a student project application for Tangible and Embodied Interaction 2018. The submission was a Design Fiction *'Essen'* for a posthuman technological future, where humans survive without the need to eat food through a bio-wearable device (See Appendix). With this initial trajectory of speculative methods in mind for my PhD, I set out to raise difficult questions through critical design inquiry. I suggested in the meeting to use speculative methods as a means of inquiry to break away from fixed future thinking moulds and to engage citizens in creative ways. My conviction to use speculative methods strengthened after attending a Design Fiction workshop and talking to other researchers at the TEI conference. As described before I experienced a shift in the use of Design Fiction as a method, in relation to understanding of food. I found it to be limited to a reflection on Design Fiction or an imagination of how life could be in the showcased future. In my understanding, the Design Fiction presented a socio-material imagination of a possible future but only from my point of view which limits participation, engagement and richness of future perspectives.

Also, the Participatory Design inclination of other researchers nudged the project towards participatory approaches in the early months of 2018. Further, deciding to move away from specific technology solutions to explore some of the more complex socio-cultural characteristics of relationships developed during earlier projects since 2015 by other researchers. These decisions were critical in moulding the *'Connected Urban Food Growers'* project and deciding it would be designed iteratively after each session, to inculcate participant feedback and learnings from each session. These considerations collectively and that of the project had defined the focus of the research towards smart cities. However, my analysis of the broader research is of my own inclination and is towards answering: How can participatory approaches engage grassroots communities meaningfully and collectively to think about sustainable futures for urban food growing? I played the role of the researcher, designer and analysed the data to inform this

question.

Within my initial engagement with the food growing community I considered myself as a *'friendly outsider'* (Hayes, 2011) since I was new to the British, primarily North-East context of food growing. However, I also felt similar to the Asian ethnic population of the neighbourhood, these had advantages and limitations as discussed by Harringto et al. (Harrington et al., 2022; Bray et al., 2022). Though Harrington et. al and Bray et. al's America black feminist arguments hold true, using ethnicity can also limit the conversations. I reject the notion of distancing myself from the communities and people I work with and carry out research, in the name of objectivity (Hayes, 2011). This Case Study also opened up a process of collaboration between me as the researcher and the community partners, both contributing to the process of participation, lending their expertise, and positions to the research process. However, I later realised the failings in my research, as Hayes calls for researchers to become *'trainers'* and use their skills to help uplift communities in the process. With an attempt to *"open up lines of communication and facilitating research activities with community partners rather than designing and implementing research about them"* (Hayes, 2011, pg. 8). This is how my reflexive journey changed after this Case Study and I continued engaging with the community at multiple events in an attempt to help them develop skills and leave behind my learnings in a productive way which I will explain in the next Case Study.

3.3.4 Case Study 3: Intervention, Participatory Visioning through the use of technology probes

The third Case Study (Chapter 6) with a neighbourhood community in Newcastle, responds to and integrates insights from the previous study (Chapter 5) which recognises the already in place infrastructuing processes within the local food growing community. It builds on their existing efforts towards ecological sustainability by facilitating future thinking processes. The previous study (Chapter 5) outlined political multi-scalar complexities that affect local action arising from negotiations of multiple stakeholders, conflicted values and the need for longitudinal sustained engagement beyond the workshops (Bødker et al., 2017). This study builds on this by scaffolding agency in participatory speculation, and the need for longitudinal sustained engagement while navigating place-based messy social and political layers intertwined with grassroots actions. It does this through the design of technology-supported, situated speculative walks of the neighbour-

hood and engagement through WhatsApp as a communication platform for deliberation and longitudinal engagement.

Therefore, this Case Study continues to engage with the previous study's (Chapter 5) food growing community Green West to continue strengthening built relationships and scaffolding long-term engagement. The Case Study is motivated to address complex issues around environmental degradation intertwined with social problems over suitable longer time scales. In this context, I specifically focus on how existing technological infrastructures can scaffold intra-community place-based visioning, exploring the role of design and technology in/for the politics of making place, infrastructuring new connections within the community and retaining them beyond research interventions. These are the considerations of the study, for necessary ecologically sustainable socio-political action within local urban food growing. The research aligns with the Right to the City (Lefebvre et al., 1996; Harvey, 2000, 2012, 2008; Soja, 2010) and social movements which re-consider expert-driven, top-down, bureaucratic ways of envisioning futures as estranged from everyday life. Instead, attempting to reposition citizens as local experts to create localised change (DuPuis and Goodman, 2005) through engagements using digital technology.

The field of HCI is increasingly addressing the role technology can play or the impact it can have in civic life for driving socio-political actions and change (Dourish, 2010; Björgvinsson et al., 2010, 2012a) by supporting and opening communication and dialogue, both at a local and global scale for socio-political causes. However, there is also caution at play, around socio-technical systems perpetuating unjust socio-political, economic systems and power relations (Raturi et al., 2017; McCarthy and Wright, 2015; Olivier and Wright, 2015). Thereby, alienating citizens in technological bureaucratic mechanisms and procedures as it is beyond their agentic reach (DiSalvo et al., 2014; Chopra et al., 2022b) . These issues are techno-solutionist in nature as they present technology as the subsequent solution to these complex social and political problems.

In contrast, HCI researchers are also exploring the potential emancipatory qualities of online and situated digital technologies (Vlachokyriakos et al., 2015, 2016; Crivellaro et al., 2015; Olander et al., 2011) for broadening of participation (Lambton-Howard et al., 2019, 2020), towards creating inclusion for marginalised audiences (Bray and Harrington, 2021; Søndergaard et al., 2022) and for social activism (Massung et al.,

2013; Kuznetsov et al., 2011).

This Case Study is positioned within these movements of concern about digital technology's ability to support infrastructuring processes (Karasti, 2014; Star, 2002; Bødker et al., 2017), place-making (Peacock et al., 2018; Crivellaro et al., 2016; Dourish, 2006), agency and participation (DiSalvo et al., 2012; DiSalvo, 2012b), and scaffold speculation (Wakkary et al., 2015; Baumann et al., 2016). It uses existing everyday pervasive digital platforms after carefully understanding their use within the food growing community's daily life and creating accessible interactions. Therefore the study asks:

How does a local neighbourhood community experience interactive technology as a platform to support a situated participatory speculation process to promote transitions for sustainable outcomes?

1. What are the experiences of people around opening up a dialogue using digitally mediated deliberation in participatory speculation processes?

2. How can technology support social cohesion and interaction in communities during participatory speculation processes?

The research is carried out using the previous study's (Chapter 5) Participatory Speculative Design approach (Chopra et al., 2022b,a; Heitlinger et al., 2019b), mediated through the use of technology to meaningfully and collectively think about the neighbourhood's futures. It uses place-based speculative tropes and digital technology, to situate speculation within the neighbourhood and further scaffold the infrastructuring processes of the community. Therfore, I created speculative walks of the neighbourhood as the research activity with specific places re-imagined using previous study's co-created futures. These places were iteratively selected with the community and mapped to the futures. These place-based futures were also visually illustrated and used as speculative tropes for sparking deliberation carried out on WhatsApp.

The RtD approach advocates trying out ideas, prototyping and exploring them in a hands-on way (Björgvinsson et al., 2012a; Zimmerman, 2009) which I did with the community in an urban context. This was a significant aspect of this work, I gave specific attention to the way research and design are positioned in processes of participation, a necessity to build social capacities, and digital literacy and fluency when working with marginalised communities (Fox and Le Dantec, 2014; Light, 2010; DiSalvo and Lukens,

2011). My involvement and reflexivity within the field also played an important role in devising the initial engagement activities, designing prototypes and interactions with the community actors. For example, mapping the area, walking the neighbourhood, audio-guided meditative walk, discussions and reflection all got integrated into the design of the speculative walks. The initial engagements influenced the design decisions and the facilitation process, which I decided to keep minimal as compared to the prior workshops. Thereby, giving the community the role of the local expert in the speculation and deliberation process, which initiated accountability and attempted to dismantle power structures at play in the design practice.

As observed in the previous Case Study (Chapter 5) the micro dynamics and power relations when working with groups for localised social change (Light, 2010; Le Dantec and Fox, 2015) can overwhelm the speculation process. Therefore attending to the agency of participants in the process and the way I engaged in "acts of configuring participation" (Vines et al., 2013, pg. 431) was essential. So as to be cautious about not unknowingly concealing or reinforcing power imbalances and oppressions (Light, 2010; McCarthy and Wright, 2015) and be transparent about who are the beneficiaries and initiators of these processes and how the sharing of control occurs in the process (Vines et al., 2013). This is also reflected in the way the research was aligned to and placed within a recently funded project in the Green West community called *'Green Communities'* (pseudonym). The recruitment for my research was also done through the project by supporting the community coordinators (more details in the upcoming sections). These considerations helped me adjust my research methods within the participatory and speculative approaches. It was for the research to help the community in their ongoing endeavours and create local impact rather than being driven towards an academic output. Therefore, this influenced the design of the research and I carried it out iteratively with the community where at different points, feedback, concerns and suggestions were integrated into the process. Thus I paid particular attention to the continuous tinkering required to put the community's needs at the fore and scaffold infrastructuring to integrate participatory ethos and insights from the continuous engagement with the community.

Thus, the process changed at several points through the continuous testing and feedback integrated into the process. This was in contrast to the previous study's (Chapter 5) tinkering process where the group of researchers were reflecting and integrating the feedback into the design of the workshops. This study takes walking as a method from

the previous workshop's exploration (Chapter 5) and reconfigures it to the needs of the community. Tinkering it to create engagement, recruitment, curiosity and deliberation within the ongoing project. This process made it less expert-driven, with me as the designer/researcher but created agency within the community actors to drive the process and tinker with it towards their own goals of integrating the wider neighbourhood and looking at future possibilities where they can collectively explore as a food growing community in the neighbourhood.

The value of such design-led, community-integrated iterative work, is to look at existing digital technologies as a valuable resource to scaffold long-term participatory processes and surface-situated bottom-up futures. Thereby, I attempt to answer the questions around the experiences of interactive technology as a platform used by the local neighbourhood community to support future thinking and create social cohesion longitudinally, beyond the limitation of co-located facilitated workshops.

Continued engagement with the community

The research is part of my long-term engagement with the Green-West CIC which started in early 2018 . Ongoing engagement within the neighbourhood has continued and is currently driven by me as a researcher and an active member of the Grow-in-Containers community and as a volunteer for other initiatives. While the four PSD workshops in Case Study 2 (Chapter 5), only ran over a period of four months from March to June, my continued involvement and interactions with the community made it possible for me to see the ongoing nature of the community's work. Prior to and during the workshops in Case Study 2 (Chapter 5), I continued to go to monthly meet-ups, supported sessions on the future plans for Grow-in-Containers and organised design projects with Northumbria design students involving the community as a stakeholder till 2019.

The community meetups and events included tree pruning, film nights, meetings on volunteering and funding, celebrating the harvest, planning for the next summer, seed and plant sharing, making preserves, seed saving, food miles and carbon footprint awareness. These events were held as street sessions, in the backyards of private homes, and attracted a socially, culturally, economically and ethnically diverse group of people, such as teenagers and families, and those self-identifying as being of British, Pakistani, Indian, Bangladeshi, Mexican, Polish, Swedish, Jewish and of Nigerian heritage. The food growing community is primarily active from late spring to early autumn with summer as

the main growing season, a time for organising events and creating community action. Planning for the year starts in spring and is done by the core members of the community. There is a high change rate in the membership of the core group due to the life transitions and personal commitments of the members. This creates a high rate of new members and dropout ratio making it difficult for the community to cohesively track progress and plan.

In late 2019, John and the local councillor of the ward, Nick (pseudonym) had expressed interest in running similar future thinking workshops with an intention of inviting the larger food growing community and including residents from different ethnic communities in the neighbourhood. These initial conversations led to ongoing discussions between John, Nick and me. These discussions were disrupted by the Covid-19 pandemic and led to an uptick in the use of digital technologies for sustaining community practices during the Covid-19 pandemic. I helped the community in building social cohesion initiatives during the Covid-19 pandemic and encouraged residents to reconnect with the community and nature through the use of technology. I helped the community establish communication through platforms like Facebook. The Grow-in-Containers Facebook page saw a three-fold increase in membership during this period. These new members were beyond the neighbourhood and were from all over the country, most people wanted to learn how to grow their own food during the lockdown. The Facebook page saw people exchanging conversations and sharing pictures and physical resources like extra plants and tools with each other in the neighbourhood. John, being the owner of the Grow-in-Containers microbusiness, was very enthusiastic about the sudden rise in membership and especially with people from beyond the neighbourhood.

Moreover, Nick secured a small fund from the city council to create nature-centred activities for the neighbourhood during the lockdown and suggested running street meetups like before but socially distanced. He wanted to reach out to the residents of the neighbourhood to start a channel of sharing and providing support to people struggling with food. He was also looking to plant trees in the derelict sites in the neighbourhood, support guerilla gardening and provide support to people to grow food in their houses. I helped design mailable packages for Nick and John for the residents of the neighbourhood. It had postcards which were dropped in each house in the neighbourhood and contained information about the initiative by the community and informed the residents about the microgreen kits they can get if they emailed or messaged the contact

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details. The designed mailable microgreen kits had potting essentials with seed packets and instructions for the residents and these were sent through the doors of the residents. Volunteers assembled, dropped off and mailed these within the neighbourhood.

Within these conversations I suggested using Zoom as a platform for running street meet-ups in an online format which would allow us to invite the larger online audience that John has recently gained on the Grow-in-Containers Facebook page. I helped John run the street meet-ups and skill-sharing sessions online via Zoom and Eventbrite, we had people attend these sessions from their living rooms, kitchens and gardens. There was a bit of hand-holding and skill-sharing within the community as they helped each other take up Zoom as a platform to meet each other online. Through the digital platform, people could show their plants to others, their gardens, and what they were growing, point out infestations on leaves, share stories and ask for help or suggestions. The street meet-ups on Zoom became a show-and-tell setting, making it possible for people and their growing practices to reach others in a more intimate way. The skill-sharing sessions on Zoom mostly attracted people from the larger Facebook community beyond the neighbourhood, it also saw prior residents from the neighbourhood and the food growing community in the sessions. There were reminiscent moments within the community, sharing of recipes, practices and how they were coping with the lockdown. The sharing led to other offshoots where people connected offline and online, and were invited to or hosted their own personal sessions and gatherings.

These lockdown activities were very well received by the residents, the food growing community of the neighbourhood and the larger online community. John and I decided to collect feedback about this initiative and see if people were more willing to take up digital technologies for communication, sharing and meeting. John also wanted to know the format people would like to connect with in the future, be it in person or online. The feedback was collected through an online survey on the Grow-in-Containers Facebook page, email list and phone calls. For this data collection I was introduced to a PhD student from another university who was volunteering with Green-West, this data is not part of my thesis, and is being written separately into a paper.

Green Communities (pseudonym)

Late 2020 Nick the local councillor asked me if I would like to be part of a funding application he was submitting to the local council. The grant was secured in early 2021

from the city council to look at future thinking, social engagement, place-making and community empowerment and taking up on our previous conversations about involving the larger community in future thinking processes. However, after the recent uptake of digital technology by the community during the lockdown I wanted to explore how long-term thinking can be fostered and supported through the use of digital technologies in bottom-up resource-restrictive settings, using existing technologies as a design material to create Participatory Visioning processes.

The green communities project was developed collaboratively with different stakeholders and members of the community. Nick wanted to build on the new connections which were created during the lockdown through the activities we had initiated in the neighbourhood. Inclusion and diversity was one of the main issues the food growing community had faced for a long time, as white retired people were the majority which was very perturbing in a multi-ethnic neighbourhood. The aim was to invite the multi-ethnic residents into the community and retain their motivation in being part of it for a longer duration of time, as there had been prior members who had become inactive.

The project had enough budget to hire a full-time community coordinator to support events, skill-sharing activities and provide good growing resources for people to start their gardens. The project decided to do garden makeovers in the neighbourhood to get residents interested in growing and also get free plants and pots in return. John asked me if I would like to apply for the post of community coordinator, I applied for it however, asked if it could be made as a job share and offer the shared post to a coloured person in the neighbourhood who would benefit from the engagement and the money. I was not offered the job and two new community coordinators were appointed in a job-sharing capacity were from the neighbourhood however, during this time Nick passed away, this was a big blow to the neighbourhood, the food growing and Green-West.

Other members of the CIC did not have documents, access and plans for the ongoing projects, making it difficult to follow through with the initial planning we had done for the Green Communities project. The start of the project got delayed, and members within the community core group had to be asked to form a steering group to manage and run the project. I was involved as a steering group member, sharing with other members the future thinking endeavours that were initially thought out with Nick. I presented a proposal for my study to the steering group and how it would align with the larger Green

Communities project. There were a few suggestions and considerations presented by the members regarding the inclusion of new members, residents and people who do not have access to technology. It was also suggested that the activity can be used to engage school children and present it as a technology-supported nature engagement to the council for further funding.

I am still part of the steering group for the project and help the group take decisions around immediate needs and the next steps in the project (as of 2022). In the beginning, I supported the newly appointed community coordinators with their recruitment through door-knocking, acts of kindness and barn-raising activities. They were looking to recruit households and members from two streets in the neighbourhood to join the existing food growing endeavours. The reasoning for focusing on only two streets in the neighbourhood was to keep the efforts concentrated and create a micro-community within the streets by helping neighbours support each other in their growing endeavours.

We would knock on people's doors and slip in a pamphlet about the project. If answered we would tell them about the project and ask them if they would want their front yard cleaned if it's overgrown or dirty, also offering free plants, and seeds donated by the community members. The door-knocking ran over a period of 2 months and was well received by the residents, who enthusiastically received free plants and seeds, appreciating the project and the activities run by Green-West. However, there were instances when we were met with unfriendliness or were asked for help in navigating a life scenario such as council tax or unruly neighbours. We were also invited to cups of tea, listened to stories, and sometimes used Google Translate in order to have conversations. Residents showed us their plants and produce, and shared experiences of the process. During the door-knocking activity, the community coordinators were also collecting data about the residents, their past experiences of growing, what plants they collected from us and their journey in the growing process. We heard stories about past experiences of growing up in their own countries, being from a farming family and thinking farming was for people from low-income backgrounds. As part of the Green West data, the community coordinators asked for the residents' emails or phone numbers to invite them to upcoming community events.

This was where I started asking the residents if they had a smartphone, whether they were comfortable using social media and what were their preferred platforms to communicate

with loved ones. During the process, I established a Green West email list, a WhatsApp group and an Instagram account with the community coordinators to look at interactions and retention of the engagement on the platforms. The WhatsApp group seemed to have been successful, adding, retaining residents, passing information and engaging them in conversation with other members. Many residents added on the Green West WhatsApp group shared pictures of the plants they had taken and the produce they had grown. For instance an elderly couple shared pictures of their tomato harvest and a student household shared pictures of microgreens they had grown. Sharing created momentum in the group inviting others to comment and share as well.

The project looked for 20 new households as recruits in the project, promising a garden makeover for their front yards and inviting them to be part of the various events being organised by the community. However, due to the transient population in the neighbourhood, it was hard for us to recruit households for the makeover, also, people thought the garden would be a long-term commitment to care for and maintain.

Figure 7: Early phase of community engagement

The event part of the project were street meet-ups and skill sharing sessions ranging from *'Flowers and Bees'*, *'Growing Lots of Herbs'*, *'Magnificent Mint'* and *'Brilliant Biscuits'*, *'How to Grow for Free'*, to *'Making your own Wormery and Fertiliser'*. I designed the leaflets for the skill-sharing sessions and street meet events which were then handed or dropped through people's doors in the neighbourhood. The street events had a good turnout from the neighbourhood, offering free plants, seeds, skills and advice. The skill-sharing sessions run in collaboration with Grow-in-Containers had turnout beyond the neighbourhood as the events were published on its Facebook page. I documented the interactions at the events through observations and notes. These events were where I got feedback on my ideas and prototypes from the community and the residents (See Figure 7, for community events where my work was discussed with the members). For example, I generated a QR code invite to the Green West WhatsApp group which people had to scan to join and involve people in conversations around the use of technology and using WhatsApp. I also displayed images and illustrations of the neighbourhood as potential areas in the neighbourhood that could be used for food growing, these locations were considered for developing my speculative walks. Later I asked the residents to map out futures (from the previous, Case Study 2, Chapter 5) to these locations from the neighbourhood which I had documented as pictures. I tested out my initial prototypes such as the meditative audio guide, my initial QR code prototypes and visualisations of the selected areas for the speculative walks, with the community coordinators and John to get feedback. These engagements were captured through notes and observations at various events. For an overview of how I designed the study refer to Figure 8.
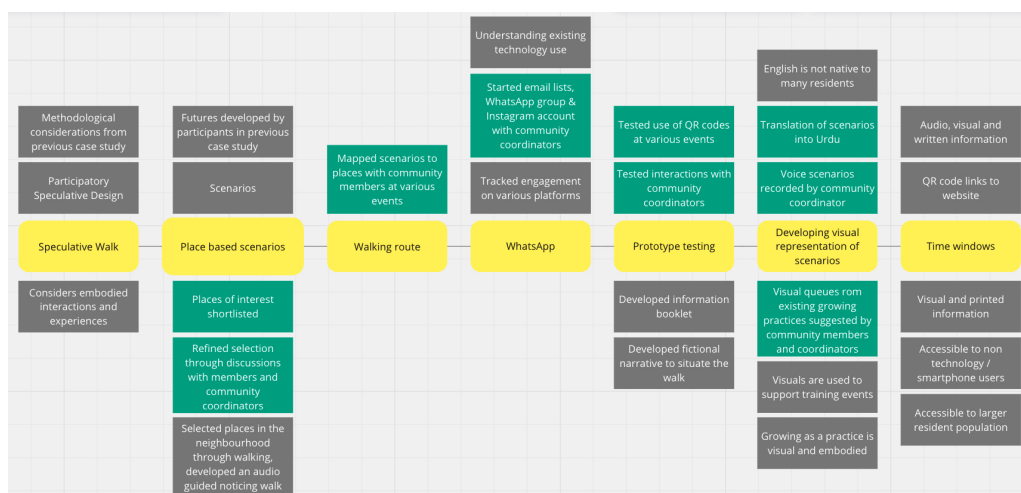
Figure 8: Different stages of study design.

Grow Green Futures Grow Green Futures, the name of my research engagement in

Case Study 3 (Chapter 6) is an exploratory project aligned to the existing Green Communities Project by Green-West. This Case Study looks at the use of the developed Participatory Speculative Design (Chopra et al., 2022b), a Participatory Visioning approach from Study 2 (Chapter 5) for co-creating community-led futures. It looks at tackling climate change and ecological sustainability at the micro-scale of the neighbourhood through the creation of future place-based interventions, citizen engagement and movement by compelling the community to think about the neighbourhood's future collectively. More details on the design and outcomes of the research will be discussed in Chapter 6.

I used data from my previous face-to-face visioning workshops in Case Study 2 (Chapter 5) and developed a place-based speculative walk which used QR codes and WhatsApp to engage the residents in situated participatory speculation (Chapter 6). This was followed by discussions on the co-created futures on the WhatsApp group for open deliberation and semi-structured interviews through Zoom. The co-created visions were further curated and a future project timeline was created by the community members in a face-to-face event which was community-led. A recent output of the deliberation and discussion on the WhatsApp group was an application to the LIONS Grant by the community members which was aimed to include more residents of colour who would be interested in growing food in the neighbourhood. I was involved in writing the application and also in the creation of the pitch video (See Figure 9, participants during the face-to-face meeting and creation of the futures timeline)

I continue to be part of the community and the neighbourhood even after the data collection of my research by going to steering group meetings. Supporting the project with help in organising, and planning events and on certain occasions acting as a volunteer in planting activities. Since the completion of my research, the project has successfully completed 20 garden makeovers for local residents. It has also held further events, tree planting and increased participation within the community. The Green West WhatsApp group established by me at the start of the project has been taken over by the community coordinators. It has also seen an increase in the number of members, with a considerable amount of participation from the local Asian community. There has also been an acceptance, transfer and encouragement for learning technological skills among the community members for participating through digital communication tools for example, through the use of various cloud-based collaborative tools.

Figure 9: Participants making a timeline.

My positionality

My research addresses the complex role of the designer in Ethnographic and Participatory Design work which focuses on the impact and creation of on-ground change. This is evidenced by my continued work with Green-West CIC which has been the primary community for conducting my PhD research since 2018 in Newcastle upon Tyne. I have taken an applied, activist approach by incentivising participation by providing free seeds, plants, potting material and vouchers during the research. My role focused on the use of creative practices to help understand communities' existing food growing practices to develop an understanding of sustainable, inclusive and equitable inter-relationships within the community and with the neighbourhood. I have established a long-term relationship since immersing myself in street meet sessions, volunteer work and other *'pop-up'* style events and have continued pro-bono support by providing research, evaluation and creative support for multiple projects such as speculative walks, creating print-based publicity material, visual data representation through maps, place-making workshops and participatory mapping of local neighbourhood infrastructures by engaging residents.

Case Study 3 (Chapter 6) began with talking to key community actors about how we could collaboratively create multiple visions for neighbourhoods' future food growing, help improve the well-being of residents and create social cohesion in 2019, for which the data collection was from May till October 2021. However, the impact and success were heavily dependent on the relationships built since 2018 after the Participatory Speculative Design workshops in Case Study 2 (Chapter 5). Also, the Case Study 3 (Chapter 6) uses the bottom-up visions for food growing in the neighbourhood from Case Study 2 (Chapter 5) conducted in 2018 to create future related artworks, select potential locations to be included in the technology-aided walk and start discussions. Thereby, creating a continuity of social, material and future thinking relations.

My racial identity as an Asian immigrant helped me immensely during Case Study 3 (Chapter 6) as I could work closely with the community coordinators, one of them is an Asian immigrant woman, whom I found as an ally, and so did she. I could help her navigate structural hierarchies, develop technological skills, write content, translate, invite residents to join Green Communities project, and support inclusion and recruitment as I could speak the language (Hindi, Punjabi and Urdu). She in return helped me recruit participants for my research and data collection, recruiting participants from the Asian community, also during the speculative walks she supported the participants from the Asian community, through technological skill sharing and walking with them.

The continued engagement with the community helped build trust and acceptance towards me, where I had initially entered as an outsider, a researcher in the field in 2018. I was now considered part of the broader community, this has been an important part of my research journey and reflexivity practice. Now I know better to navigate the complex social and political settings of the community and the neighbourhood. There had been instances where my positionality was questioned during this project by the members who hold power within the community especially after Nick passed away. I had to explain the intent of my research, data collection and how it would benefit the community and Green-West as a CIC. The back and forth between power centres within the community has also made me aware of the complexities of community work and how it is also an emotional labour offered by the researcher when on the field. I was also recently offered to serve as a board member on the Green-West CIC which I declined as I now see myself as an *'ally'* (Hansson et al., 2018), to help the community in their work towards being more sustainable and self-sufficient.

These informal long-term engagements shed light on community dynamics, the spatial negotiations within the neighbourhood around available land for food growing, and subsequent decisions around growing practices, to build opportunities for diverse forms of inclusive engagement within the neighbourhood. The ongoing interactions and building relationships within the neighbourhood played an important role in understanding the socio-material aspects over time. These interactions helped me build on social capacities by becoming a community member in the setting, giving agency to the community actors, and moving away from the role of an expert researcher. I aligned myself with social justice and environmental citizen-led movements driven through grassroots and feminist perspectives to challenge top-down narratives of sustainability. In an attempt to depart from the critical question of who the problem *'owner'* is in a particular context and who should have the authority to define it as such. Therfore, recognising that framing a problem is always already a political act where *'any claim to expertise to diagnose a problem and devise interventions is a claim to power'* (Light, 2010, pg. 184) and I give that power to the community and its members.

In the next Chapters I describe my case studies in detail, the findings I draw from each one of them to answer the questions and build insights towards Participatory Visioning.

3.4   Summary

In this Chapter, I have described my key epistemological positions which inform my methods for the subsequent three case studies in Chapters 4, 5 and 6. This Chapter also presents the four key theoretical and conceptual threads which inform my methodology, and run throughout the case studies, feminist theory, living experiments, Social Practice Theory and visioning. I will now summarise each of these in turn, to further consolidate these positions.

Feminist Theory with its commitments of agency, fulfilment, identity, equity, empowerment, and social justice is built into my work through relational ways of thinking, care and reflexivity (Shiva, 2009; de La Bellacasa, 2011; Haraway, 2016). These commitments provide alternatives to dualistic and hierarchical modes of thinking to respond to issues of marginalisation which go beyond positioning such experiences through austerity or deficit. Moreover, people on the margins, often those in poverty, who can be

disenfranchised and beyond the mainstream way of life are often the most vulnerable, and the hardest hit by top-down changes from government. Marginalised communities don't always have economic, social and political capital, and government directives can threaten modes of life and livelihoods, leaving many without a say and agency in articulating what is required and desired to create fruitful change. Such decision-making can exacerbate current social injustices associated with sustainability and the climate crisis without acknowledging how many marginalised communities have long contributed to localised sustainable ways of living and being. Therefore, there is a need to consider reflexive praxis to offset privilege which can be either perceived, racialised or institutionalised. I developed my reflexivity and critically carried it through in my positioning of marginalisation and developing the research praxis. This is important for sustainability research in HCI because it moves away from framing sustainability as a problem to be solved by technology, and rather frames sustainability as creating alternative ways of seeing and doing. Incorporating voices from the margins to create new worlds, is in line with hooks' idea of sites of radical possibility and resistance for producing counter-hegemonic discourses that are not just found in words but in habits of being and the ways of life (hooks, 1990).

Living Experiments further build on these ideas of marginalisation by considering what the existing practices within everyday communities are that then enable alternatives to be created. Living experiments in the thesis are positioned as innovative practices performed within marginalised communities for tackling sustainability issues. These act as experiments with an explicit attempt by the individual or the community to modify habits and habitats according to a fixed procedure of changes, but with some uncertainty of the outcome, reflection on the learning and sharing of the process and what is learnt. This showcases the motivation of people to make small changes in their day-to-day lives, accompanied by the sharing of these changes and the subsequent learning over a period of time. Therefore, the idea of living experiments explores collective practices of researching social and cultural change, and seeing how these changes take place in practice, rather than a thought experiment or through future planning. This makes experiments in living (Marres, 2012; Mill, 2002 (1859) an ideal bridge to connect feminist theory to visioning and Social Practice Theory for researching within the domain of sustainability because it offers a theoretical and analytical language; to understand the practice of creating better futures through everyday action and subsequent reflection and tinkering by

people.

Social Practice Theory has already been influential within SHCI as it provides a theoretical framework that helps research move away from techno-solutionist, individual behaviour change approaches, which have been shown to be severely limited in addressing the interconnectedness of dominant social, cultural and political influences on sustainability (Dourish, 2010; DiSalvo et al., 2010). Social Practice Theory has also been brought forth within SHCI in response to a perceived misalignment of social and material contingencies and competencies within individual behaviour change research, where the everyday citizen and their motivations, practical experimentation and tinkering towards living sustainably are not considered. There is a strong affinity with the sustainable living experiments of Marres (2012) which argues why everyday life is significant for the thesis (Marres, 2012). Sustainability challenges can be couched in terms of our current (shared, social and cultural) ways of living. Therefore focusing on practices of doing, rather than responding to abstract issues as described through policy, strategy or making plans. Applying a Social Practice Theory lens in the thesis helps to sensitise how practices are performed in everyday life by people as *'embodied, materially mediated arrays of human activity centrally organized around practical understanding'* (Schatzki et al., 2001). Social Social Practice Theory can provide a useful lens for understanding existing everyday practices, scaffolding thinking about future practices, and critically evaluating future practices in the context of current ones. The thesis opens up the design challenge to critically examine these and imagine, evaluate and establish alternative ways of living. The three-part framework by Shove et al. (2012) consists of materials, competencies, and meanings (ibid. p. 14) which help orient researchers to better understand and articulate the nuances of practices. There are, however, some limits to Social Practice Theory in that the focus does not always accommodate for responses to inequalities, and local understanding of hierarchies and is much more of an analytical rather than design approach. Despite this, drawing from the work of Shiva (2009) and hooks (1990), I am aware of these limitations, but recognise the value of understanding how meaning, materials and competencies are important for living experiments through a situated cyclical iterative process. Values held by a community can influence the creation and perpetuation of practices, moreover, when aligning with living experiments these activities are considered more deliberate because people are trying to change them through continuous tinkering, reflection and sharing in response to each other. In doing

so, communities build niche situated practices and meanings which, when taken up by other people, influence change at a larger scale, thereby creating a shared vision to work towards from the ground up.

Visioning in HCI is an abstraction of values or ideas, a set of principles, or maybe as well as socio-technical projections or speculations for the future held by the HCI research community. These have been criticised for being rhetorically ambiguous (Wong and Khovanskaya, 2018; Purcell and Tyman, 2015) as they fall short of grasping their ability to create change and stop at building scenarios for new words or future technologies (Quigley et al., 2013). Speculative design, Design Fiction and Design Futuring are among the various approaches used within HCI by researchers and designers to create concept, critical and persuasive design practices that produce powerful visions of the future (Mazé, 2019). However, Bardzell (2018) criticises these design practices for not providing social strategies or tactics to bridge the mundane everyday with the perfect end states that design draws out.

I position visions not as end states or design problems, but as alternates created keeping in mind the mundane everyday pulling together the strands of feminism, living experiments and Social Practice Theory to imagine better futures keeping their actionable capacity. Invoking temporality of ambiguity, reflexivity and materiality in design, through a more deliberate form of inarticulacy, where design research can be invoked as a practice of inventive problem-making (Fraser, 2006) through the act of social dreaming (Dunne and Raby, 2013; Sanders and Stappers, 2014). Thus supporting multiple approaches to meaning making from the onset, creating fictions that start from the margins and work towards more preferable, equitable and socially just futures (Butler, 2012a). Still keeping true to the theoretical and conceptual framework of feminism but building practical commitments in relation to Social Practice Theory through the use of experiments in living. These practical commitments are also weaved into the methodology for knowledge creation by considering speculation and Participatory Design praxis.

The experimental iterative capacity looks kindly at failures, and is motivated towards building and sharing knowledge. I influence this lineage within SHCI research by re-articulating Speculative Design in a participatory context still keeping intact the tinkering process. The co-created visions are imagined as situated speculations and enacted as experimental practices, not just as imaginaries or articulations of far-in-the-future

distanced, top-down ideas beyond the agency of everyday citizens. This supports the understanding of existing social sustainability practices carried out in the communities and the practice of visioning as a cyclical iterative process to imagine alternative futures more commensurate with those on the margins.

The thesis positions visioning both - as a way to approach sustainability; and as an important factor in meaningfully engaging with sustainability issues, by developing visioning further into a practice itself. Firstly, the three case studies look at a well established vision of the future to understand its interpretation into sustainability practices carried on by the community. The Case Study also provides understandings of meanings, competencies and materials, and how these are manifested in everyday practices and also the dynamics involved in negotiating a shared vision alongside other competing factors that influence or shape the town's practices (e.g., Westernised notions of sustainability). Later using RtD methods to engage in participatory speculation to co-imagine community futures, opening up the design space to look at visioning as an approach. This is to integrate the tacit knowledge and practices present in the communities to build visions as a way to meaningfully engage with sustainability issues.

Secondly, visioning can also be positioned itself as a practice, the thesis tries to unfold the practice of visioning as a unit of study through the creation of emergent visions using meanings, competencies and materials by employing different methods. These meanings, competencies and materials help designers understand more clearly, what practices are already in place and what could change in the future. These are used to understand and articulate ideas of the future that are more meaningful for the community while addressing it within the context of existing practices in the community; and how elements of existing practices might come together with new designed materials to begin to establish an acceptable and meaningful way of doing visioning. Social Practice Theory can help think about design, and can help us explicate the beginnings of what might (or might not, and why) become established ways of doing community-led visioning.

Throughout the thesis and the three case studies I pull together these threads to create, articulate my research and my reflexive praxis. These threads together sensitise me towards considering complexities, peculiarities and creating interrelations within the research and the data. I use ethnographic methods and RtD to document and later propose workshops for action through iterative reflection-in-action cycles. Providing ways of par-

tial and situated knowledge constructions (Bardzell and Bardzell, 2011; Haraway, 1987) which weaves in and acknowledges the interconnectedness of all life (Tsing, 2015; Haraway, 2016) giving way to radical pluralism when approaching future thinking.

"Our hopes and politics are largely the result of a given framework. It is particularly important that we reflect on this fact in times of profound transformations, such as today"

(Arturo Escobar, Other Worlds are Already Possible (2009)

There is always a tight connection between social reality, the theoretical framework we use to interpret it, and the sense of politics and hope that emerges from such an understanding. This connection is often overlooked.

Chapter 4

Understanding the role of future thinking in sustainability through visions and practice

4.1 Introduction

In the previous Chapter, I have described the methodological underpinnings of my thesis and details of the following three case studies. I discussed how each Case Study in the thesis is linked to the larger milieu of community-based Participatory Design, which helped me to conduct research within the messy social, material, and invisible realities of urban food growing. I also highlighted the commitment to equitable engagement and improving the lives of the community members involved in my research. I argued that the participatory predisposition of the methods, interwoven with future thinking, brings criticality, care and creativity to the case studies to build alternative co-imaginings for socio-technical food futures.

In this Chapter, I try to question Sustainable HCI's interventionist approaches by engaging in a place-based grassroots community context, where the community members are committed to living a more sustainable lifestyle and are working together towards a shared vision for a more sustainable future. This is in opposition to individual-focused behaviour change technologies for environmental sustainability (Hobson, 2002; Brynjarsdottir et al., 2012; Dourish, 2010; DiSalvo et al., 2012), which a large body of Sustainable HCI research has historically focused on, for example, in the case of en-

ergy use monitoring and feedback for reducing consumption (Pierce and Paulos, 2012; Schwartz et al., 2015; Jahn et al., 2011). Previously discussed in the literature (Chapter 2), these techno-solutionist, eco-feedback and visualisation technologies usually work on efficiency-based values and economic rationales to influence behaviour change in individuals. They frame energy use (and sustainability) as the responsibility of the individual and put the onus on them to make the right decisions and choices for themselves. Dourish has previously argued this inadvertently relies on the guilt of consumption (Dourish, 2010) of an individual. The design and directions of such technological interventions have been repeatedly criticised in HCI as their purview misses out on the complexity of scalar systemic issues (Raturi et al., 2017; Norton et al., 2019; DiSalvo and Jenkins, 2017), also missing out on the capacity of grassroots communities to create change through practices.

However, SHCI's recent turn to Social Practice Theory takes a critical departure from the overwhelming reliance on individuals as a unit of influence and analysis for design. This approach builds on the complex systemic nature of the problem rather than understanding it as a problem of individual behaviour change where the individual makes informed, autonomous and rational decisions to reduce consumption for sustainability. This involves identifying the limitations in capacity for individual actions and acknowledging the different socio-political scales at play, the longitudinal nature of change, and the material challenges involved (Dourish, 2010; DiSalvo et al., 2010; Dillahunt et al., 2010). In response, Social Practice Theory conceives practices as *'embodied, materially mediated arrays of human activity centrally organised around practical understanding'* (Schatzki et al., 2001, p. 2). Shove et al. further explain practices as the fundamental unit of social existence that influences social order and individuality. They explain the relevance of social order by arguing *'Rather than existing in mental qualities, in discourse or interaction, the social exists in practice'* (Shove and Walker, 2007, p. 12). The three-part practice framework by Shove et al. consists of *'meanings'*, which include *'symbolic meanings'* in addition to *'entities'* and *'competencies'* (Shove et al., 2012, p. 14). These symbolic meanings are socially constructed ideas and aspirations linked to the practice. This material, mental, and performance interlinkage helps frame the argument for this Chapter's research. In particular, I look into the role of visions in forming everyday practices and investigate the capacity of visions as *'symbolic meanings'* and *'ideals'* held by a community that can influence the creation and perpetuation of on-ground practices.

These co-created meanings form the basis of future thinking; however, I would like to point out that visioning is not related to Value Sensitive Design (VSD) in HCI (Friedman and Hendry, 2019). VSD engages with human values in the design process and is primarily related to moral and technical imagination, brought to bear on the design of technology (ibid). Also, VSD has a tendency to universalise values to operationalise them in design (Borning and Muller, 2012; Le Dantec et al., 2009). However, in my work, marginalised ideals, values and voices are collectively negotiated towards future visions by associating with practices that the individuals or communities perform daily, as evidenced in this Case Study.

Visions, as discussed in the literature (Chapter 2), are associated with predictable knowledge structures, forecasts and planning (Joseph, 2019; Sheppard et al., 2011; Buhring and Koskinen, 2019) associated with expectations and set goals (Pargman et al., 2017; Mankoff et al., 2013; Bendor, 2012). A relatable example is of smart city visions driven by corporate and government bodies (Cowley et al., 2018; Mullins, 2017; Rosenbak, 2018; Gray and Marres, 2018), which are sometimes shared and amended with citizens through consultations. However, these efforts are limited from the perspective of citizen participation as they only gather comments on proposed ideas rather than co-imagining new ones. On the other hand, visions are generally associated with metaphysical imagination, creativity, supernatural or apparition. Yet, I would argue visions in HCI are distinct from these associations and are an abstraction of values or ideas, a set of principles, or maybe as well as socio-technical projections or speculations for the future. They are usually developed or associated with the domain of experts like designers and technology visionaries, for example, Weiser's vision for Ubiquitous Computing (Weiser, 1991). Speculative Design (Dunne and Raby, 2013; Candy, 2010; Desjardins et al., 2019), Design Fictions (Lindley and Coulton, 2015; Blythe, 2014; Auger, 2013) and Design Futuring (Kozubaev et al., 2020) are among various approaches in HCI used by researchers and designers to construct visions of the future, also discussed previously in the literature (Chapter 2, Section 2.2). For this research, I define visions as not an endpoint or a long-term goal but an abstract ideal, a set of values or a dream which inspires a way of living and the ongoingness of it.

In this exploratory Case Study, I look at visions as *'meanings'* - ideas and aspirations, and their role in bringing about long-term sustainable change through their interpretations into practices. Moving away from the domain of experts and into everyday life where

the visions are contested and negotiated. I study this negotiation of the everyday in relation to the vision through the questions of temporality and scale, presenting insights useful for HCI to understand the longer-term, collective nature of visioning in relation to designing for sustainability. The research seeks to answer,

'What can SHCI learn from long-term collective negotiation towards a shared vision?'

- **What is the role of visions in influencing everyday sustainability practices?**

- **What are the challenges faced by citizens or communities in reconciling static visions with everyday practices and vice versa?**

With these sub-questions, I try to understand the role of future thinking and its interrelation with socio-material realities. In particular, it was understanding the role of visions in influencing everyday practices and how the concept of sustainability plays out during the negotiation between vision and practices.

This exploratory research is set within the international township of Auroville (elaborated in Chapter 3 Section 3.3.2), situated in the peri-urban milieu in the south of India. The town is primarily an ecovillage, where its international residents explain it as an urban and social experiment in human unity; they live and work towards a common vision. My field research attempts to understand the approximate 50-year-old spiritual, static and top-down vision of the town regarding its influences on creating sustainable living and associated practices around food.

This Case Study attempts to understand the everyday negotiation of the existing longitudinal vision in practice, which differs from the following two case studies (Chapters 5 & 6) that deal with community engagement in an urban setting. Auroville is a mature community with knowledge and lived experience of negotiating a vision for the last 50 years; it can inform how other communities can develop similar practices and sustain them over a long period. Therefore, this Case Study is essential in understanding the material landscape of visioning praxis in communities, including negotiation, mobilisation and materialisation of visions.

Auroville residents are motivated towards living a holistic, sustainable life, and the spiritual vision of the town brings an ideal (see Mother's vision for Auroville, Chapter 3, Section 3.3.2). I hypothesise working towards the realisation of the vision is an attempt

to interpret and bring into practice the vision. This speculative interpretation by the citizens is a way to design preferable futures for the community. The speculative element is driven by critical reflection and the community's spiritual nature, bringing out the practice of consciously growing and consuming food and living out the vision as a way of life.

4.2   Auroville: methods and participants

In this Chapter, I present research where I engage with the residents of a small town in south India established 50 years ago with a spiritual vision towards human unity. The town has a multi-generational resident population and a high transitory population consisting of tourists, volunteers and new residents who come to the town from all over the world (see details in Chapter 3, Section 3.3.2). The township's residents, even if multi-ethnic and diverse, align with the vision and have been transitioning to live and work towards the vision's realisation. Therefore, they are consciously choosing to live a more ecologically sustainable life. My research primarily engages with and questions the dynamics of this relationship between the top-down vision and the bottom-up practices of everyday life.

Data collection started through notes created as part of digital ethnography (Pink et al., 2015) in mid-2018, engaging with online content available on Auroville and its many initiatives and farms. The primary source was Auroville's official website, which has information about its various initiatives, farms, voluntary services, and guesthouses. It is also a source of archival material about the town and the founding vision. I started by making notes about the vision, farming initiatives and practices, focusing on each farm's ethos and practices in detail. I selected the farms that had a digital presence or were practising something out of the ordinary, for example, seed saving, drip irrigation or used time exchange and reached out to them. Their digital presence made it easier for me to understand their practices, get an overview of farms and how I can align with them for my research. Also, unique practices like time exchange or seed saving interested me in understanding alternates within the already unique socio-economic system of the town. This sensitisation to the town's existing practices helped me frame my interview protocol, which inquired into their relationship with the established vision.

Through my desk research, I created five categories of food system stakeholders which

I wanted to interview on the field and aimed to get at least 3 participants per category to create cross-sectional data - farm stewards, food administration, volunteers, residents and organisations related to the larger food ecosystem in the local area. One of the farm's stewards responded to my request and offered to arrange an online call to ask me about my research, what I wanted to do in Auroville and to tell me about the food growing activities of the town. They also offered to host me as a volunteer on their farm during my field research and advised me to conduct my research during the primary growing and tourist season in Auroville. After the online meeting with the farm's steward, I created semi-structured interview questionnaires within these categories - farms, food administration, volunteers and residents.

On-field research was conducted through immersive fieldwork, using ethnographic praxis of in-depth semi-structured interviews, field notes and observations. These ethnographic methods were used to engage with the understanding of the town's vision within the peri-urban setting and the multi-ethnic residents and how the vision is *'lived out'* in everyday life. I conducted my on-field ethnographic research in January 2019.

I embodied the role of a tourist and a volunteer to embed myself and participate in the setting. I participated in the daily farm activities, helping plant, grow and harvest; after spending my mornings on the farm, I visited various other establishments, organisations and places of relevance to gather more information about Auroville and its way of life. These were restaurants, farms, non-profit organisations, offices, manufacturing units, studios, community kitchens, forests, community centres, small businesses and local villages. I also visited the administrative block in Auroville and got a copy of the local newsletter *'News & Notes'*, which listed events and information for residents and volunteers. Through this information, I attended various local events, for example, the indigenous food festival, Pongal (local harvest festival) and associated local events, and the youth festival. These engagements made me appreciate the complexity of the place and the diversity of the residents, understand their aspirations or viewpoints, and the town's sustainability practices. I used participant observations to record interactions, conversations and experiences in the field, supporting them with field notes and images. On the field, I would usually take photographs and quick audio or written notes, later writing them down as accounts for the day describing my observations. I didn't capture anything specific to a person or had identifiers in the data; Auroville is a close-knit community, and it wasn't easy to create anonymity.

During my participatory observations, I explained my positionality to people as an academic researcher doing a PhD, on-field gathering data about the setting, Auroville practices and their relation to Mother's vision. I explained that my research is around sustainability and asked people if they knew about the mother's vision. Additionaly inquiring about their interpretation of the vision and how they thought it translated into material practices in Auroville later I asked them if they would be interested in engaging with the research and giving an interview, which would be audio recorded. People were curious to know why I was personally interested in doing this research and what would be the output. I had just finished the first year of my PhD, and it was difficult for me then to answer how this research was fruitful in creating on-ground change or for Auroville. Although people showed enthusiasm towards my study, they were not interested in formally being part of the recorded research. Thus, my participants for the interviews was primarily recruited through word-of-mouth references and acquaintances.

I recruited participants for my interviews if people said yes to being audio recorded, and the steward of the farm I was working for acted as a gatekeeper to the community, connecting me to other members, residents and stewards of different farms. My initial recruits were also my hosts, cohabiters and volunteers. The recruitment was largely snowball sampling through conversations with the participants and being referred to the larger residential community of the town. On explaining my research to people in the community, they would suggest other members or organisations that would be useful or interesting to get in touch with.

The semi-structured face-to-face, one-on-one interviews were conducted in participants' homes, different public settings such as cafes and work environments like farms and offices; these locations were chosen by the participants. Most of the interviews were one-on-one with two exceptions: one was a resident couple and the other two stewards of a farm; these two interview cases have audio recordings with two participants. My participants were within the age group 18 to 90 years of age, which included *'pioneers'* (early settlers), farm stewards, residents, farm volunteers, food administration officials, farmers and local non-profit organisation mentors. All my participants were English speakers and engaged with me in English or Hindi. I could not recruit Auroville farm workers who lived in the local villages surrounding Auroville because I could not speak the regional language and did not have a local village gatekeeper (see more detail in Chapter 3, Section 3.3.2).

The developed semi-structured interview protocol, information sheet, and consent form, were translated into Hindi for any respondents who could not read English and for me to interview them in Hindi. However, on the field, I did not meet anyone needing the Hindi translated protocol as Hindi is not the regional language, and everyone spoke or read English. I gave people the interview protocol, information sheet and consent form to read and sign; I also read aloud the information sheet and the interview protocol to participants who requested it, like older adults. Sometimes, it was challenging to maintain the topic of focus in the interviews, as residents wanted to discuss various issues and subjects they thought were more important. In particular, stewards of various farms were hesitant to answer the questions related to their farming practices as they felt this information was well documented and already available on internal website pages. They were also hesitant to answer questions about sustainability as they thought it was a concept of dominant economic structures driven by Western society. I felt this resistance to my questions was also an unwillingness to conform to dominant academic structures of generating knowledge. In the process, rather than imposing structure to my questions, I engaged in conversation with the participants. I built my questions within the conversation, therefore, changing the questions during the engagement, this created complex, layered data with lots of personal information and discussions.

Participants (Pseudonym)	Interviewed as
Radha	Resident
Mateo	Resident
Ted	Resident
Govind	Resident
Charles	Resident
Benson	Farm Steward
Lolita	Farm Steward
Timothy	Farm Steward
Grant	Farm Steward
Castro	Farm Steward
Joseph	Food Administration
Prakriti	Food Administration
Shri	Food Administration
Rukmani	Farm Volunteer
George	Farm Volunteer
Prashanth	Non-profit organisation worker

Table 2: Participants who participated in the study; however, I do not provide details because of anonymity issues

The collected data was iteratively used and analysed to develop the research further. The

data collected as part of the initial online ethnography was used to initialy understand the town, reach out to different farms, ask them to act as gatekeepers and develop the semi-structured interview questionnaire.

The on-field data comprised observations, field notes, photos and semi-structured interview transcripts. The on-field notes and observations, were used to change the interview protocol at different points of research and support the analysis of the interviews. I interviewed 18 people, out of which two did not want their recordings to be used for formal research. I deleted those interview recordings, and they are not part of this research. To see the details of the participants, refer to Table 2. Once the interviews were completed, the 14 audio-recorded interviews were transcribed verbatim, some interviews had parts of the conversations in Hindi that were translated into English as well.

This research was done early in the PhD and was exploratory in nature so, I initially open-coded the data to come up with an initial codebook, however, the interviews were too dense and it became too complex. Therefore, the codes were then reworked using observations and field notes for reflexivity and iterated over time by me in consultation with my supervisors to create consistency and agreement in grouping the codes into themes. Later, specific instances in the data that captured the relationship between visions and practices were interpreted through sensitisation of the Social Practice Theory framework (Shove et al., 2012). These analytical modes from Social Practice Theory helped me sensitise towards meanings, competencies and materials operating in Auroville and how they might play important roles in everyday practices for the future. Taking this into consideration, I thematically analysed the data (Braun and Clarke, 2013, pg. 19) to create themes through systematic reading and affinity diagramming of the codes. Findings were derived from the themes that represent insights about the interrelation of vision and practice and how residents negotiate the vision through their everyday practices.

4.3 Findings

In this section, I detail how the existing vision, community governance and structures influence the food growing ecosystem of Auroville. The section focuses on answering the questions around the challenges of reconciling future visions with everyday practices, especially considering how citizens of the town of Auroville bring forth this negotiation in pursuit of sustainability. The findings are drawn from the analysis of the empirical

data from the ethnographic fieldwork and the semi-structured interviews. The results present essential elements (materials, meanings and competencies) for mobilising and constraining visions in everyday practices, for example, socio-economic considerations, interpersonal conflicts, scalar issues and limitations of material infrastructures. Thus expanding on the tensions between the vision and practices and the negotiations between them to create attainable changes that align with the communities' historical trajectory, motivations and future intentions.

Each section represents a prominent topic that surfaced in the thematic analysis, bringing to the fore the practices of the town, the influences of the vision on them and the conflicts and tensions within it. It elucidates differing opinions and interpretations of the vision, and how practices get negotiated in Auroville, thus contributing new understandings of the role of the vision in influencing sustainable food practices.

4.3.1   A negotiated lived reality where the vision is an ideal in the present

Auroville can be explained as an eco-village or a small town with minimal built infrastructure and resources to retain a small population. It primarily functions on the premise of goodwill and the intention of the residents to live and work there. The town operates outside the jurisdiction of the Indian state with a loose citizen-led governing system and no law enforcement. Auroville's top-down vision frames the city as an experiment towards human unity. This is explained in the quote below by a resident who works within the food management system in the town.

> *Shri: this is an experimental community (...) to show the world that we are living together with difference in us, race, difference in country, difference in color, difference in caste and creed (...) in religion, we center in only one thing, that we made it [possible]*

Shri explained the town is an experiment to test out an alternate concept - a way of life, and what matters is that the community has substantiated it. Therefore, the vision plays an essential role in providing a value system and building togetherness and coherence for people to rally towards. It is also an influencing factor in establishing the town and its infrastructure, endeavouring towards community living. This influence has trickled down into the everyday practices developed by residents and how the town is governed and plays a vital role in defining governing systems for the functioning of the town;

for example, the vision states Auroville would function without money, this has been realised as a system of *'invisible money'* within the town. Most residents get a minimum allowance to live, offering their services in return to the community as a barter. This minimum allowance is linked to their membership accounts, which they can spend in shops or restaurants; for example, the primary co-op used for resource distribution in the town operates as an experiment in a *'kind'* collective economy. It is primarily a shop but does not have price tags on goods, and residents can shop without restriction. Figure 10 shows an image of the store; it asks residents to take as much as necessary as participants, not consumers. However, the purchase gets accounted into the monetary system and gets deducted from the contribution made to the co-op from the resident's allowance. Overspending and balancing are accounted for through publicly displayed lists in the shop, which detail a resident's contribution, monthly spending and annual end balance. This illustrates the interconnectedness between the vision and the wider local economy. However, some residents think this economic system is a problem (and perhaps a poor interpretation of the vision) as explained by a resident.

Figure 10: Auroville - the primary co-op used for resource distribution

Ted: (...) I keep thinking like, I don't know if I can do it within my 3000

(...) the ideal of no monetary exchange is a wonderful ideal, but frankly, in my view, we're fooling ourselves. We're kidding ourselves because actually they're calculating every time how much you spend. Well, how much you've taken in the way of material. So the money's there, but it's hidden.

Despite disagreements like these among the residents, these interrelated systems of accountability and codependency create a community-oriented lifestyle and an alternate economy to mainstream neoliberal capitalism through a shared value system and cohesion among the residents. The vision also plays a role in attracting visitors, volunteers and local villagers to be part of the town. The local villagers join the community to change their social, economic and cultural status, and these new members are predominantly young Indian adults from local villages looking to find and build a new life by integrating themselves into the community. Thereby distancing themselves from the embedded socio-cultural expectations of the local village life. However, many older residents see this as a problem and a dilution of the vision and its value system.

Similarly, in the case of the transitory population of volunteers or tourists who come in to work and live in the town for shorter periods, the vision helps them integrate into the community's existing systems and infrastructures, offering a lived reality different from the life they are used to in other (primarily urban) parts of the world. This integration is possible through the vision's ability to create a shared value system - an ideal that the residents strive for in their daily life. The shared ideals help create shared practices within the community and foster cohesion through a sense of shared ideals and ideologies. The effect of the vision extends beyond the Auroville community, and there have been efforts to replicate similar practices and systems in other places. Therefore, the values and ideals can create extended invisible communities, as explained by a farm volunteer, George, who had recently come to Auroville.

George: (...) Auroville is not a city (...) but some concepts, they are more related to spirituality, I guess, the way you live. So it's more related to Aurobindo and the mother's vision, of course, the idea is to be here from any part of the world. This is something that can help nowadays, in Italy for example, we have so many problems with people coming from North Africa (...) there is no real integration (...) values [from the vision] can be brought to our western point of view and then you start to think differently

and you see yourself as part of a project a consciousness project. So you
would see also somebody else in a different way and then he's not going to
be any more your enemy and then you will start to probably help them or
find a way to be together in peace.

As George explained, the vision is not only about the future, it's an ideal in the present shared and agreed upon within a community through which everyday practices are established. As seen in the context of Auroville, the residents strive to build a new reality for themselves and others to challenge the dominant narratives of neo-liberal society.

4.3.2 The vision as a way of life interpreted through meanings, material practices and consciousness

Auroville's vision, even if resolute, is abstract and does not provide a definitive approach to realising it tangibly. The vision does not define or predict a year by which it will be reached or a plan with steps that the residents of the town can take to fulfil it. As Prashanth puts it, *"Mother started the city with the dream, not a plan. It evolves. Every once in a while, the Auroville evolution is dialogue between the dream and the plan."*

Thus, the vision is an abstract, interpretable form of articulation that creates imaginaries. These imaginaries form connections to individuals and communities through interpretations that make a possibility for situated action. Compared to the 5-year plan developed by the town's food growing community, which had steps to create more self-sufficiency and resilience. The plan experienced roadblocks and was unsuccessful in meeting its goals; it failed because it was not participative or inclusive and didn't have the buy-in beyond those who made the plan. Therefore, it fell short of being able to manage and predict the everyday negotiation and participation by people, for example, the consumption habits of residents, which eventually off-tracked the plan. As explained in the quote of how even the food growing community was not able to successfully implement it *"we used to sort of have this [5-year plan] meeting, but (...) the people in the meeting got very separated from what was happening on the ground, and then they're just this talking shop, that nobody wants to listen to nobody wants to do what they say".*

Therefore, plans are prescriptive steps that need to be followed to achieve a defined goal, as in the case of the 5-year plan in Auroville. Goals can be valuable; however,

they are not comparable to visions and can be problematic if devoid of participation and on-ground realities such as long-term planning in the town. As explained in the quote below, the plan did not include a large number of people and could not create buy-in or foresee the impacts of the larger economic system on it.

> *Prashanth: policies are always doomed to fail if it is made by a small group, because, If it is a Auroville policy that is made by everybody in Auroville it will succeed, a small farm group consisting of two and a half people making a policy [5 year plan] and broadcasting it on the news and notes which has got like 300 announcements every week. This will not make a policy stick to anybody, nobody's got the ownership (...) It is heavily influenced by the local economy, all of Auroville, even if they subscribe to something, they cannot definitely, engage or change this*

On the other hand, the vision is abstract ideals shared by the community and working together on how to live by it. This needs to be continuously interpreted, negotiated and worked upon, making it generative rather than prescriptive. This needs ongoing collaboration from the residents, which comes with its own set of challenges. These challenges are numerous, ranging from everyday issues to long-term concerns such as governance, participation, economic constraints, the passing of land to the next generation, etc. Each individual holds a different view of the vision, while some take the vision to be "set in stone", others consider it morals and values to live by, and a few think it needs to be reinterpreted and negotiated. For example, Lolita remarks on the top-down long-term vision of Auroville, on how the collective knowledge and understanding of the community precedes the spiritual vision.

> *Lolita: (...) again, you know, somebody - a spiritual visionary person - says something. Now, does that mean that because he or she said that at a particular time in that particular context, is it true for all for the rest of eternity? There's this tension between (...) [what] a spiritual leader said (...) compared to tapping into the kind of knowledge and understanding of everybody which is much more, that to me is a kind of divine anarchy, you see this tension kind of manifesting again and again, on lots of different levels and in lots of different ways*

This diversity of views adds to the challenges of a top-down vision and its implementa-

tion, leading to agonistic deliberation. As explained by most residents, these challenges of working together lead to non-consensus in decision-making, resulting in slow changes in Auroville. Thus impacting the pace of change in material practices necessary to live a sustainable life in line with the vision. This also impacts the materialisation of the vision, an important part of daily life in Auroville. For example, Benson, a farm steward, very eloquently explained that the realisation of higher consciousness is part of forming conscious material practices, *"What we tried to do is to take that consciousness [vision] (...) and fix it in the earth physically (...) You can have spiritual attainment but (...) it has to be done in matter. Otherwise, it remains the same (...). It has to be physical. The ultimate solution has to be physical in our physical life because that's what we have (...). Otherwise, the world will continue [the same]."*

He further explained the idea of a *'third position'* as part of consciousness and goes beyond materialisation and conceptual understandings of sustainability. He used a spoon and asked me *"how do you know this is a spoon?"* and explained it is the idea and the form, but after criticising sustainability as part of the neoliberal agenda of development, where the idea dictates how we use sustainability as a concept. He said *"It has to be a total new thing, initially it may be that, but it has to emerge into something that is at the same time, both (...) A third position. That we see the spoon in a totally different way, which is above form and matter and something else, which we cannot see, maybe known, but must exist somewhere"*. Therefore, explaining sustainable living as a superposition of concept and materiality which can be defined through consciousness, where the materialisation of the vision through everyday material negotiations constructs the groundwork for the long-term inception of practices and the functioning of infrastructures for sustainability and mobilisation of the vision. This brings to the fore the interrelation of abstract thought, such as the vision to on-ground practices where the vision is implemented through action at multiple stages - imagining, reasoning and doing.

However, in some cases, the practice overrules the abstract spiritual vision, as they are based on lived experiences and tacit knowledge built over a period of time. These are instances where the theoretical and dialectic structures of the vision and its interpretations are surpassed by the knowledge generated through lived experiences and everyday negotiations. Grant, a farm steward, explains how the farms face everyday negotiations between conscience and practicalities.

Grant: I bought 500 seeds of tomatoes which are pretty costly and we saw that they are each one inch [of growth] and suddenly I have an attack of insect. Now, should I leave this eaten by insect? Or should I put a small molecule of pesticide to kill this insect? Now, this is again a very philosophical and practical thing.

Moreover, these practices are not set as they evolve depending on socio-political and economic transitions; for example, the predominant western population of Auroville have adapted to the local way of life, such as using bathrooms without a roof or living without electricity during the night. Therefore, residents experiment with the possibilities of developing new ways of doing things in an attempt to live a conscious life for the realisation of the vision and passing on practice-based sustainability knowledge becomes essential in the ongoing understanding and practicalities of the integration of vision and practice where everyday life and lived experiences renegotiate visions, plans and actions over time. Thus, the vision isn't about an endpoint or a long-term goal; it's about a process, a way of living, and the ongoingness of this gives it longevity and relevance across generations. These considerations foreground longer timescales, inspiring the formation and reproduction of practices and building institutional structures for social and ecological sustainability.

4.3.3 Vision is manifested through a constellation of interdependent infrastructures and practices

Food growing is literally a grounded practice dependent on multiple uncertainties of everyday work and natural elements. These can be the cycles in nature, weather, an insect infestation or an animal attack, some of the everyday concerns faced by the farmers in Auroville. Practical concerns, daily uncertainties, and human intervention affect sustainability choices, for example, what is grown and available to the community. However, the community also use their food practices to set an example within the larger ecosystem as described by Joseph *"you should buy Auroville first and you should buy organic, using it politically [as a statement] to be able to make such a demand"* .

Additionally, considering the town of Auroville, the food production and consumption processes are also affected by the forces of demand and supply. Being a spiritually and ecologically focused community, the residents strive to live a minimal and sustainable life; however, residents of Auroville struggle to be sustainable or self-sufficient. For

example, the western population of the town likes to eat carrots and potatoes, which cannot be grown in the arid climate of Auroville. This demand gets fulfilled by the nearest vegetable market that is 30km away, part of the mainstream food system, or from a companion organic farm situated in a different state about 400 km away, which supplies fruits and vegetables to the town. This has been a continuous struggle within the food growing community in Auroville as they work towards self-sustenance but cannot grow what the consumer wants to eat. They emphasise on the education of the consumers, as discussed in the quote below by Joseph, who is part of the food administration and management working committee. See figure 11 for local newsletter, news & notes.

> *Joseph: We've set up small groups (...) to influence communities' public opinion [and] put information out in the Auroville news and notes. This effort, over many years to try to change attitudes (...) the best to be hoped for is not really that the community would suddenly stop eating carrots and cabbage and lettuce and all of the things but rather that it'd be a kind of shift, you know, there would be slowly more consumption of local things.*
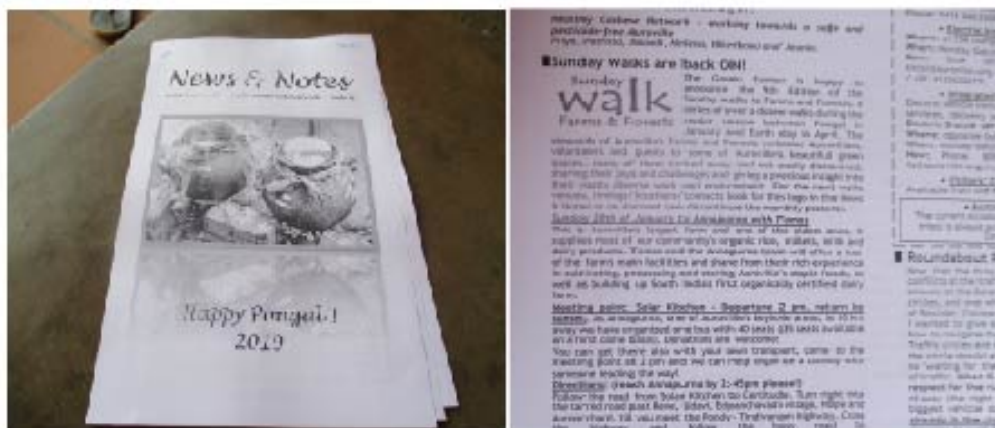
Figure 11: Local newsletter

This indicates that eating practices are part of established behaviours and lifestyles that are slow to change as they are cultural and built over an extended period similarly, as elucidated by Benson in the following quote *"Humans are attached to everything they attach to their body, to their possessions, room, food, people are getting killed for food"*.

Farmers do not think Auroville can be 100% self-sufficient, as consumption influences food production. They struggle with balancing ecological sustainability and economic viability, where financial numbers exclude cost to the planet. Since Auroville's incep-

tion, land and water continued to be concerns for food production, also affected by mainstream economics and policies of the outside world. For example, rising land prices, annexation, protection and passing ownership to the next generation or the policy of free water to farmers by the State Government raise concerns about depleting water tables affecting longitudinal water management. However, in some instances, such negotiations with the outside world led to the creation of systems with increased sovereignty and self-sufficiency; an example is the recent dilemma of applying for an Internationally recognised organic certification for the Auroville farms, which would allow them to sell their products outside Auroville and at a higher cost. However, the cost is considerable and would need surrounding local village farms to be organic as well to qualify for the certification. In these circumstances, the community decided to create its own local organic certification to be able to implement and regulate it and help other local village farmers to be included as well.

> *Lolita: The thing is that a lot of people took the [IMO] certification (...) But the other, a lot [of] the other farms wouldn't do it and so we ended up just one or two farms doing it and then it just got too expensive (...) And then, [Name] actually came up with this idea . . . it's called participatory organic certification (...) you get farms together, and then the farms themselves decide how they going to be [organic]*

Similarly, over time, Auroville has continued to develop an ecosystem of interconnected systems and practices to manage the production, demand and supply of food, like the use of time as an alternate currency, which is earned as a volunteer by working on the farms and can be exchanged for food grown on the farm. This place-based interconnected system is an example of hyper-local production, demand and supply. Another example is the community kitchens, which accommodate the surplus and gluts and are already the biggest patrons of the food grown in Auroville (see Figure 12 for the community kitchen's images). These community kitchens also provide the residents with nourishing daily meals and are a site for social connections.

All these practices and systems highlight the interconnectedness of the overall food system itself and the community's attempt to strive to live an alternate lifestyle and negotiate the pressures of the outside world. This would not have been possible without the resident-led bottom-up governance, which creates sovereignty. However, similar

Figure 12: Auroville - Solar Kitchen

to any attempt for bottom-up governance, Auroville also faces challenges to equitable participation, conflicts and diverging points of view, experiencing agnostic deliberation, making it harder to make decisions as noted by Ted, *"Much more structured, but essentially the fundamental thing [is that] nobody's in charge. There's no hierarchy, with no management, every individual has a right to participate"*.

Yet, it does create feedback loops within the ecosystem, and a shared history to later build on this common ground and shared knowledge. Thus, the vision creates movement and commons for individuals and communities to build infrastructures of interconnected systems and the likelihood of existing institutional involvement. These multiscalar negotiations both inside and outside of Auroville build institutional support for the long-term materialisation of the vision. In the process, they are creating new institutions necessary for changing the local food system to live as a resource restraint, ecologically conscious community life.

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4.3.4 Personal is part of the collective as the individual interprets the abstract vision

The abstract vision of the town undergoes interpretation in varied ways. Some take it as instruction, while others consider it contextual and open to deciphering. Although the vision suggests a particular moral and ethical value system, each interpretation reflects the person's motivations to move to and live in Auroville. These motivations are socio-cultural and personal- predominantly spiritual, living a sustainable and minimal lifestyle, socio-cultural change or an escape from the unlivable city life. These individual motivations and a person's lived experience create an array of elucidations of the abstract vision, which gets transferred into everyday life and practices. Here, Grant explains why he is unhappy with Mother's vision, as it does not mention anything about food in Auroville.

> Grant: There is nothing written (...) she didn't put any words, like environment, nature, food, ecology and all these things (...) so there is a kind of big hole (...) so a lot of people who don't think about it, those are people who are just not aware of what happens in the world. What do they put into the hole? They just put the same shit from the outside world (...) and especially English-speaking people.

As described in the above quote, the individual fills the gaps in the vision with their own motivations and experiences, thereby creating the meaning of the vision for themselves. This meaning-making, to be progressive and for it to be translated into systemic change, requires the person to be motivated towards a conscious change and sustainability.

> Timothy: Important is that we somehow serve Auroville, that we are connected to this community and the farm kind of produces with that purpose in mind (...) within the farm the human beings are treated in a way that they can actually grow so they are not a just production means or whatever but basically that you recognise them as beings and you try to work with those values in mind.

Thus, individual ingenuity is essential in reviewing the existing vision as they become anchors in further developing practices. These anchor roles are critical for driving and developing an ecosystem of interrelated practices, thereby highlighting the *'personal'* to be part of the collective. This illustrates the importance of individual responsibil-

ity within the collective and gives importance to the ideas of individual transformation.

> *Radha: in this kind of lifestyle choice where you're not taking more than you need, where you're in a situation, where you're interacting with the community by giving whatever talents you have, to training and then volunteering and stuff like that, in eating wholesome simple food. In being vegetarian and nurturing (...)*

Radha explained her life in Auroville as a personal choice to leave behind a predominantly disconnected modern lifestyle and the want to live a minimal lifestyle by being part of the community and contributing to it. Here, the individual has to go through an inner transformation to lead a conscious life, and this can be related to the idea of self-actualisation as a building block for sustainability practices. The individual is critical in making sense of the abstract vision and translating it into material action. This points to the importance of the individual's role and agency within the town's larger interconnected ecosystem of the town. However, the sense of community precedes the individual, as described by Joseph *"[the] goal is to have people working towards collective activity and purpose and not just individual. Individual gain, control security and so on, one thing does not work, but the broader intention is working towards collective or communal purposes"*.

Moreover, it does not discount the negotiation of everyday practicalities within the community, which is done at the scale of the individuals. For example, a steward manages each farm in an individual capacity, and this grower autonomy helps them run the farm as a unique entity with a distinctive set of food growing practices where each farm steward creates their own vision or plans for their farm and its functioning.

> *Joseph: each of these farms has a responsible person or in couple of places there are few joint responsible people and they represent the farms in the farm group (...) They make collective decisions often stuff about finances, money management, crop production, especially fruit and vegetables planning for what's kind of produced by and all.*

Therefore, the abstractness of the vision leaves holes for individual interpretation and innovation to happen. The individual thus has the agency to create change; however, the implementation of it needs to be at scale through interconnected practices. Therefore,

these practices can be looked at as creating niches for others to adapt and to be able to live a collective, conscious, sustainable life. However, when the scale moves from the individual to the functioning of the town, it brings complexities and conflicts. Broadening the community is thought to create resilience to survive in the long term; however, it surfaces fears of the vision being diluted due to an external influx of people. These are the many concerns regarding the scaling of vision in the context of Auroville, where it rests upon the individual to interpret, create meaning and translate it into their daily choices as a community.

4.3.5 Living consciously is not technology agnostic as community values and practices influence its adoption

The community functions through high interpersonal communication predominantly because it is a small community and the town has limited built infrastructure. The town, an eco-village might seem to be cut off from the world; however, many use the internet and devices like smartphones, computers, and digital communication technologies. This is primarily to reach out to the residents through the internal online newsletter or to people outside Auroville, like their families, staying in different parts of the world. As expressed by a resident *"you don't have to live in the city (...) you can step away from it live your dream so to speak and still have a dialogue going on with the world which is great but having said that (...) we're quite conscious about [technology] having a very deliberate effect on the world in some way"* - Radha
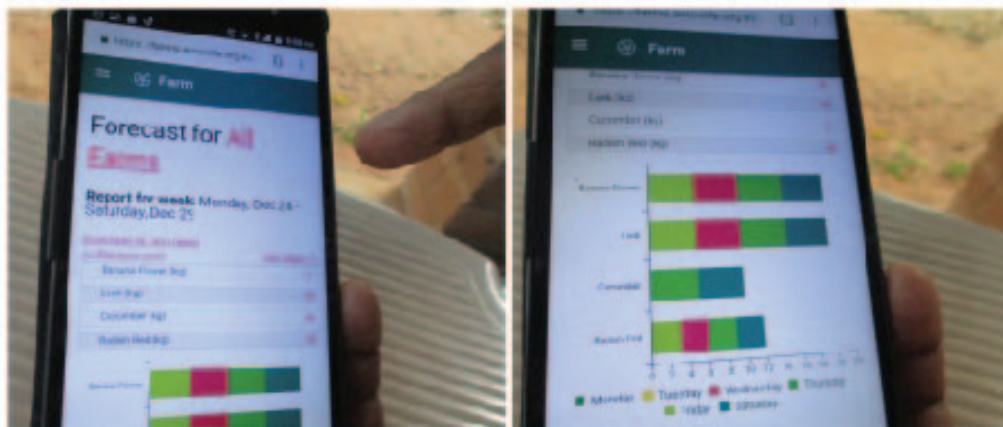
Figure 13: Auroville - Food Production and Forecasting Mobile App

Although Auroville offers an escape from capitalist life, it has created digital infrastructures to reach out to the world, sharing information and inviting others to join in,

thereby scaling up. For example, its website functions as a repository for its history and documentation of activities, and categorises links to its various establishments and enterprises. Some farms and enterprises have websites, YouTube and other social media channels to document their activities and practices, and to sell products online to a broader global audience.

Yet, the food system particularly relies on interpersonal communication, especially to create a support system for farmers and food distribution. This support system consists of different member groups who help collectively run the town's food system. The members either meet face-to-face once a month or coordinate through communication technologies such as email, text messages and phone calls. Thus far, the recent adoption of communication technologies now plays a vital role in the smooth coordination of the everyday demand and supply of food within Auroville. This everyday coordination of farm produce and the consumer demand for vegetables, eggs, milk, etc., is done through individual phone calls. Technology is considered an enabler to support this effort and make it less tedious; for example, there has also been a recent development of an app to help predict the supply and demand of food, see Figure 13. On the App, the farmers would input what they have available a week ahead, and the dominant consumers, like the community kitchens, would enter their demands a day before. Currently, the App allows the food link as an intermediary between consumer and farmer to use data as an enabler, in predicting the food supply and meeting demands as described below.

> *Shri: [Data] in many ways it helps. We can record, we can replay it, we can communicate it and we can share with others. You can even send across the world (...) using it [Mobile App] for farmers initially, what they are going to supply to us next week, they feed the data into the [Mobile] App. Then we will see that data and take that data to give a menu to the [community] kitchen or individuals for the sales. Data will be taken for the sales plan, this has started in practice.*

The App presents a case for the increasing scope of digital technology use by the community. However, the use of technology within the broader community is a convoluted topic with different layers of complexity. Some experience a digital divide with no access to computers, phones or the internet, hindering their ability to be part of technology-supported decision-making processes. As Lolita points out *"They feel that if somebody*

takes a decision over the email, then they haven't been consulted because they're not connected with the email, then this decision has been taken without them. And they don't want that, they want a face-to-face meeting". However, she acknowledges that technology can help streamline decision-making processes; still, not everybody can read and write, not everybody's comfortable with technology use, and there is a need for inclusivity. Moreover, for others, technology acts as a tool for change, disrupting their social-cultural and economic conditions. As Prashanth points out, the recent adoption of phones by the local women farmers has radically changed their ability to get work.

> *Prashanth: (...) women from the village (...) they all use mobile phones. They all use data, they spend about two hundred rupees monthly on the data plans and use WhatsApp (...) existing tools and technologies have been a great leveller, particularly in unorganised sector (...) rather than waiting for someone to come up with work they find out where the work is and go directly*

These are some of the scope and limitations of digital interventions within the community. Furthermore, the utilisation of technology at large is driven by the community's value system that interacts with the larger vision of the town. Individual or collective values bring in stark thoughts for and against the use of technology where knowledge of practice, consciousness and spirituality impacts these understandings of technology. The residents explain technology at times grounded in practice, like in food growing, where the microorganisms of the soil are intertwined with the larger ecosystem and work as technology.

> *Timothy: technology is such a big word. It's more than mechanics and machine. It's basically by challenging all the different facets which you have to face and you work with over time and people and your own nature and that of the world.*

As explained above, technology is a tool to be used for work and to express one's interrelation with the world through its use. It is sometimes an expression of one's spirituality; as Charles explains, scientific practice and spirituality are interrelated at the core; *"science without conscious consciousness and conscience is dangerous"* - Charles. So, it is up to the person who is developing and using technology to be able to act through their own consciousness. Therefore, technology use does not conflict with spirituality or liv-

ing a higher conscious life but still is in friction with the concept of sustainability, which is based on materiality and consumerism. To add, consciousness in technology can be built in by the person using it as explained here by George *"(...) are you going to use it [technology] properly? So it's an inner shift, when you're shifting from inside, everything will come outside (...) So it's important to change from the inside first"*. Therefore, acknowledging the merit technology brings to practices of food growing, for example, through the use of communication technologies, drip irrigation, harvesters, solar panels, shredders, etc. However, farmers think of their use through a holistic lens where they negotiate and ascertain how using it impacts the politics of oil, the larger ecosystem, soil quality, and dependence on practice, creating trade-offs due to practicalities. Therefore, sustainability as a value is not technology agnostic but relies on creating individual and collective trade-offs for its conscious use.

4.4 Reflections

The study builds conceptual understandings of future thinking and its relationship with practices based on empirical findings from ethnographic research inquiring into an institutionalised longitudinal vision of a sustainability community in India. This exploratory study examines the intergenerational actualisation of the shared vision of the town and its interrelation with the everyday practices of food production and consumption. The conceptual understanding surfaces limitations and transformative capacity of the vision in creating actionable sustainability transitions considering the materials, competencies and meanings (shove) of everyday practices. The study responds to longitudinal concerns and practice-oriented approaches and how these may be adapted to build design considerations for SHCI research and practice for co-creating socio-technical visions.

The Aurovillian vision in and of itself unifies and holds together a complex set of meanings and aspirations internally – for workers and the community, and externally – for volunteers, tourists and visitors. It is a well-constructed and well-established representation of a sustainable living experiment (Marres, 2012) worked on a daily basis, and the openness of the vision offers multiple forms of interpretation. The town offers a change in status for longer-term residents but also an opportunity for more transitory forms of labour, contribution and experience of an unattainable lifestyle for city dwellers. For many, and also important for the thesis, is the vision's capacity to raise consciousness

and spiritual enlightenment for more ecologically stable forms of production and consumption.

In this sense, the vision might appear fairly inclusive, which calls to the feminist ethics Mol (2008); Haraway (2003) in the thesis, in how those who come to Auroville are able to contribute meaningfully in different ways. At the same time, this openness creates complexity through multiplicity and tensions, in how people bring to the vision their own meanings and habits, or competencies that can have inevitable unsustainable material consequences, for example, the desire to eat carrots and potatoes in their diet, these European crops are not possible to grow or are resource intensive, in the Aurovillian climate. Moreover, the idea that Western competencies or ideas fill the openness of the vision with *'rubbish'*, as the vision doesn't include specific goals or plans for implementing the vision into reality. For example, the vision doesn't hold together the direct limitations of land, socio-economic shifts in supply and demand, and the material realities of what can be grown through access to soil, water and seeds. Instead, it suggests for some an opportunity to think more consciously and alternately through the choice of materials used and what is available. This way of living consciously comes through in the limited built infrastructure and the need for adaptation, such as living without bathrooms and limited electricity.

However, these also surface tensions within the relationship between the vision, existing practices and multi-scalar politics. Some examples within Auroville include how the worth of the material and grown produce within the town is determined by outside economic forces as much as internal ones. This also brings out the perceived tension between Western and local eco-friendly ways of producing or eating food, making self-sufficiency in food unattainable. Similarly, the materials and competencies influence the town's food practices, like there is a clear digital divide and exclusion of people due to the use of digital technology to speed up decision-making processes among the farmers in the farm group. This has recently been seen through the use of the mobile App developed to track the production and consumption of grown produce. However, this streamlined process conflicts with the flat hierarchy of democratic decision making in the town where decision making is difficult due to its agonistic nature. Such complexity, constraints and instances influence a constellation of interdependent infrastructures and practices inclined towards sustainable outcomes, created in a slow iterative manner that is longitudinal and intergenerational.

The study, therefore, presents visions as an abstract ideal but with holes to be filled in, through interpretation by the individual or collectively as a community. This interpretation and negotiation is an ongoing process and has benefits compared to the 5-year food growing plan of Auroville, which failed in comparison to the 50-year-old vision of the town due to limited representation, perspectives and duration. Here, I articulate that visions are not static; they are ideals and ideologies that stand the test of time: renegotiated, revisited and reinterpreted, and are achievable as opposed to a utopia or a forecast, as a speculative foresight far in the future and difficult to relate to. Visions are ongoing processes interpreted through practices as one puts them into action rather than being set into one particular articulation; therefore, they can be "lived" right away - through shared values and practices. This is in opposition to how sustainability is framed in HCI, where it is a problem to be solved and a value to be achieved in the future (DiSalvo et al., 2008; Dourish, 2010). Visions inspire and motivate change through interpretations enacted through social and material praxis of daily life created by the residents, enabling on-ground action.

Therefore, visions aren't an endpoint or a long-term goal; it's about a process, a way of living, and the ongoingness of this is what gives it longevity and relevance across generations, inspiring collective imagination, self-transcendence and grassroots innovation. I argue that socio-technical systems for sustainability should have these considerations of longer timescales that need to be concretely looked at beyond *'being green'* (Håkansson and Sengers, 2013; Pargman and Raghavan, 2014) and living within limits (Nardi et al., 2018; Remy et al., 2017). One such aspect beyond the modern scientific world is the interlinked nature of sustainability with religion or spirituality (Rifat et al., 2020, 2022), which moves away from the purview of *'higher quality of life'* and into *'the higher self'* (Knowles, 2013) much in line with the way of life in Auroville. This offers an exciting mix of individual and institutionally focused conversations for SHCI. The Aurovillians focus on resilience as a way of spiritual and conscious living more than just being responsible, through their continuous way to attain or live a higher self; relating this to Social Practice Theory, the vision can, therefore, bring a way to resist dominant, convenient and comfortable ways of life (Shove and Walker, 2007).

Auroville is a unique township which already has a strong vision in place, putting forth the interrelationship between visions and daily practices. The Case Study argues why everyday life is significant for the thesis and SHCI by surfacing insights from the town's

sustainable experiments in living (Marres, 2012) and its negotiations with the vision. These negotiations elucidate that sustainability challenges can be couched in terms of our current (shared, socio-cultural) ways of living, thereby, creating an understanding of what sustainability practices are already there and what competencies, materials and meanings could be significant for future practices. Therefore, in this Case Study, Social Practice Theory provides a useful framework for understanding how a vision is manifested through everyday practices and the dynamics involved in negotiating a shared vision alongside other competing factors that influence and shape these practices (e.g., Westernised notions of sustainability). There is a need to look at these interrelationships within SHCI research to articulate the multidimensionality of sustainability better and work towards long-term sustainable outcomes.

Therefore, the design challenge is to critically examine this interrelation and negotiation between vision and practices to co-imagine, evaluate and establish alternative ways of living. This Case Study excludes the processes of creating visions together, but other communities can be guided to produce visions representing their shared ideals - how they want to live or what it means to live sustainably for them, with intentional gaps; however, this leaves open methodological questions. Prior research in HCI presents participatory speculation as one methodological approach to understanding community values and creating safe spaces for discussing these, and additionally, considering the role of digital technologies for long-term intergenerational negotiation to create infrastructuring beyond the design of the research interventions. Therefore, attempting to support and equip communities to move beyond the deliberative process and take action themselves, like in this Case Study, the community came up with their own organic certification. Keeping these understandings about the interrelation of vision and practice, I build my following two case studies (Chapters 5 & 6). I am cautious that these learnings wouldn't wholly translate into the urban context of the community in Newcastle, England, that I am engaging with in my subsequent case studies (Chapters 5 & 6). In the two case studies, I approach visioning and long-term thinking methodologically to respond to longitudinal concerns and practice-oriented approaches, and how these may be adapted to build design considerations for SHCI research and praxis for co-creating socio-technical visions.

Chapter 5

Facilitating future thinking in grassroots communities

5.1 Introduction

In the previous Chapter (Chapter 4, Case Study 1) I described how plans and visions differ. This was evidenced in the case Auroville where the 5-year food growing plan failed in comparison to the 50-year-old vision. Although both the Mother's vision and the 5-year plan were top-down, the reasons for the plan's failures were attributed to the fact that it was developed by a few people within the established community which has its own local politics. Also, the 5-year plan was prescriptive and fixed and did not allow room for the socio-material negotiations of everyday practices (consisting of competencies, materials and meanings) that occur over the longer term (across multiple generations as in the case of Mother's vision in Auroville). Therefore, these need to be taken into account in facilitating long-term sustainable practices, for example, the food consumption patterns of the residents.

Furthermore, the capacity of visions to inspire and motivate change through interpretations is practised as negotiations of both the physical materials (e.g. soil, water, seeds, land) and the specific competencies of the individual growers (e.g. knowledge of the land and particular seasonality). These negotiations of materials and competencies are an attempt to create meaningful practices and thereby, a translation of the vision into practice. Therefore interpretations are enacted through the social and material praxis of daily life created by the residents of Auroville enabling on-ground action. These inter-

pretations are both personal and collective within the community while attempting to keep the essence of the Mother's vision (in Auroville) intact through negotiation and meaning-making. The vision is manifested through a constellation of interdependent infrastructures and practices inclined towards sustainable outcomes. In the case of Auroville, we saw how these are created in a slow iterative manner which is longitudinal and intergenerational in nature.

The vision isn't about an endpoint or a long-term goal; it's about a process, a way of living, and the ongoingness of this is what gives it longevity and relevance across generations. By inspiring collective imagination, self-transcendence and grassroots innovation, the somewhat abstract quality of the Aurovillian vision foregrounds considerations of longer timescales, inspiring the formation and reproduction of practices and the building of institutional structures for social and ecological sustainability. However, the vision is also static and top-down and suffers from restrictions of existing interpretations of the vision by the older generation which makes it difficult for intergenerational relationality.

Thus building on these findings, on the need for participation, continuous interpretation and negotiation by people as part of understanding visions and their capacity for sustainable transitions, in this Chapter I open up the design space for creating visions to better understand how a community can co-create useful visions for futures and for approaching longitudinal sustainability. Not every community has a Mother's vision in place for instance, the neighbourhood food growing community from the West End of Newcastle, I engage with in this Case Study, is relatively new and does not have a written down, established vision or any kind of existing long-term thinking processes in place. However, even before I moved into exploring future thinking, I had to look at possible approaches which can help facilitate the co-creation of sustainability-oriented visions. Influential previous work within SHCI, as explained in Chapter 2, explores sustainability in a contained manner as technological interventions within particular settings (Comber et al., 2013; Heitlinger et al., 2013) and strives to create efficiency (Clear et al., 2015) for sustainability outcomes. These typically point to possible implications for future technology use and development, thus reporting successes from the project, but often not addressing the systemic and longitudinal issues (Raturi et al., 2017; Norton et al., 2019) of sustainability interventions or technology deployment.

Taking learnings from the last Case Study (Chapter 4) and recent work in SHCI has also highlighted that working with local communities is more egalitarian for promoting viable long-term and embedded change (Baumann et al., 2016; Heitlinger et al., 2019b). Yet within this area, little work has explored the challenges of effectively creating and negotiating collaborative future visions (Chopra et al., 2022b). The following Case Study leads on from the previous one where we see the influence of the vision on the city's food practices and is therefore set within the context of urban food growing - a well-researched site for studying community-led sustainability in action. Community food growing, as an instance of sustainability research within HCI, has predominantly focused on collaborative acts of growing (Heitlinger et al., 2013; Norton et al., 2014, 2019) rather than political frictions that may emerge through multiple competing agendas and narratives. This risks missing out on the complexities of negotiating long-term effects and place-based enactment of futures for sustainability outcomes.

I explore the question of considering longer timescales in designing for sustainability in this Case Study described in the following Chapter by framing it in two ways. First, by addressing the question of how communities can be supported in thinking outside of the status quo through participatory speculation about possible futures, and secondly, by engaging with a food growing community in the West End of Newcastle upon Tyne, England over longer timescales. In this Chapter, the Case Study explores,

How can SHCI researchers facilitate future thinking in urban food growing grassroots communities?

1. **What are the possible methods to help scaffold the participatory speculative processes in bottom-up, grassroots community contexts?**

2. **What do food growing communities who are motivated by sustainability challenges think about their future and what are the tensions and barriers concerning these futures?**

With these two questions, I examine the intricacies of co-creating visions with the local community by opening up the Speculative Design space to develop methodological approaches to undertake Participatory Visioning. The methodological approach contributes towards the overall aim of the thesis in supporting local, grassroots communities in creating and exploring material landscapes of long-term thinking processes. In particular, I look at participatory and speculative processes in HCI, which have received

increased recognition for supporting grassroots ideas of sustainability and visions of urban futures.

Recent SHCI work considers speculative approaches and associated practices for challenging normative socio-technical systems to encourage more criticality (DiSalvo, 2012a; Dunne, 2008) and opportunities to think expansively (Tharp and Tharp, 2019). This involves engagement with stakeholders to imagine alternative futures (Soden and Kauffman, 2019), co-designing with grassroots communities and citizen-led initiatives (Baumann et al., 2016; Wakkary et al., 2013) and fostering resilience in the face of uncertainty about the future (Barr and Pollard, 2017). The intention is to move away from conventional ways of approaching sustainability through speculation with designers or researchers as the experts (Baumann et al., 2016; Bray and Harrington, 2021; Bray et al., 2022). Instead, urban communities are considered to be in a more informed position to articulate and imagine a more environmentally sustainable future for themselves (McPhearson et al., 2016). They can achieve this by tapping into longitudinal, local knowledge that brings into focus an appreciation of place (DuPuis and Goodman, 2005), intersecting histories, and fragile ecosystems (Baibarac and Petrescu, 2019; Capaccioli et al., 2016; Dillahunt et al., 2009).

Thus, the study contributes an approach to participatory future thinking processes and methods called Participatory Speculative Design (PSD) for grassroots communities to meaningfully and collectively negotiate thinking about the future for sustainability outcomes. It also highlights the particularities of the co-created socio-technical visions, thereby generating an understanding of how these are positioned within, and constrained by, the local and larger socio-political contexts of the neighbourhood, city, and country (UK). This approach brings to the fore tensions and barriers of the community's food growing practice within the neighbourhood. This concern with the everyday practices of the community is in line with the *'Sustainable Living Experiment'* (Marres, 2012), as discussed in the methodology (Chapter 3). I connect the theoretical understandings of the *'Sustainable Living Experiment'* to the attempts made by the neighbourhood community at imagining, negotiating, and modifying their everyday practices and spaces. This framing is also incorporated in the design of a series of PSD (Clarke et al., 2018; Heitlinger et al., 2019b) workshops to form the basis for doing collaborative speculation work with the local food growing community. I discuss the details of the development of the workshops and the approach in the next section.

5.2 Connected Urban Food Growers: Methods & participants

In this Chapter and the one that follows (Case Study 3, Chapter 6), I present research that is part of a long-term engagement between academia and the local community interest company (CIC) based in an economically deprived neighbourhood of Newcastle upon Tyne, England. The neighbourhood has multiple active citizen initiatives and I engaged with the food growing community through ethnographic inquiry discussed within the methodology (Chapter 3, Section 3.3.3). During the research, the ethnographic data collected included field notes and observations along with the data from the workshops and a closing interview. Next, I detail the design of the series of Participatory Speculative Design (PSD) approaches, which are four interrelated workshops between March and June 2018, and the closing interview with the director of *'Grow-in-Containers'* (pseudonym) in July 2018. The workshops were aimed to engage the food growing community in co-imagining the future of food growing in their neighbourhood through creative exploration and experimentation. The workshops focused on sensitising to materials, competencies and meanings within the community by exploring values, aspirations and challenges faced by the community, and subsequently how this inspires and constrains co-created futures. The workshops were also designed to further provide insights into how visions might be created in a bottom-up way through practice, rather than through top-down abstractions in order to develop meaningful processes of speculation through situated understandings.

The workshop series attracted 14 community members in total and each workshop had 3 - 8 residents, with some participants attending multiple workshops. Participants self-identified as English, Polish, Swedish, or Mexican and were interested in or were already growing food. They were recruited through word-of-mouth, directly approaching individuals (as one of the researchers involved in the work was a resident and approached individuals as a neighbour) and through posters put up in the community centre. The posters advertised a free lunch, a hands-on food growing skill-sharing session, followed by a creative workshop and free packets of seeds to attract the residents in the neighbourhood interested in food growing. This was to attract a diverse group of participants who were interested in food growing practices and would like to learn a new skill. Workshops were scheduled in the middle of the day, 12 pm - 3 pm due to the research team's schedule, availability of the venue, and to attract people with childcare responsibilities. This

unfortunately often meant limited participation in comparison to evening events organised by Grow-in-Containers. The workshops were designed to be drop-ins where people were free to walk in and leave at any given point and would last 3 - 4 hours. The director of Grow-in-Containers, John, is an influential figure within the food growing community and acted as the gatekeeper for recruitment, facilitating skill-sharing sessions as a precursor for each speculative workshop. He joined the workshops to facilitate these more practical skill-sharing elements and as a member of the community to add to the discussions towards future thinking.

The skill-sharing sessions included planning your garden, what to plant every month over the year, and composting and wormeries. The workshops and skill-sharing sessions saw attendance from people of different ethnic backgrounds, predominantly between the age of 25 - 70 years, who were part of the existing food growing community or were interested in urban food growing. For details on the participants demographics and which workshop they attended refer to Table 3.

Also, a large proportion of the food growing community is predominantly white and retired. The representation within the four workshops was affected by this fact and saw only a few people within the young middle-aged bracket and of different ethnicity. Each workshop had between 3 - 8 participants with equal gender distribution, novice to expert growers who expressed the most interest in the facilitated skill-sharing session. There were 4 participants who returned to attend 3 out of the 4 workshops.

5.2.1 Data collection and analysis

After collecting written informed consent from the participants they were asked to fill in a small questionnaire telling the research team about their food growing practice. The questionnaire gave initial details on the participant's growing practice, and how they were related to the neighbourhood and its food growing community. Each workshop was audio and video recorded and photographs were taken to document, for example, visual materials produced by the participants like maps, drawings, handwritten notes and 3D models. This was also supported by field notes, observations and researcher reflections which captured participants' reactions and embodied interactions in space. Participants have been assigned pseudonyms in the data to preserve anonymity. Audio data was transcribed, transcriptions were anonymised, and the video data was annotated specifically

Participants (Pseudonym)	Approximate age range	Years of Food Growing Practice	Living in / associated with neighbour-hood	W1	W2	W3	W4
John	35 - 44 years	15 Years	Local expert and owner of micro-business *'Grow-in-Containers'*. Doesn't live in the neighbour-hood	Y	Y	-	Y
Rebecca	56 - 64 Years	All life	Resident	Y	-	Y	Y
Rick	56 - 64 Years	30 Years	Resident	Y	Y	Y	-
Marta	56 - 64 Years	20 Years	Resident	Y	Y	Y	-
Clara	35 - 44 Years	30 Years	Resident	Y	-	-	Y
Dan	25 - 34 Years	5 Years	Resident	-	-	Y	-
Graham	35 - 44 Years	Never	Resident	Y	-	-	-
Norton	35 - 44 Years	8 Years	Resident	Y	-	-	-
Kim	65 or over Years	3 Years	Resident	-	Y	-	-
Molly	65 or over Years	30 Years	Resident	-	Y	-	-
Sabrina	35 - 44 Years	35 Years	Non-resident, however active volunteer with the community	-	Y	-	-
Pamela	56 - 64 Years	20 Years	Resident	-	-	Y	-
Amy	56 - 64 Years	20 Years	Resident	-	-	Y	-
David	Under 18 Years	-	Resident	Y	-	-	-

Table 3: The details of participants who participated in the Case Study 2.

to record where community members speculated about futures. After each workshop, an iterative analysis through inductive open coding was used at different stages of the project to design and develop each subsequent workshop by the team of researchers. More details on my involvement in the research team can be found in Chapter 3 (section 3.3.3, My Positionality); and for more details on the collected data, refer to Table 4.

Once all data collection for the workshops and the interview were complete, I analysed the complete data set for this Case Study through a deductive analysis. This is not related to the development of the workshop series (Section 5.2.2 Workshop Design Process, and 5.2.3 A reflective iterative process of developing the workshop series), I took out particular instances in the data where participants were speculating about futures and analysed this data in two different ways. I explain the reasons for this bi-analysis next

	Workshop 1	**Workshop 2**	**Workshop 3**	**Workshop 4**	**Exit Interview**
Method	Mapping the neighbourhood	Walking the neighbourhood	Playing the Future Lands Board Game	Crafting a new world	Semi structured questions
Speculative Tropes	Prompt Cards	Speculative scenarios	Speculative Future Lands	Speculative scenario	-
Data	Notes & observations, Audio recording, Video recording, Pictures, Crafted making	Notes & observations, Audio recording, Video recording, Pictures	Notes & observations, Audio recording, Video recording, Pictures, Feedback	Notes & observations, Audio recording, Video recording, Pictures, Crafted making, 3D models	Audio recording, Feedback

Table 4: The details of data collection for Case Study 2.

and describe them in the Findings Section (Section 5.3) with two subsections (5.3.1 and 5.3.2).

Initially, I had used thematic analysis (Braun and Clarke, 2013) applying it to particular instances of speculation that captured the participant's imagined futures and what everyday life might look like in them. This analytical way of reading the data was useful in surfacing practices that featured in the data, and later made sense of through the elements of Social Practice Theory, where possible, for example, where materials, competencies, or meaning were evident in descriptions of the futures. This thematic sensitisation was helpful in creating themes through systematic reading and affinity diagramming of the codes. These themes surface barriers and opportunities affecting the co-created futures for urban food growing, and the socio-technological systems linked to food growing in future cities. I reworked and iterated the themes over time in consultation with my supervisors to create consistency and agreement.

However, it also made me realise that the thematic analysis did not do justice to the complicated and diverse data set collected during the workshops. Moreover, this analytical process did not create methodological understandings to answer: *What methods can help scaffold the participatory speculative processes in bottom-up, grassroots community contexts?* The reason for this is that the thematic analysis did not capture the evolving dynamics within the series of workshops and community interactions. This

presented a need for a different analytical way to read and analyse the data, especially focusing on individuals, how they activate and engage with the rest of the community, and communicate and navigate differences. Therefore, it was important to see communication in chronology and to analyse the narrative in the discussions. Also, these charged discussions have protagonists and victims, people who take the lead, and provoke or shut down conversations and people who often find they are shut down. It is important to take notice of the victims and understand if they saying the same thing or putting across a different perspective. Within the workshops, people also engaged with the sense of ethnicity and place through embodied activities, such as walking the neighbourhood or crafting responses. It therefore became important to understand embodiment as part of the narrative and iteratively place them with what I got through conversations within the workshops.

Therefore, I used narrative analysis (Frank, 2010) to understand the chronology of events which identifies key characters or people in the story as the engagement sits within a chronology. This analysis also connects it explicitly to embodied practice and place which are part of the ongoing ethnographic enquiry. A key part of ethnography is engaging with people's stories and narratively making sense of them, as explained in the Methodology (Chapter 3). I conducted the narrative analysis and calibrated it through discussions with the supervisors, which involved placing all data in a chronological sequence including photographs, transcripts, video annotations and notes. Following a close reading of the data from each workshop, significant events where participants speculated about the future were highlighted. Further details of the wider context of the speculation, who was part of the speculation, what emerged before and how these ideas were later expanded on by others or dismissed were pulled out for closer analysis. These episodes were represented in diagrammatic form to highlight the chronological and semantic relationships between them. The diagrammatic representation of the workshops was then written into a narrative account to recreate an interpretative rendition of important moments of speculation from each workshop.

This bi-analysis is written in the findings section which has two subsections: firstly, the Methodological Findings: Participatory Speculative Design are written in sub-section (5.3.1) and analysed through narrative analysis (Frank, 2010). Secondly, Socio-technical findings: Bottom-up community food growing futures described in Section (5.3.2) are analysed through thematic analysis (Braun and Clarke, 2013).

5.2.2   Workshop Design Process

In this section, I detail the process followed during the design of the workshop series to scaffold the creative thinking processes when engaging with the grassroots community. I elaborate on this through the designed activities, alongside what the research team was hoping to achieve during the process. I give details on each workshop and describe the design of the four PSD workshops in the series. These were designed for engaging the community in creative exploration of futures of food growing in their neighbourhood. The approach for the workshops is positioned as a series of interrelated experiments in living (Marres, 2012) that work in tandem with the community as they move toward collective resilience and food sovereignty.

The research began when John the director of *'Grow-in Containers'* (pseudonym), a local micro-business, contacted our research team in early 2018 (details are discussed in Chapter 3 section 3.3.3) interested to explore uses of technology within the community to support more self-organised activity and expand his online community of container growers. However, the workshops were drafted to be technology agnostic to move away from specific technology solutions as seen in dominant HCI work related to sustainability. Instead, they focus on exploring some of the more complex socio-cultural characteristics of sustainability and relationships within the neighbourhood in relation to future thinking. John was later asked to be involved in running the learning sessions as part of the workshop's free offering (See Figure 14)

Figure 14: Free Community Workshop by John

Workshop 1

In the first workshop the research team was building trust and understanding of the community and its practices. This workshop focused on opening up conversations between the researchers and the participants about the neighbourhood, food growing and sharing. The workshop included a mapping exercise which was designed as an invitation (Lindström and Ståhl, 2020) to allow local knowledge to surface, and to challenge researcher and participant assumptions and expectations about the community and the project, respectively. In designing the workshop, I acknowledged that collaborative activities and speculation can sometimes be uncomfortably demanding, and the map was envisioned as a space for enabling participants to share and negotiate points of interest, perspectives, and values.

Figure 15: Workshop 1 - Yearly growing timeline discussed with the participants in the training session; cardboard map being populated through prompt cards by the participants.

This activity was partly to ease participants into potentially more demanding ways of thinking about the future in later workshops. Thus the activity was focused on capturing local understandings of place and belonging in the area in relation to food growing, inspired by participatory mapping methods (Corbett, 2009). The activity involved popu-

lating a sketched geographical cardboard map which only included some key landmarks, and responding to prompt card questions For example: *Draw your garden, where it is located?; Draw your future garden. What food would you like to grow in it?; What and where can you forage in your local area? Are there places you would prefer not to grow food? How and where do people share food in the area?* These questions helped surface how materials, competencies and meanings were ascribed to practices in certain places and the activity of mapping did bring out these considerations, however, Social Practice Theory misses out on place-based focus which the map helped to surface in the engagement. A few illustrated and filled in examples are seen in figures 15 and 16. The map was purposely sparse to leave it open for participants to add their own places of significance and elicit different understandings of *'place'* (Harrison and Dourish, 1996) with respect to food.
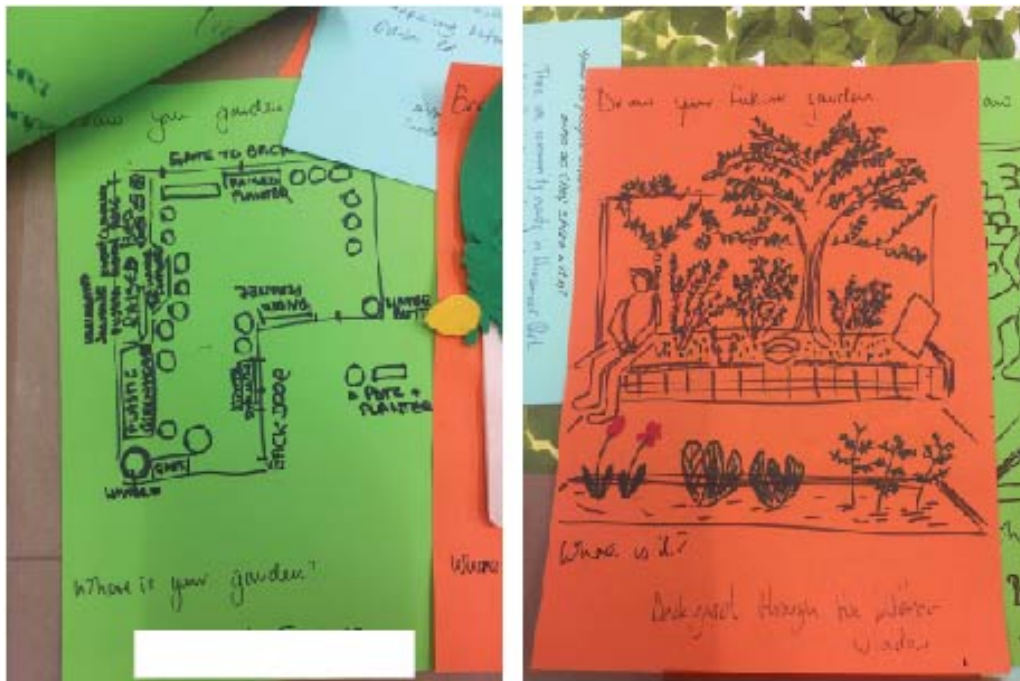
Figure 16: Prompt Cards from the cardboard map in workshop 1

As an invitation to engage with the map, the participants were asked to represent their neighbourhood, their houses, its growing areas and the potential growing areas for the future on a hand-drawn map on a big piece of cardboard. The participants were given prompt cards to fill in which asked them about their current gardens, future gardens and food interactions like sharing and giving within the community. The participants mapped places, foods they grew, and neighbours they have and talked about foods they would like to grow and how these would fit within their imagined personal gardens. The activity is focused on the present realities, everyday practices, and personal interpretation

and aspirations; approaching the neighbourhood sustainability through the scale of the individual. Mapping activity looks at the mundane present and the aspirations for the future, mapping the potential of the place, and the activities the residents would like to carry out in the neighbourhood.

Workshop 2

In the second workshop the research team focused on initiating and situating speculation within specific sites of special interest, highlighted in the previous mapping workshop. After looking at the populated map and its material artefacts, a speculative walk was devised, taking inspiration from walking methods (Tomkins, 2012), while also incorporating fictional scenarios like in the work by Stals et. al (2019). These were related to specific places highlighted by residents as existing or potential new social spaces for growing food. Six areas including residential streets, back lanes, an abandoned hospital and local grocery stores were identified.

Figure 17: Participants discussing the route of the Walk

Situated fictional scenarios were devised as a way to suspend belief about what was possible while keeping the long-term values of the community intact through the chosen sites. Examples of scenarios included on the walk: *People in the neighbourhood now get 25 per cent of their food from sharing with others. How do they coordinate this?*;

The government introduces high taxes on meat and dairy products to mitigate harmful climate change. Higher demand for fruit and vegetables means that the prices of these also rise. How have people in the neighbourhood responded?

These scenarios were to encourage critical reflection on the existing configurations of food growing spaces in the neighbourhood. These created scenarios were based on themes emerging from Workshop 1, like limited growing spaces available to the community. Each scenario was developed by the members of the research team through a desk survey of recent news articles and other successful and more speculative food growing projects. Images were collected from these projects as well, as future visions to further help facilitate the workshop discussions. The second workshop began with participants discussing the wall-mounted printouts (see Figure 17) of these visionary projects and news articles we had collected while eating lunch. Potential locations to be visited during the walk were also discussed with the participants and a route was devised collectively.

Workshop 3

Figure 18: Workshop 3 - Participants playing the board game of speculative future land

The previous workshop surfaced a multitude of concerns and conflicts that influence food growing within the neighbourhood. In response, for Workshop 3 the research team fo-

cused on opportunities for speculative deliberation by creating a game to try and provide some distance from the issues discussed in the previous workshop. The research team began by analysing the discussions in the previous workshop, drawing out concerns, fears, hopes and values of the community alongside an understanding of materials, meanings and competencies of the community attempting to integrate these considerations within the design of the future worlds in the game. However, the aim was to break away from existing social and spatial realities and shift the framings of the fictional provocations away from problems to solve, which often led to solutionism. Taking inspiration from recent work on developing and using games in design workshops (Blythe et al., 2015), and Coulton et al.'s idea of games to introduce more playful conversations and flatten hierarchies (Coulton et al., 2016), I designed a board game for futuring (See Figure 19 for an illustration), incorporating the discussions and insights drawn by the research team.
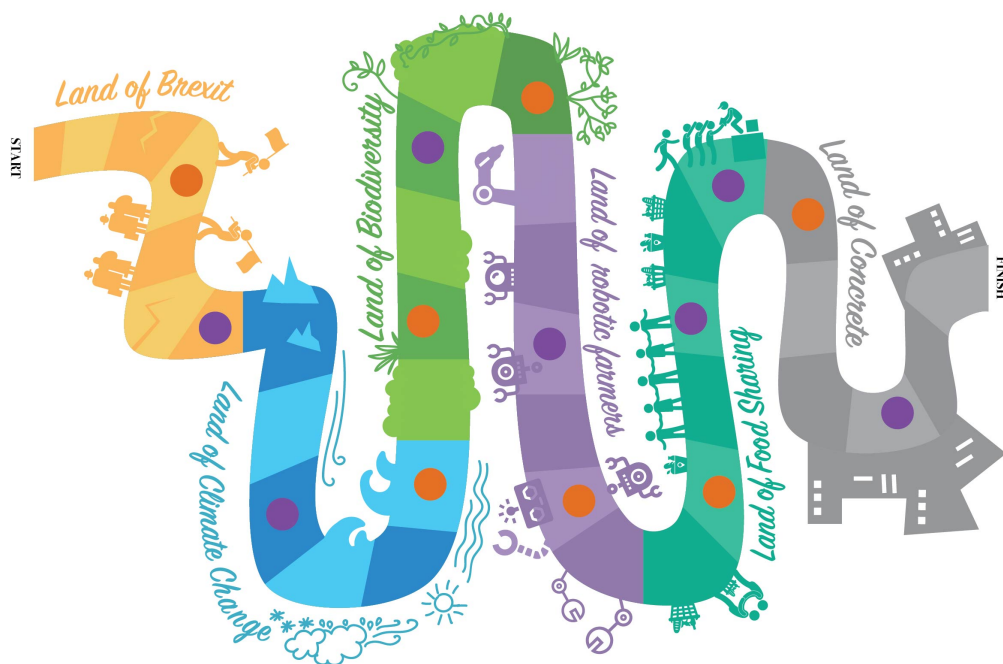
Figure 19: Board Game used during the workshop

The board game was designed as a turn-based race game arranged into future lands that the team created based on the analysis of the data from Workshop 2. Lands were characterised by scenarios like the use of robots, Brexit, and climate change, and their descriptions ranged from probable, plausible and possible futures relative to the lived realities of the neighbourhood described by participants in the previous workshop. *Lands on the board game were: Land of Brexit, Climate Change, Biodiversity, Festivities, Robots and*

Figure 20: Card Deck - Beasts of concerns

Concrete; See Figure 19 for the actual board game image.

The gameplay proceeded as follows: each player chooses a token to represent themselves on the board. Player tokens included things like jars of herbs and spices, stones, and seeds. During a player's turn, they roll a die to determine how many steps they move forward on the board. When a player arrives at a land for the first time, they read its description to the group and the group then describes and discusses together what growing food in this land would be like. To scaffold further critical thinking about the land, the board is populated with beasts, which can be either positive or negative influences on life in the land. Squares on the board are marked with a purple or orange dot to indicate a positive *beast of opportunity* or a negative beast of concern, respectively. A deck of cards was designed for both beast categories. When a player lands on a new square they must pick a beast card from the corresponding deck and read the card to the group before speculating how the beast might have an impact on food growing in the land.

Figure 21: Card Deck - Beasts of opportunity

We created the beast cards to reflect values or challenges expressed by participants and associated them with specific animals or insects. For each beast, we described both its abilities and its weaknesses, representing dimensions to be considered with respect to its existence or mitigation in a given land. See Figures 20 and 21 for the actual beast card shots.

Workshop 4

In the fourth and final workshop, the research team decided to try speculation using material making that built on narratives and values of growing that underlined the vast knowledge and expertise of the community. Considering reflections and feedback from participants in Workshop 3, the workshop that followed focused on an embodied and experiential outcome rather than just critical deliberation. Using previous learnings from Workshop 1 with craft and its connections to embodied growing practices, I drew inspiration from Andersen et. al's Magic Machines approach (Andersen, 2013) further situ-

ating the approach within Heideingsfelder et. als' idea of *'participatory design fictions'* made by laypeople to give shape to societal needs and perspectives (Heidingsfelder et al., 2015, 2019).

We decided to create a worldbuilding (Coulton et al., 2017) task, asking the community to be part of the genesis of a new food growing planet. I designed the scenario as an invitation letter building on the positive experiences and skills of the community as expert knowledge bearers of food growing. The letter addressed to the community members from the British Interplanetary Society, to visit and build infrastructures conducive to growing: *(...) We are writing to you to inform you that you have been chosen to be the first inhabitants of this parallel planet Earth X where you will set the groundwork for future human societies. The environmental conditions on Earth X are identical to your area. We've chosen you because of your pioneering expertise in community growing, community engagement, innovation and your collective vision for prosperous and harmonious urban living (...).* This letter built on the community's competencies and their specific knowledge as growers and the use of materials. The activity in the workshop was further built on existing everyday practices of the community and their constituent elements, for example, the use of recycled materials to build future worlds. It highlights the competencies of the community and encourages them to draw on their valuable resources rather than undermining their skills as seen in the earlier workshops.

The participants were invited to conceptualise and build a 3-dimensional world using a range of scrap materials including cardboard boxes, plasticine, straw, small plastic figurines and animals, plastic bottles, cans, other craft materials and other naturally found materials like feathers, sticks, stones, mud and leaves see figure 22 for reference images. Participants were encouraged to tangibly represent their future visions using these alongside desirable community values expressed in prior workshops. These values were written on wooden sticks, for people to use as signposts or motivators for their worlds, like trust, festivities, intelligence, re-use, beauty, wisdom, sharing, diversity etc.

5.2.3   A reflective iterative process of developing the workshop series

The project started with the intent to explore possible speculative approaches for facilitating the co-creation of bottom-up community-led visions of food growing. Focusing on the development of the design space encapsulating - community-based ideologies, creating alternatives to the mainstream, grassroots politics, and grounded action-led nature

Figure 22: Workshop 4 - Participants building three-dimensional worlds

of urban food growing practices.

Starting out, the research team had to build trust and a working partnership with the participants, together with focusing on strengthening bonds within the community and being sensitive to conflicts arising from collaborative work. Especially with my position as a brown immigrant outsider, I had to build relationships in the community as previously discussed in the methodology (Chapter 3, section 3.3.3). The research team did not want to jump into speculative activities in the first instance as thinking about the future can be hard, overwhelming and thereby disempowering, especially for non-designers which is also evident in previous literature (Baumann et al., 2016; Heitlinger et al., 2019b).

The workshops were created to be a series (see Figure 23 for details) where a new workshop is informed and designed by the outcomes and reflections of the last workshop. I co-designed the workshop series as part of the research team, we analysed the data and made decisions collectively informing the design of each workshop. After each workshop, the data collected was transcribed, annotated and later coded by two researchers, to carefully develop initial findings from each workshop. These findings were values,

	W1	W2	W3	W4
	Mapping	Walking	Gaming	Making
No. of Participants	8	8	7	3
Returning Participants	-	5	4	3
Mode	Invite	Situate	Deliberate	Craft
Activity	Hand Drawn Cardboard Map of the neighbourhood with Prompt Cards and crafting material	Walk of the neighbourhood with Fictional Scenarios mapped to specific locations	Board Game of speculative future lands played with a Card Deck - Beasts of opportunities and concerns	Crafted 3D models of the new world made out of recycled material in response to Fictional Scenario
Speculative Tropes	Prompt Cards Draw your future Garden. Where would you like to grow food in the neighbourhood	Fictional Scenarios Residential Street - "People in the neighbourhood now get 25 percent of their food from sharing with others. How do they co-ordinate this?" Backlanes - "The neighbourhood has won an award from Grow Your Own magazine for best innovative green food growing community. How do you think this came into being? etc.	Board & Card Deck Fictional Future Lands - Land of Climate Change, Land of Brexit, Land of Robotic Farmers etc. Beast of Opportunities - Hare of Intergenerational Exchange, Owl of Knowledge, etc Beast of Concerns - Whale of Activity, Magpie of Community, etc	Fictional Scenario Invitation from British Interplanetary Society, to visit and build infrastructures conducive for growing on a parallel planet Earth X
Data Analysis	Responses on prompt cards and geographical areas of interest and concerns raised on the map. Through field notes, transcription and video data.	Audio and video data was open coded later performed axial coding to consolidate emerging themes as inspiration. Highlighting values, fears and hopes associated with growing	Audio and video data was open coded later performed axial coding to consolidate emerging themes as inspiration. Highlighting fears and dystopias associated with future	
Influence on next workshop	Develop a mapping exercise - inform route for the walk and develop issues as fictional scenarios to be discussed at locations	Particularities of place and the different actors involved in constraining or creating opportunities for food growing provided inspiration for the game design and the card deck.	Key themes used as value signposts for future worlds and building activities. The fictional scenario was also developed to move beyond w3's socio-political complexities	
Context	Individual	Neighbourhood	Larger social and political context	Community context (in a new world)

Figure 23: Overview of Workshops

needs and problems faced by the community, put in dialogue with how they were related to everyday practices, and further used to develop insights for designing activities and scenarios in the subsequent workshops.

To further give an idea of the iterative reflective process followed in the design of the workshop series I elaborate on the process. In workshop 1 the research team read responses from the postcards and fieldnotes to map geographical areas of interest and concerns raised through the participatory mapping exercise to inform the route for the walk developed for workshop 2.

Audio and video data from workshop 2 were openly coded independently by two researchers after initial transcription. These initial open codes were then brought together and the researcher team together performed an axial coding to consolidate emerging themes as inspiration for the following workshop. This preliminary two-stage analysis highlighted values, fears and hopes associated with growing in relation to the particularities of place and the different actors involved in constraining or creating opportunities for food growing within the community and provided inspiration for the game design in workshop 3.

I designed the board game for workshop 3 which asked the participants to cross future lands as they played the game. The lands in the board game were developed using the

scenarios discussed during the walk. A card deck was also developed, it had beasts of opportunities and concerns. The beasts were inspired by the fears and values of the community which we had gathered during the previous workshop. Audio and video recordings from workshop 3 were similarly analysed.

I developed a future scenario keeping in mind the complexity of discussion and negotiation, and the difficulties of facilitation that emerged during workshop 3. We also synthesised key themes and used them as signposts for future worlds and building activities in workshop 4. The same analytical approach was applied to workshop 4 to gain insight for a reflective interview with John at *'Grow-in-Containers'*.

The series of workshops were also designed to shift temporal categories and scales, to blur and reposition the neighbourhood food growing futures. This had implications for the envisioning process, thus introducing social, material, political and economic dimensions which were beyond the control of the participants. We wanted to introduce these shifts to scaffold speculation and help participants towards creating possibilities of re-imagining systemic change, more in line with their own food growing practices that run in parallel to the hegemonic food system. During the workshops, the continuous documentation of the design process through notes and observations mapped these shifts, the subsequent reactions of the community members within the discussions to the speculative tropes and their response to them.

It is evident that this process for the design of the workshops reflected the power held by the research team. However, the embedded reflexivity and the co-creation of the process itself followed by the research team rejects these claims of power. Criticality and care are profoundly and thoroughly integrated within the design of the series. Throughout the development of the series the researchers engaged in a deeply reflexive process which also considered the evolving positionality of the researcher, unfolding of the research *'in the wild'* (Chamberlain et al., 2012; Rogers et al., 2013) and *'staying with the trouble'* (Haraway, 2016). Some instances were, staying with the conflicts arising within the participant group when discussing futures or personal politics. Mitigating power dynamics within the group, fear about the futures and the creation of dystopian ideas with the creation of safe spaces for agonistic discussions. This reflexivity helped in the iterative creation and curation of safe spaces for voicing out concerns, building equity in participation and managing the impoverished thinking linked to dystopian futures, fear

and anxieties.

5.3 Findings

After analysis and considerable reflections on the data I articulate the series of workshops into four speculative modes; mapping to support common ground; walking to situate everyday forms of speculation; gameplay to support agonism and crafting to speculate on diverse community experiences; I illustrate how each method scaffolded community engagement with issues of future socio-technical ecological sustainability. This section is divided into two subsections - Methodological Findings: Participatory Speculative Design, and Socio-technical findings: Bottom-up community food growing futures. Firstly, I elaborate on Methodological Findings (Section 5.3.1) analysed through narrative analysis that answers *What are the possible methods to help scaffold the participatory speculative processes in bottom-up, grassroots community contexts?* Secondly, I present Socio-technical findings (Section 5.3.2) analysed through thematic analysis answers "What do food growing communities think about their future and what are the tensions and barriers concerning these futures?"

5.3.1   Methodological Findings: Participatory Speculative Design

The findings in this section focus on the methodological aspects of fostering community engagement and citizen participation in the processes of co-speculation about the future, which elicits valuable rich perspectives on the present.

The section details the methodological learnings from the series of PSD workshops and the process followed, to scaffold creative thinking processes when engaging with the grassroots community. I elaborate on the same through implications of the designed activities and the facilitation to scaffold speculative thinking. The different approaches designed for facilitation in each workshop - focus on the engagement between the researchers and the community through the various design activities.

In the description, I emphasise the form or medium of the activities, as ways of engaging people to enable capacity for speculation. The different modes of speculation presented in each of the workshops are: invite, situated, deliberate and craft.

I also provide details on the observations and on-field unfolding like the enactment of social interactions, the creative capacity of the community and limitations of participa-

tion. These were some of the considerations for the scaffolding process provided on-field through conversations and interactions by the researchers and findings from the experiences of conducting the workshops. Each section represents a prominent narrative that surfaced in the analysis and corresponds to one of the four workshops.

The map: a site to create common ground

Eight people attended this first workshop and the initial drawing and crafting in the mapping exercise made it easy for them to respond to specific questions about growing practices by representing current and future gardens. However, discussions about places to grow food or not, beyond individual gardens surfaced more contested ideas of the use of communal council planters and back lanes which were often filled with rubbish . Some participants felt they couldn't possibly grow food in these public spaces, but Rebecca, one of the more seasoned growers, believed otherwise and linked the local council planters to the need for more communal spaces due to the recent closure of the local allotment site. Here she expressed frustration, pointing to the hand-drawn partially populated cardboard map where the site was located while describing her political contestations about their removal.

These expressions of frustration and concern over the taking away of the growing land were captured through her crafting of a raised bed on the map, alongside discussions about the history of the local allotment site. The process of making and mapping the raised bed symbolised a number of geographical sites for her and the wider community's aspirations for growing and a sense of catharsis for the loss of the allotment site through the use of matchsticks and used tea leaves (see figure 24 for the crafted raised bed). She told the researchers to delay wrapping up the workshop to complete it and once finished she asked everyone to plant something in the miniature raised bed, *"It's a community garden we all need to plant something in the garden now. Do you want to add something? A watering can maybe or bean shoots if you can manage"*.

Throughout this process, participants presented themselves as expert knowledge bearers, inviting me and the team as researchers and novice growers into the community through sharing. The design of the workshop activities and materials enabled the participants to draw on their food growing experience and fill gaps in the collective knowledge about the neighbourhood. My positioning as a researcher, and others in the team as largely unfamiliar and non-expert in the setting and practices, emphasised the expertise of the

Figure 24: Raised bed crafted by Rebecca

participants and invited participation on these grounds. In doing so, the mapping exercise became a safe space to accommodate varying points of view, expressions and opinions, even challenging the researcher's assumptions, especially mine, of the neighbourhood and highlighting particular areas of complexity for communal food growing that we hadn't anticipated. These were to do with the particularities of how everyday practices and ideas of the place were (re)negotiated within the neighbourhood by the food growing community, which is further unpacked and explored in the subsequent workshops.

Situated speculation: redefining the everyday rather than breaking away from it

The second workshop began with participants discussing the wall-mounted printouts of visionary projects and news articles. Potential locations to be visited during the walk were also discussed with the participants and a route was devised collectively. One area that was mentioned during this initial conversation included the back lanes which triggered some unease and concerns around issues of litter.

There were eight participants on the walk out of which five had already attended Workshop 1, and they were asked to think of the following questions as they walked: *1) Can you spot where food is being grown now? 2) Where could food be grown in the future? 3) What would need to happen for food to be grown here? 4) Is there a magical thing (tool, device, material that does not exist) that you could use to help you?*

Walking in small groups, See (Figure 25) we discussed with the residents, their rela-

tionship with the neighbourhood and its history, which highlighted a sense of pride and belonging. The group walked towards a popular residential street well known for its food growing endeavours and began to observe what was already growing in concrete spaces, pots and small front gardens. The engagement was heightened through embodied actions like touching, pointing and tasting with excited discussions about which plants were edible. John jump-started the visioning process by reinterpreting the space, suggesting alternative uses and plants which could be planted in the roadside council planters.

Figure 25: Participants on the walk

John: Gosh, what could you grow there? [...] like perennial veg, herbs or vegetables, which you don't have to plant every year. So you could grow things like erm raspberries or blueberries, strawberries or herbs like bay and rosemary and sage (...)

Rick: One of the things we talked about, these would be great as just community herb gardens where people could come out and pick some herbs and whatever they need.

John: (...) And (...) although you can go and pick it in the woods, actually if you had it on the street, if you can just pop outside your front door, pick a few leaves, it's very healthy, it's very good for you.

However, discussing the planters, issues such as austerity and who's responsible for managing them also surfaced wider conflicts and tensions, bringing out opposing values about sharing food. For example, the fact many residential front yards were open and accessible was positive for John but was a concern for others,

> *Molly: (...) growing outside your house here every passer-by could help*
> *themselves if they so choose (...)*
>
> Sabrina: So there needs to be an understanding that food that are grown
> close to the house primarily belongs to the person living there and growing
> the food. That needs to be established well within the community (...)
>
> Rick: It's enforcement

Similarly, contested public spaces like the back lanes were linked to ongoing negative experiences of littering. However, the fictional scenario *"The neighbourhood has won an award from Grow Your Own magazine for best innovative green food growing community"* gave John a window of opportunity to push the boundaries of the discussion, inspiring others to think positively and break away from concerns. He extrapolated existing technologies such as solar panels, reflectors, growing lights and food growing solutions to create alternate imaginings.

> *John: Well what you could do is you could make a sort of big polytunnel*
> *couldn't you, the walls painted white to reflect the light in, but also put heat*
> *back in...*
>
> *Martha: Oh, you mean the polytunnel over the lane?*
>
> *John: [You could funnel] the extra heating from the houses into the thing*
> *and you could take the [rain] water from the roof [to water the food growing*
> *inside (...) and] put massive great raised beds on the concrete [lane].*
>
> *Molly: It would need a lot of committed children!*

Situated speculation, in the context of the walk and the fictional scenarios, allows for a redefinition of the everyday rather than encouraging diverse alternatives. Residents often found it difficult to imagine creatively and collectively beyond what was already present. For some, imagined alternatives often evoked fear and disgust, even when generative possibilities were introduced. In this way, rather than providing an entry point or context for speculation, the situated and the everyday prompted the critical questioning of possibilities. Everyday concerns about the practicalities of successfully implementing the suggested alternatives negatively affected the distance the research team had hoped the fictional scenarios would provide from the perceived limitations of growing in the neighbourhood.

Agonistic speculation: experiences of disempowerment

Workshop 3 was attended by seven people out of which four were returning participants. The board game was played on a table set up in the community garden with participants sitting around it (See Figure 26 for participants playing the board game). During the game, as it was being played, we discussed with the participants what it would mean to grow food in the different future lands in the board game. We wrote down the main discussion points on post-it notes and placed them on the board itself around the land being discussed. On starting the game, discussions automatically led to high emotions and strong opinions. Rick landed on the Land of Brexit on his first turn. As this strongly related to the current political reality at the time, led to intense political debate around socialist and communist governments and dictatorships, and what it would be like to live and grow food after Brexit. Given that all participants indicated that they perceived Brexit as negative and damaging, speculations about a future beyond it were similarly framed:

> *Rebecca: (...) migrant workers aren't coming here because the pay's not as good, because the pound is not as strong (...)*
>
> *Rick: Automation will happen if they haven't got people to pick, they'll have no choice but to go to automation (...)*
>
> *Martha: They can pay students to pick the strawberries and pay them a good price.*

Figure 26: Board game played during Workshop 3

We found it difficult to navigate discussions beyond political opinions. We tried to suggest counterpoints and stimulate alternative directions for thinking about the future by proposing more positive future scenarios but these were not very well engaged with by participants, often refuted using familiar concepts and arguments like drawing parallels with historical events and personal memories. Land of Climate Change, for instance, brought about the fear of refugees, migration, survival and a constant threat to land access, which mirrored perceived causes of the current austerity being experienced in the neighbourhood. However, when presented with the *'Aphid of Competition'* Beast of Concern in a scenario of economic competitiveness, Rick dominated the discussion, shutting down other peoples' ideas while using a historical reference to *'dig for victory'* in World War 2 to argue potential harmful consequences of Brexit on the agricultural land and the price of food in the UK, *"(...) before the end of the war the yields were going down greatly because the soil was basically shot in a lot of areas (...) it was just totally infertile (...) If your natural yields are going down, if the land's not properly managed, the prices are just going to escalate. (...) It's going to cause even more division, you can have more haves and have nots".*

When participants came to the Land of Robots, however, the ideas of robotic farmers provided some comfort, associated with efficiency and a bright future by reinterpreting technology to existing values and motivations associated with food growing practice. Technology wasn't perceived as political in the way that Brexit was, and so the Land of Robots provided new space for speculation. It was proposed that the use of robots could help grow food without chemicals, enhance yield, help farmers with more leisure time and manage soil. Robots were also compared to the functionality of a dishwasher, while also recognising their potential limits and the ongoing role of people: *"the machine is only as good as the programmer"* - Dan. Some believed the availability of inexpensive robots would also end up deskilling people. The opportunity card, *'Hare of Intergenerational Exchange'*, did bring in an opportunity for positive reflection after the fear of deskilling was brought up. Rick explained, *"One of the things maybe with the robotic farming is, if you're on it, at the same time you're passing on intergenerational skills. Maybe that has got to be only a certain maximum amount of robotic farming [is allowed], and so much manual [farming], purely so the skills aren't lost. So let's say you're allowed to do a maximum of 75% on your land, robotic farming, but the last 25% must be manual for to preserve the skill, if that makes sense."*

Just before wrapping up the game, we asked for feedback from the participants about the negative associations with futures that were discussed during the workshop. They pointed out that the Land of Brexit was too close to a reality that they did not vote for and when positioned at the beginning of the game, affected the mood and general direction of discussion in the rest of the workshop. Rick said *"The tone was negative. To suspend belief, you want to be removed from reality."* Martha also highlighted how her social and political position made it difficult for her to be positive about the future.

The game was an intense and emotional experience, both for the participants and the researchers. For us, it was difficult to encourage speculation that was not limited by everyday realities and to avoid the discussion being consumed by the exchange of political worldviews. In one sense, the game was successful in distancing the participants from the specific spatiality of the neighbourhood through the introduction of fictional future geographies and speculative political climates. However, the macro-level refocuses on challenges like sustainability, diversity, and national and global politics limited opportunities for speculation. The scale and uncertainty associated with events like Brexit and climate change evoked anxieties and feelings of a lack of agency, which meant that they were also often difficult to meaningfully relate to community-shaped futures of the neighbourhood. As a result, participants felt disempowered and disengaged with the idea of speculating about them and instead exchanged their current views and opinions on the matter. And so, while gamification of macro-level lands as a form of agonistic speculative deliberation successfully created distance from existing assumptions and limitations of place, it also created distance in terms of agency in shaping the future of everyday life in the neighbourhood.

Speculative making: building on diverse community expertise

This workshop had fewer attendees than previous workshops with only 3 people joining. Each participant was handed invitation letters enclosed in a sealed envelope. John offered to read the letter aloud to the group as an act of invitation and instructions for how to start the activity. Materials to be used for the making of the 3D worlds were laid out on the table for people to select and pick up, to start worldbuilding. Everyone worked individually, was given a cardboard box and asked to choose specific values or create new ones to start building their new worlds. In the course of building their individual worlds, the participants conversed among the group, collectively taking inspiration from

one another, talking about family, and religion, asking questions, and describing their in-progress worlds.

The opening of individual letters and reading them out aloud made people smile and laugh, and created an invitation (Lindström and Ståhl, 2020) to momentarily leave the present reality and challenges in the community and travel to a new place. This workshop had a sense of familiarity, comfort and ease, due to the developed relationship, familiar faces, and limited numbers of participants, since each person had been to a prior workshop and also seemed more comfortable with the speculation process. This helped in expressing values more freely without immediate negotiations, sharing, talking and questioning each other and was replaced by a process of taking inspiration from each other to develop their worlds.

Technology featured here as a means of automating rituals, sharing knowledge, managing the land and helping maintain equitable ecological governance. Most narratives indicated a place less ridden by difficulties and problems but more with sharing, desires and wonders. For example, Rebecca described an existing pagan ritual she used in collecting moon water for her plants that she wanted to automate with robots. John created a scene with soldiers, which Rebecca thought was a reflection on the allotment wars but he explained these were part of a rehabilitation growing centre for violent people. He also built an intergalactic internet device for sharing seeds and food growing knowledge with others from different planets.

Figure 27: Worlds with intergalactic internet use and plastic as a sharing currency

The materials selected to build the worlds showcased the values chosen at the beginning and the desire to take materials from the present reality with them for the purpose of growing. For example, Rebecca's world was based on wisdom and reuse, and she used recyclable materials such as milk cartons and aluminium foil containers to make it. She

also decided to take plastic as a shared currency: *"Can't produce plastic anymore because we've got enough to just keep going forever now (...) the plastic stuff on here is not from this world. It's come from the old world because we've got enough plastic, we don't need to make any more. So we never run out, we just keep reusing it. Their own bank of plastic (...) share it with people who haven't got enough. So it's all, community sharing, no one's owning anything."*

An essential part of these new worlds was technology, with its capacity for wonders but still embedded in everyday food growing practices. For example, Clara, a young mother and a novice grower who joined in later, wanted a *'dandelion zapper'* made to pull out dandelions from her land, yet it quickly turned obsolete as she suggested innovative uses of the weed: *"well it would be very spot active, you know. It would be like (...) it might be some sort of being that just go down on the big dandelion and go shluurp woosh. And just zap them all up (...) Well actually dandelion wine is supposed to be a complete cure. (...) A weed is just a weed because it's growing in the wrong place. And dandelions are quite attractive and, you know, obviously there is value in there, the nutritional point of view (...) Yeah it is rather surprising in a way that like, you know, we haven't developed some sort of industries to do dandelions because they're so resilient. You know, obviously rabbits and guinea pigs that love them. Maybe we could have a guinea pig farm. Dandelion risotto. It's medicinal."*

Governance was also applied through careful negotiation and compromise of values via recognition of the loss of plants inherent in creating growing space for people even in a low-tech, eco-community. Clara, for instance, described the problem of colonisation of the new planet by removing old trees for houses and food growing space. Yet to ensure this was managed sensitively she decided there would be no land ownership or transport. *"you know, we're colonising this world and obviously if it's the same as here then it would have been forest wouldn't it? So we'll have to chop down some really quite big trees unfortunately (...) you don't inherit anything and you live in it while you live in it (...) do away with the concept of land ownership altogether"*

The act of crafting the world, in comparison to a conceptual discussion, took away the pressure of dialectic co-speculation allowing more freedom to individually re-imagine ideas on starting afresh to build a utopian future. However, each created world was also imbued with socio-material values from the neighbourhood and personal growing prac-

tices. The use of humour and magic was also repeatedly used to explain their created worlds and objects within them. The participants were challenged in the first three workshops to think beyond their known, and often difficult, reality of urban food growing, the last workshop used material making to scaffold thinking beyond the present while still embedded in the practices of growing food. The workshop worked well to open up the possibility of creating a utopian food growing world with community values leaving behind the worries of the everyday. The realization of change and agency was sparked through the making process. I explore these co-imagined futures further as findings in the next section.

5.3.2 Socio-technical findings: Bottom-up community food growing futures

In this section, I detail how the existing community structures, practices and concerns frame the future of food growing in the neighbourhood. I create descriptive accounts of the inquiry by drawing themes from the series of four Participatory Speculative Design workshops. Highlighting the contestations in socio-technical community food growing futures through participant-described futures during the workshops.

Using the accounts of co-created futures from the data I answer *What food growing communities think about their future and what are the tensions and barriers concerning these futures?* In the findings, I surface conflicts and tensions within the neighbourhood, detailing what restricts or aids the co-created community futures, and how technology features in these discussions. Each section represents a prominent theme in the analysis of the four workshops which create understandings towards socio-technical futures.

The present shadows futures: deprivation and austerity affect future thinking

In this work, futures were closely related to reality and everyday life, even after attempts of creating temporal shifts through speculation. The futures were still embedded in the present lived reality, formed through participants' experiences and world views. During the workshop series, the participants' co-created futures relative to their present situation and everyday life. This brought to the fore the participants' relationship with the neighbourhood, and the future description focused on how it might shape the future or be changed by it. For example, the suggestion of using roadside council planters as community herb gardens. However, this reuse of the planters raised issues such as austerity,

limited resources and manpower. In particular, it raised the question of who would be responsible for managing them, thus surfacing wider conflicts and tensions in the neighbourhood, and bringing out opposing values about shared food. For example, open and accessible front yards were positive for John to invite interactions and conversations; however, it was a concern for other participants as they feared stealing and littering by other residents in the area which was already quite prevalent. In the following excerpt, participants share their concerns about the extent of vandalism and theft in the neighbourhood that might affect their ability to grow more food in front yards and gardens in the future.

> *Martha: (...) growing outside your house, every passer-by could help themselves if they so choose. If there was a lack of food then it would be very difficult to secure anything anybody grew at the front of their homes.*
> *Molly: So there needs to be an understanding that food that are grown close to the house primarily belongs to the person living there and growing the food. That needs to be established well within the community*
> *Rick: It's enforcement.*

These conversations surfaced tacit norms and tensions of negotiating private/public spaces in the neighbourhood. Similarly, contested private/public spaces like the communal back lanes were linked to ongoing issues of littering and negative experiences with other residents or the council (e.g. see figure 28) . However, the fictional scenario *"The neighbourhood has won an award from Grow Your Own magazine for best innovative green food growing community"* gave John the opportunity to push the boundaries of the discussion and introduce the idea of using existing resources and technologies like polytunnels and solar panels, reflectors, and growing lights to create alternate imaginings for food growing in the back lanes.

For example, when participants were asked to consider a scenario where they had achieved 25 per cent self-sufficiency of plant-based food, they discussed the practicalities of this in terms of lack of resources. These conversations reflect the current lived reality of the neighbourhood affected by council cuts and austerity like the taking away of the community allotment site. This had the effect of creating a lack of resources, such as communal meeting spaces, inaccessibility of land to grow food, and money.

However, the fictional scenarios did help in re-imagining the neighbourhood through the

Figure 28: Backlanes as contested spaces for food growing

reuse of existing infrastructures, areas and buildings to grow.

> *Rick: I just don't think you could (...) do 25 per cent in the space the terraced houses have got. I just think it would be too far a step. You're going to have to use everything. You would need some space, the community would need specified allotments or specified green space. (...)*
>
> *John: You could farm the parks and churchyards (...)*
>
> *Rick: Actually I can think of a great green space that nobody's ever been near on the [road name] for years (...)*
>
> *Martha: It's what used to be the old nurses' accommodation.*

The speculative conversations of reusing existing built infrastructures were taken on well by the residents creating some relief from the discussions of lack of resources and money to grow food which dominated the conversations on the walk-in workshop 2. The conversation moved to other public spaces like the use of the city centre, car parks, hospitals, churchyards and schools to grow food for sharing in response to the fictional scenarios that we introduced, it resulted in discussions of access, money and control by the local authorities. This reflected the feelings of lack of agency over growing land seen in Workshop 1, which was linked to prior attempts made by the community to engage the council and other local stakeholders in their food growing endeavours. One example of this is the unsuccessful attempt to acquire community funding to continue a project

that aimed to engage school children in growing food.

The situated fictional scenarios allowed for situated discussions that surfaced tacit or taken-for-granted social norms, conflicts and tensions within the everyday realities that underlie or constrain the possibilities for on-ground action. Participants found it difficult to imagine creatively and collectively beyond what was already present—imagined alternatives often evoked fear and disgust (rather than excitement and joy), which is the case when the future looks bleak due to an uncertain present. However, through the use of our fictional scenarios and with the help of the community expert John, we were able to engage the group in a redefinition of the everyday. This was not a leap into far-fetched futures, but a deeper engagement with the problems of today and how they could be dealt with differently. In this way, rather than providing an entry point or context for speculation, the situated and the everyday prompted the critical questioning of possibilities with the associated limitations of successfully growing food in the neighbourhood. Thereby, situating tensions and future activities within the neighbourhood.

Multi-scalar issues: experiences of disempowerment linked to systemic stakeholders

There were feelings of powerlessness felt by the community due to the ever-looming ecological global issues like climate change and Brexit. Furthermore, if not set within the particular geographical or social setting of the neighbourhood, the futures were formed of participants' values and political views. Participants used their political position and beliefs to emphasise the future descriptions to express ideological values and anxieties around them. For example, in the Land of Brexit while playing the game, participants were concerned about the effects of the looming Brexit on the food growing policies which were controlled by larger government bodies

> *Martha: What would happen as well if the government started giving subsidies (…) like they've done with things like the mustard seed, rape and things, that suddenly engulfs every other crop (…) Monoculture. That's what I'm thinking of. That's the dangers of it, isn't it?*

Given that all participants indicated that they perceived Brexit and subsequently climate change as negative and damaging, speculations about futures beyond them were similarly framed and indicated the helplessness felt by the community and its members

regarding issues of such global concern. Such assumptions, biases, and values implicitly shape these futures and were closely related to the stakeholders through whom these futures could be enacted. Futures can be hard to imagine if the community is not able to think of stakeholders who can put these futures in action, as highlighted in a quote from Molly.

> *Molly: Isn't the question as much as where, who? (...) I mean, the who includes not only people like [name] who're growing stuff for themselves (...) the people who are going to want to spend time and effort maintaining, for example, a vegetable garden for other people's benefit.*

This sheds light on interconnectedness of systems and stakeholders' that influence food growing in the neighbourhood. These futures were limited or enabled through these systems and stakeholders, like the neighbourhood's immediate problems such as fly-tipping, theft and security come from a lack of mutual trust and a sense of community within the residents. Moreover, a change or the addition of like-minded stakeholders with similar value systems or practices creates positive change. For example, the participants express the need for extending the community by involving schools and taking advice from professional urban growers to be able to grow 25 percent of their food requirement in the neighbourhood, in response to the fictional scenario.

Also, an inclusion of other stakeholders like the corporations and councils which are beyond the purview of the community was found to be essential in on-ground work. For example, Rick talks about the possibility of filling in for green work which corporations fall short of through a green in-kind rebate that people like him could receive from the energy or water corporations for their green work for society.

> *Rick: (...) local utility organised companies (...) don't (...) put so much into green work (...) some sort of environmental rebate, you know, on whether it's your rates or whatever and that could be linked to the amount of things you recycle, the amount of things that you grow, composting and things like that or would probably class it as a green rebate or rebate on your on your water.*

The participants also felt a loss of agency and power within these scenarios that were performed at scale and were interrelated to hegemonic systems beyond the influence or control of the community. This loss of autonomy leads to suggestions of community

autonomy and self-sufficient futures, such as through the development of a community enterprise of communal composting and a community garden centre or, through reclaiming land from the council and developers.

As elucidated in the beginning of this section, the fictional futures and speculative spaces were shaped by actual political landscapes (i.e. Brexit, etc.), this exposed the scale and uncertainty associated with macro-level challenges and with abstract concepts such as sustainability, climate change, national and global politics. These evoked anxieties in participants, who voiced lack of agency in shaping and navigating events like Brexit and climate change, which would eventually impact the community food growing futures at a local neighbourhood level. As a result, participants exchanged their current views and opinions on the matters of these macro-level concerns rather than engaging with the possibilities of creating alternative futures. It became difficult for us to encourage discussion on potential speculative responses to such significant world-reshaping events (Climate change, Brexit, etc). However, I also came to better appreciate the impact that these have on participants and their sense of what's possible.

Promises of technology: Problematising innovation through everyday practices and community values

The design of the workshops was technology agnostic; however, they did spark lively discussions about constraints, and possibilities of current and future technologies. For instance, in the case of Land of Robotic Farmers in workshop 3, the participants expressed their concerns with current offerings of technology and the popular imagined technological futures in the game, like the use of robots to grow food. Martha explained the media-led technological visions of using robots sold by neo-liberal corporations as pipe dreams. This discontent is linked to the inability of the present or near-future technologies to offer any support to their food growing practices or not fulfilling the promise offered.

> *Martha: When I was young and technology was just really starting to come up, you know, and there was oh one day robots will be doing everything and you'll have all of this leisure time to yourselves (...) I'm still waiting? I'm 60 (...) Is it just pipe dreams or can we actually do something with technology to stop all this theft and whatever else?*

The collective thinking about futures can be punctuated with differences in perspectives and opinions, leading to disagreements. Although these result from people's experiences or prejudices, they are also a result of conflict or technologies lacking community values. For example, the case of robots used for food growing, which came up as a discussion point in three out of the four workshops, which treaded a fine line between accessibility of the technology, fear and acceptance. For instance, the ubiquitous use of robots for small-scale food growing also instilled fears of job loss, deskilling people, and the loss of tacit knowledge over time. However, the idea is also associated with efficiency and was perceived positively by some. The food growing robot was compared to the functionality of a dishwasher, while their potential limits and the ongoing role of people in their success was also recognised: *the machine is only as good as the programmer* - Dan. Technology wasn't perceived as political in the way that Brexit was, and so the robotic futures provided the opportunity to reinscribe existing food growing values to technology. For example, the use of robots to help grow food without chemicals, enhance yield, help farmers with more leisure time and manage soil. The idea of a consumer device for growing food such as a personal robot is essentially novel, making the participants reflect more abstractly on how they would align themselves with it. Therefore, when the community's values, such as intergenerational exchange, are embedded in such technologies, they are seen positively as a means to conserve and impart knowledge, and skill sharing to the younger generations.

Also, the participants were inclined towards the low-tech practices that they are accustomed to, have agency over, are low cost and serve their purpose. Within this were polytunnels, vertical food growing, hydroponics or solar-powered lights. I found that the participants approached thinking about technology for future food growing in different ways. The two most common of these were thinking in a problem-solution framing, or a more exploratory one. With the problem-solution approach, futures are considered responses or solutions to perceived problems or challenges in the present. For example:

> *John: I would like is, a device which (...) would measure the nutrient content*
> *of my soil (...) because it's really impossible to tell with containers what*
> *needs adding (...) like a pH meter in the soil (...) told me what the NPK*
> *was. (...) like before planting a new crop (...) because you don't want to*
> *keep adding something if it's already there.*

An described above it is an already experienced problem which is being solved by incrementally speculating about the functionality of a future device that would address the issue. In the exploratory or open-ended futures, participants build a picture of the future following one or more abstract themes, such as "community growing". For example, on a new planet, John enabled community growing through seeds and tool sharing using an interplanetary teleportation device, sharing seeds and food growing knowledge with others from different planets which had close resemblance to the capabilities of the internet. Thus, bringing to the fore the ambivalent nature of technology and how re-appropriation of existing technology and innovation is necessary for infrastructuring future social action.

Similarly when considering governance in the new planets, these were built into the value-systems of the participants and the kind of compromises that they were willing to make, for example creating spaces for food growing which would mean the loss of existing biodiversity and ecology. Clara described her eco-community on the new planet as *'low tech'*; however, she was concerned about removing old trees for building and creating food growing spaces similar to colonisation. Yet, she decided as a governance measure not to have land ownership or transport: *"you know, we're colonising this world [new planet] and obviously if it's the same as here then it would have been forests wouldn't it? (...) you don't inherit anything and you live in it while you live in it (...) do away with the concept of land ownership altogether"*.

These negotiations and reconsiderations of values highlight the imbalance on our planet due to neo-liberal colonisation and capitalistic ownership, or how one should not excuse the chopping of trees without any balance in the new world. Such instances of reuse and repurposing draws our attention towards a reconsideration of present day problems where values of technology and innovation are sometimes problematised. However, the values and focus of the community was to look for ways in which current problems can be redefined to create possibilities for infrastructuring for alternate better futures and towards re-appropriated technology use. As participants crafted their worlds, they imbued them with socio-material values from the neighbourhood and personal growing practices opening up possibilities for more utopian visions of food growing worlds characterised by community values.

Figure 29: Eco-community developed by Clara in Workshop 4 as a low technology speculation

5.4 Reflection

This case study uses conceptual understandings of future thinking and its relationship with practices from the previous Chapter (Case Study 1, Chapter 4) and opens up the design space of collective visioning through a series of design workshops. The case study establishes Participatory Speculative Design as an approach building on feminist ethics, Participatory Design and previous speculative work in HCI (Chopra et al., 2022b; Baumann et al., 2016), to break away from the status quo which can constrain thinking about futures of food growing in cities through experiments in living (Marres, 2007). As exemplified in this case study, the participatory processes helped me understand community practices and preferred futures. However, the omission of these practices in speculative processes can sometimes seem to unwittingly replicate and reproduce more normative ways of imagining food futures. This was repeatedly evidenced in the workshop series where the research when using dominant narratives as speculative tropes fell short of engaging the community. It can be said that these dominant narratives were constrained as they did not embed practices or local knowledge. Furthermore, the limited participation experienced in the case study was another factor that influenced such restrictive thinking as it lacked diverse voices and participation from the wider residential popula-

tion in the neighbourhood. The workshops also experienced power struggles among the participants. Prominently seen in Workshop 3 when playing the futures game rather than scaffolding dialogue and deliberation within differing points of view, political perspectives and leanings, it took over conversations thereby, shutting down people.

I found it useful to reflect on this methodological challenge concerning participatory speculation used in this case study with what renowned activist Vandana Shiva refers to as monocultures of the mind (Shiva, 1993). She argues that monocultures are reproduced through dominant systems of knowledge and power, mostly referring to Western scientific knowledge. This concept surfaced in Case Study 1 (Chapter 4) when participants in Auroville were asked about the abstract quality of the vision and its interpretability. They responded that people fill the abstract void or interpret the vision through their own lived reality, everyday practices and dominant narratives from the urban Western society they come from. Thus repopulating the interpretations of the vision through monocultures of the mind (ibid). Shiva highlights that monocultures of the land start first in the mind through the circulation of scientific knowledge and are then transferred to the ground. Monocultures of the mind (Shiva, 1993) persist through powerful institutional mechanisms which replace local knowledge, diversity and decentralised control. Shiva argues that monocultures, therefore, need to be resisted through diversity as a way of life and thought, and the politics of debate and dialogue (Shiva, 1993). This chimes with the development of agonistic public spaces in Participatory Design (DiSalvo, 2012a; Björgvinsson et al., 2012b) and radical pluralistic democracy (Mouffe, 1999).

I acknowledge that normative reductive ways of thinking were a response to the fictional scenarios developed in Workshop 2 and the speculative lands in Workshop 3. Participant responses to these scenarios were either place-based solutions or a fear response to displacement from the neighbourhood. These responses often reflected the design of the tropes that were unwittingly designed into these as provocations. Such as the cornucopian paradigm where sustainability can be achieved through efficiency gains that limitless technological advances and growth can provide (Widdicks and Pargman, 2019) like the suggestion of automation due to scarcity of labour, or sustainability as living with scarcity (Nardi et al., 2018). Therefore, ways of thinking at either extreme can be problematic (Gui and Nardi, 2015a) in conducting speculative ecological work because they can unhelpfully reproduce the kinds of monocultures of the mind that Shiva refers

to. In fact, the challenges, and potential ways of addressing them, are more nuanced and varied than these extremes imply. Although the fictional scenarios were intended to be engaging provocations, in some cases they encouraged normative ways of thinking associated with well-rehearsed narratives and the lack of agency experienced by the participants. This resulted in participants experiencing and sharing negative thoughts about futures or approaching them through a problem solution perspective.

These inhibitions, however, seemed to be limited within Workshop 4 where participants worked on their individual future worlds and expressed agency in designing it. Participants embody everyday practices and tacit knowledge, and the activity made visible the competencies, materiality and meanings within these. Thus, the activity encapsulated their competencies and skills of building a future world which brought forth the shared community and personal meanings within the everyday material practices of food growing. Here, Social Practice Theory provides a useful lens for surfacing existing everyday practices, scaffolding thinking about future practices, and critically evaluating future practices in the context of current ones. However, this case study brings forth a strong association between place and marginalised voices when considering sustainability work which is not usually a consideration in Social Practice Theory. I would argue that materials and competencies are emplaced, therefore, researchers should pay attention towards elements of practices existing in imagined preferred futures. In the socio-technical findings of this Chapter in Workshop 1 through the population of the cardboard map of the neighbourhood, this helped identify a series of values, materials, competencies and meanings building an understanding of the community's tacit shared knowledge. Similarly, the futures imagined in the subsequent two workshops, Workshop 2 and 3, either discussed existing experiences and limitations; or used the community's meanings and competencies to co-imagine preferred futures. The workshops also discussed skill sharing within the community as part of everyday practices, therefore, building on existing competencies rather than imagining anything new. However, I would like to acknowledge at the time the study lacked critical reflexive thinking to link the futures to the community's existing practices through the Social Practice Theory framework. Furthermore, the workshop series did not create ways to carry on this work and look at action-based outcomes in the neighbourhood which are considerations of Participatory Design (Karasti et al., 2010).

Therefore, in developing a final case study in response to these findings, I looked at

responding to challenging normative thinking through methodological considerations of integration, diversification and increasing participation in line with feminist ideas of ethics and care Mol (2008); Haraway (2003). I also take up the considerations towards the integration of place and community practices within the design of the research using three approaches in the next case study (Case Study 3, Chapter 6). The first is using existing scenarios to build speculative tropes, the second is in diversifying scenarios and the third is looking at increasing participation which I explain below.

In the first instance, I focused my attention towards introducing futures co-imagined in this case study (Case Study 2, Chapter 5) and brought these futures to the next study (Case Study 3, Chapter 6). These co-imagined futures were embedded with existing practices from the neighbourhood and the community. Therefore, I opened up these futures for deeper interrogation by participants - to invite more criticality, asking questions about limitations of scenarios, what participants think or feel, or how they could be rewritten rather than asking them to imagine what a future like this would be like. In the following Chapter, I consider ways of grounding the speculation through the integration of place-based instances within the speculative tropes.

In the second instance, I looked to diversify by bringing existing values and practices from the wider neighbourhood and developed creative ways for collective deliberation by using a digital messaging platform. Through the PSD approach, the community members can co-create ideas and visions and are able to respond and deliberate on them to create place-based action. Further creating longevity of the speculative work and engagement with the community beyond the designed engagement.

Thirdly, I respond to the lack of diverse cultural and ethnic representation by creating ways of engaging more culturally diverse participants (Case Study 3, Chapter 6). In particular looking at recruitment material and method, e.g., the wording and language used in recruitment materials, my positionality as a researcher embedded in the community and looking at community gatekeepers; all important considerations and learning for the following case study. Also, considering the potential of digital technologies to increase participation and reflexive processes by actively drawing from and practising cross-cultural research on sustainability and everyday practices. Demonstrated by the rich representations created in Baumann et al. (2016, 2017)'s work, necessary to create instances for long-term engagement in situ to the ongoing community efforts.

Chapter 6

Digital technology as an ally for future thinking

6.1 Introduction

The previous Chapter (Case Study 2, Chapter 5) presents research through a design-led exploratory study consisting of a workshop series, developing Participatory Speculative Design (PSD) as an approach to co-imagine bottom-up food futures. The previous study (Case Study 2, Chapter 5) is designed to be in conjunction with the Green-West food growing community's efforts to move towards collective resilience and food sovereignty. It contributes towards the overall aim of the thesis in investigating methodological processes for long-term sustainability research and supporting local, grassroots communities in envisioning food futures.

The previous study (Case Study 2, Chapter 5) aimed to move away from specific technology solutions and explore some of the more complex socio-cultural characteristics of food growing and future thinking. The study surfaced tensions of collaboratively working towards socio-technical alternatives and complexities of negotiating futures for sustainable outcomes. Thus, the emerging futures were seen to be closely related to place-based material reality which at times stopped the participants from imagining alternate futures. The participants also found it difficult to speculate, instigating fears and a lack of agency and control towards the futures that do not involve the neighbourhood. The workshops also saw power struggles and political tensions surface during the deliberation processes. Furthermore, the research outcomes did not go beyond the workshops

and the participants only engaged with future thinking processes for the three hours of the workshops.

In my continued engagement with the neighbourhood food growing community in Newcastle, in the North-East of England, since January 2018, my role within the community has evolved from an observer, and volunteer to now a member of a project team with which this research is positioned. I have had the capacity to be helpful with my skills and was opportune to align my research more deeply with the objectives of the community. Therefore, this research directly aligns to benefit the community and its objectives which at the moment were to invite new multi-ethnic residents and re-invigorate its activities with an intention towards the future of the community. It also picks up on the initial agenda of the research from 2018 when John, owner of the micro-business Grow-in-Containers, wanted to explore the uses of technology within the community to support more self-organised activity and expand his online community. Moreover, I use it within the context of community-led future thinking.

While previous community-based futuring work in HCI has also used traditional design workshop methods (Baumann et al., 2017; Heitlinger et al., 2019b; Chopra et al., 2022a), they have been applied in small-scale community scenarios. It raises questions about large-scale engagement, longitudinal capacity to increase participation and inclusion of new stakeholders, and also what can be role technology can play in facilitating it (Bødker et al., 2017). Taking learnings from the last workshop series in Case Study 2 (Chapter 5), the importance of place-based speculation was highlighted, which is closely related to reality, to be able to integrate practice and grassroots action for sustainable food growing. This study applies the PSD approach using the modes - invite, situate, deliberate and act, within the design of the research study and uses digital technology as a medium to bring longitudinal capacity for change.

I take unplatforming and off-the-shelf digital technologies (Alhadlaq et al., 2019; Lambton-Howard et al., 2020; Celina et al., 2016; Prabhakar et al., 2017; Bettega et al., 2022) as building blocks to look at appropriating existing technologies and assembling them into interactions to engage participants through the use of QR codes, WhatsApp, and Google maps. This was geared towards lowering barriers to access and looking at participants' existing experiences of technology to scaffold visioning processes. My work is aligned with unplatform design, in particular taking inspiration from WhatFutures, which uses

WhatsApp to run a game for engagement with a large-scale audience distributed across five different geographies (Lambton-Howard et al., 2019). This is a coordinated, top-down resource-intensive future forecasting engagement for the International Federation of Red Cross and Red Crescent Societies (IFRC) to create future scenarios (Whatfutures). The non-co-located participants are divided into small groups and asked to pick up identities and roles as part of the game-led engagement.

However, within the design of my research, I looked at community participation through a different lens of being local, smaller, situated, embodied, and carrying tacit knowledge. Participants are treated as local experts who hold more knowledge and agency than the researcher to make informed decisions for their neighbourhood. The research integrates the need for regular ongoing efforts of tinkering already carried out by the community, placed in close dialogue with more speculative acts in commensurate ways. This creates a diversity of possible contested visions, ideas and on-ground actions by approaching the co-creation of visions in a bottom-up, situated way. Even if the participants are not co-located, they are placed within the setting of the neighbourhood, thereby situating the speculation and the engagement.

Taking on from there, this Chapter looks at facilitating participatory and speculative processes through the use of digital technology. It applies the PSD approach through the activity of walking in the neighbourhood. Walking in the neighbourhood facilitates speculation in a way that is embodied and situated, and emphasises socio-material relationality. It considers the intertwining of people, technologies and processes in socio-technical and material systems (Bannon and Ehn, 2012; Suchman, 2002; Björgvinsson et al., 2012a; Ehn, 2008), and infrastructuring (Karasti, 2014; Star, 2002; Crivellaro et al., 2019). The use of social media technologies contributes to inventing alternative, more expansive, responsible, and accountable ways of understanding and doing participatory future thinking. Therefore, the study takes on the question,

How does a local neighbourhood community experience interactive technology as a platform to support a situated participatory speculation process to promote transitions for sustainable outcomes?

- **What are the experiences of people around opening up a dialogue using digitally mediated deliberation in participatory speculation processes?**

- **How can technology support social cohesion and interaction in communities**

The study creates embodied situatedness through walking the neighbourhood and scaffolds the speculation process with the use of digital technology. The relationality of place and co-imagining place-based futures is achieved through illustrated speculative scenarios supported by the use of QR codes, scanned through personal smartphones. Conversations and documentation of the interactions are captured through WhatsApp groups, to contribute to longitudinal agonistic deliberation. As a result, I contribute to understanding the potential of existing digital technologies to be used as a resource for the design of sustainable and scalable ways of coordinating participation in local neighbourhood transitions for sustainable outcomes.

6.2 Grow Green Futures: methods & participants

6.2.1 Design of the research engagement

As mentioned in the last Chapter (Case Study 2, Chapter 5) the food growing community engaged in this research is situated in a multi-ethnic neighbourhood in Newcastle in the North-East of England. Despite this, the prominent members of the food growing community are middle-class, retired older white adults. The community faces challenges to include people from other ethnicities or who might be from low-income families in the neighbourhood. Similarly, including young adults and students from the local area has been a struggle. The neighbourhood also hosts a large transient population of university students, immigrants and asylum seekers, and has two local schools within the area. Getting the larger residential population involved has been a long-time aspiration of the community, in spite of the residents' enthusiasm to receive free plants, seeds and food growing advice. The issues of inclusivity are also related to the resource and monetary deprivation faced by the neighbourhood due to austerity measures, discussed in the previous Chapter (Case Study 2, Chapter 5) as well.

This study was part of a bigger project - Green West Communities, recently funded by the local council. It was an attempt to recuperate interest and community spirit after the lockdown during Covid-19 pandemic. The community had been functioning without any funding, on volunteer time since 2019 with limited self-organised events. Therefore, to be able to use some funding towards its long-standing desire to include new members and residents from the neighbourhood in its food growing endeavours was a much-needed

change.

Participants (Pseudonym)	Approximate age range	WhatsApp Group	Walked alone or in a group
Christine	45 - 55 years	Group 1	Walked with Bela and other times alone
Raza	45 - 55 years	Group 2	Walked with wife
Mosina	45 - 55 years	Group 2	Walked with her daughter, Bethany, Bela & Omar
Bela	45 - 55 years	Group 2	Walked in various groups with multiple people
Ashley	45 - 55 years	Group 1	Walked alone
Ben	55 - 65 years	Group 1	Walked with Sarah
Delma	45 - 55 years	Group 1	Walked alone
Sarah	55 - 65 years	Group 2	Walked with Ben
Omar	18 - 25 years	Group 2	Walked with Mosina, Bethany & Bela
Monty	55 - 65 years	Group 1	Walked alone
Tom	30 - 45 years	Group 1	Walked with family
Drake	45 - 55 years	Doesn't own a smartphone	Walked with Holly & Albert
Michael	30 - 45 years	Group 1	Walked with Steve
Steve	30 - 45 years	Group 1	Walked with Michael
Bethany	18 - 30 years	Group 2	Walked with Mosina, Bela & Omar
Holly	45 - 55 years	Group 1, captured conversations with Drake & Albert on the WhatsApp group during the walk	Walked with Drake & Albert
Isaac	55 - 65 years	Group 2	Walked with wife
Albert	55 - 65 years	Doesn't own a smartphone	Walked with Holly & Drake

Table 5: The details of participants in Case Study 3.

Therefore, the recruitment for this study, which I call Grow Green Futures, was done as part of the larger project's initiative to meet residents and invite them to join the community's endeavours. It was done with the community coordinators through snowball sampling and along with other ongoing activities which included door knocking, invitations to the activities run by the community, and random acts of kindness. The acts of kindness included cleaning front yards and picking up litter; offering free plants, soil and seeds; and planting trays of microgreens with people who showed interest. During the doorknocking, I helped the community coordinators invite the residents to connect with the community's social media accounts which I had recently created.

These activities were focused on two prominent streets in the neighbourhood, which,

although they are located adjacent to each other, are drastically different in terms of their population demographic, architecture, and enthusiasm of residents to grow food. However, both streets have residents who face food poverty and deprivation, and occasionally access food banks in the area.

Keeping these considerations in mind, the study was designed to run with recruited participants and also be accessible to the wider neighbourhood. This was done through print and QR code-based speculative material, and by inviting people to join the community's social media channels. Participants were promised a shopping voucher in a local supermarket as a token of our appreciation for taking part in the research. I recruited 18 participants with the help of community coordinators who self-identified as Indian, Pakistani, British, and Middle Eastern in origin and were already members of the community or were residents interested in learning more about food growing. Participants were within the age range of 19 to 65 years. For details on different participants please refer to Table 5.

Creating place-based speculative tropes

As learnt from the previous study (Case Study 2, Chapter 5), global issues such as climate change or sustainability are abstract concepts and are difficult to navigate. The scale of these issues makes one feel disempowered to bring about meaningful change. Also, during the workshop series, thinking about futures can be difficult and value-laden as they seem distant and placeless (DuPuis and Goodman, 2005), and mostly devoid of any association with on-ground everyday realities. Furthermore, the Case Study (Case Study 2, Chapter 5) focused on the relevance of practice-based futures through competencies, materials and meanings, relevant to the community I was engaging with and grounding place-based sustainability through everyday action.

Taking these learnings from the previous study's, Participatory Speculative Design (PSD) approach and the grassroots community's focus on tackling sustainability issues by creating on-ground change through their food growing practices, I arrived at the idea of a situated speculative walk. I developed place-based speculative material for the walk which was inspired by existing places and everyday practices in the community that are of interest for food growing. Futures discussed in the previous Chapter (Case Study 2, Chapter 5) were used as initial fictional scenarios to create prompts for participants to reflect on. These were used during community events and skill-sharing sessions to spark

discussions around issues, spaces and futures.

To design the situated walk, I documented several locations in the neighbourhood by walking the neighbourhood alone or with the community coordinators. I also developed an audio-guided walk for the community coordinators to use on their phones while they were walking the neighbourhood on their own. This was for them to closely observe the neighbourhood through a guided voice. The coordinators appreciated this, however, they felt it would be better experienced in a group. The walks were done several times and photos were taken of places that showed promise for food growing which could start interesting conversations. These locations included empty public spaces, edges of roads, built infrastructures, and roadside council planters.

These locations and the fictional scenarios were iteratively discussed and prioritied with the community members who visited the community events. This process helped short-list six locations of interest in the neighbourhood to be then mapped onto future scenarios which seemed promising or actionable to the community members. These then served as place-based speculative tropes to be used during the walks with study participants.

After selecting the locations and mapping them onto the futures with the community members, I decided to develop my place-based speculative tropes further using images rather than written scenarios. This decision was inspired by existing practices scaffolded based on competencies and materials within the community; for example, skill-sharing events for new growers were supported through diagrams and pictures. These images were seen to engage participants much better in discussion during community events as people could visualise, learn and imagine growing different plants. Such skill-sharing practices are in line with the already existing experiments in living taking place in the community, therefore the design of the research materials, activities and interactions in the case study was based on these considerations. Consequently, the images of the selected locations were illustratively augmented, depicting the possible futures on the photographs of specific locations. These illustrations were hand drawn on images using illustration software. I intentionally kept it illustrative, suggestive and imaginary to distance myself from the hyper-real images created by architectural planners or technologists of futures or smart cities. Further, making the images more approachable and accessible for people to imagine and layer with their own ideas.

The visualised futures created using the images of selected locations were further dis-

cussed with members at a couple of community events. The illustrations were very enthusiastically discussed by the community, some members raised issues with the futures and their possibilities of implementation in the neighbourhood. These sessions helped refine the illustrations to support discussions further and act as provocations. Furthermore, the visual language of the speculative tropes was influenced by the aesthetic of existing everyday practices of food growing within the community. These design decisions were based on material, meanings and competencies which ranged from the kind of plants the community chooses to grow, the use of recycled containers, etc. and this was developed into the visual style of the images used as speculative tropes. Such a design decision was taken to illustrate future back lanes, as these have been repeatedly voiced as a contested public-private space and seen cases of vandalism and theft, as mentioned in Case Study 2 (Chapter 5). Therefore, residents mostly grow flowers and inedibles because of concerns about littering. During my initial walks, I saw people using low-cost, recycled material or immovable structures to create small growing spaces in the back lanes. I carried this aesthetic into the illustrations and visualised the futures through the peculiarities of the location. I also took inspiration from a back lane growing space created by a resident using tyres and how he wished to see it as a cul-de-sac. Therefore, the visualisation is a private-public site to grow food, with council-rebated solar panels on the roofs for free electricity, and monitored through cameras and sensors as seen in Figure 30. The use of back lanes for food growing is already a contested topic in the community and the illustration was received with these contestations and debates, feeding into the surfacing of current menacing problems like rat infestations.

Another example is a fringe area next to the [location] a boundary wall, which was often overlooked by residents as a potential site for growing. It was illustrated as a site for growing fruit trees, wildflowers and fruit bushes; to encourage wildlife and insect life in the area and to install a future technology called an eco-monitor to track and create balance in the ecosystem of the place as seen in the Figure 31

Iteratively developing interactions and engagement

During my last few years of interactions and engagement with the community and the local residents in the neighbourhood, I have found them to be aversive towards the idea of technology in general. For them, technology use is analogous to corporate control and aligns with consumerism. However, during Covid-19 pandemic, the community became

All the roofs have been covered by solar panels, a combined private and public collaboration to green and clean the west end neighbourhood. This initiative has provided free electricity enough to run greenhouses and polytunnels in the backyards and backlanes supporting food growing in the neighbourhood. Making it a place of interest for visitors and tourists alike, encouraging the possibility of entrepreneurial ventures

Sensor based devices have been deployed in food growing areas to monitor intrusion and deter trespassers. It only allows people with special access tags in to the community growing spaces and raises an alarm for anyone else

The backlanes have been converted into growing areas for winters which is shared and cared by the community members. This conversion came into being through a citizen created and signed policy that helped create guidelines for converting backyard private spaces into public shared ones

A food growing rebate has been introduced by the council in the west end to encourage people to grow part of their own food. The rebate includes free water and council compost for the community

Figure 30: Backlane illustrated with future possibilities

much more accepting of the use of communication technologies and had been using Zoom to run their events and skill-sharing sessions. During Covid-19 pandemic, the community and Grow-in-Containers also saw an increase in their Facebook followers, with more people wanting to engage with food growing. With the influx of the new online membership which goes beyond the local neighbourhood, the community has decided to retain their hybrid approach to conducting their skill-sharing sessions.

During the recruitment for the larger project *'Green Communities'* with the community coordinators, I decided to test out a few different platforms such as Instagram and WhatsApp to recruit and retain new members among the local residents. WhatsApp was thought to be more accessible to people of all age groups and was already used by residents and community members. Therefore, the WhatsApp group initially set up for the community was used as the primary communication platform to welcome new members and continue conversations. This use of WhatsApp built on the existing competencies and skills of the community rather than building new ones; this was the main consideration for using WhatsApp during the speculative walks in my study.

Similarly, QR codes were exceedingly being used during Covid-19 pandemic, and I chose to test their accessibility with the community members during the community events. I used QR codes as an invite link to join the newly set-up WhatsApp community

Figure 31: An example of a selected space in the neighbourhood which is developed as a place-based speculative trope.

group. The people who were not accustomed to scanning QR codes, including older adults, faced issues in this process. However, with a little guidance these people were able to use their smartphones to join the WhatsApp group.

Study Design

The study design assembles existing everyday technologies like WhatsApp and QR codes to support the community in thinking about situated long-term visions for sustainable transitions. The work applies situated speculation via a neighbourhood walk designed to provoke the residents to think about futures, using place-based visualisations accessible using QR codes scanned on personal smartphones. It also makes use of WhatsApp groups, for people to share their thoughts, ideas and suggestions, thereby, leading to conversations and agonistic deliberation. These activities, of walking and digital deliberation brought in considerations of place, practices and material realities and were tested as initial prototypes by the community coordinators to gauge accessibility and further improve the interactions.

Through these suggestions, a booklet was designed to help people navigate the walks. It invites the participants to be part of a team through a fictional scenario set in 2035 and engaged them in thinking about futures of food growing in the neighbourhood. The booklet listed QR codes linked to an invite to the WhatsApp groups, a training video and a 10-minute audio-guided meditative walk of the neighbourhood. The training video gave information on what to expect during the walk and presented the concept of *timewindows*, giving information on how to use them. The booklet also introduced the 6 locations in the neighbourhood to be visited on the walk. Each location on the map had QR codes linked to the geo-locations of the sites which used Google maps to navigate to the location. This was later appreciated by people who were new to the neighbourhood but were not used by older members or long-term residents.

Figure 32: The infographic describes the different mediums used in the walk to engage the residents such as QR codes, the information booklet, illustrations, web pages and the WhatsApp group. Each medium helped participants envision futures and facilitated discussion to help formulate ideas for change in the WhatsApp groups.

The speculative walk asked participants to visit six locations that had printed flex boards called *timewindows* (see Figure 32). The *timewindow* brings together the considerations of physical place and futures to build situated speculative tropes which were represented through visualisations, audio and written material. It further asked people to

share their reactions, suggestions and ideas on the WhatsApp groups. Each *timewindow* had a unique QR code that invited the participants to scan it, taking them to a website link with the visualisations, audio and written future scenarios. To be inclusive to the larger residential population and create engagement, the futures were in English, and the audio catered to Hindi, Urdu and Punjabi speakers. However, later the content on the web pages was reproduced into an image and placed on the *timewindows* at the request of the project steering group members to make it accessible for people without smartphones.

The contents on the webpage served as provocations for the participants to think about the questions asked on the *timewindows*. They were asked to use the WhatsApp group to share their thoughts with other people. These questions asked participants: *Where they might grow food in the neighbourhood. How could they bring back nature and wildlife in the neighbourhood? How might they achieve these in the community and does technology play a role in this?* Participants shared their thoughts, ideas and reactions in relation to the specific location and the larger neighbourhood with other members on the WhatsApp group.

The timewindows were put up in the six locations for four days starting Saturday morning and running until Tuesday evening. The locations were numbered, and to control the WhatsApp conversations within the groups, at first three timewindows were put up on Saturday, and subsequently, the remaining three were put up on Sunday morning. This was to pace participation and discussion giving a chance for everyone to engage and contribute in their own time. However, for the latter 2 days, for convenience, and to engage the larger residential population, all 6 timewindows were left in the neighbourhood. They touched on abstract yet critical topics with ease through speculation and visualisation, thereby scaffolding engagement beyond the walks through technology use.

Following the walks, I worked with community coordinators to facilitate discussions via WhatsApp groups with the residents about their experience of the walk and how some of the ideas that people shared could evolve. The interactions within the week-long deliberation were designed to instigate conversations around the topics and ideas shared by the participants during the walk and to look at how these could be carried forward. Every evening I shared a series of questions on the WhatsApp groups along

with ideas generated during the walk by the participants. These invited participants to open up conversation and deliberate on how these ideas could be put into practice. I often initiated conversations by tagging participants who had initially shared the ideas, they would then pick up the conversation and invite others into the discussion.

However, some residents were unable to contribute or were not confident enough, but were reading the conversations. In light of this, I engaged the coordinators to help facilitate a socially distanced participatory workshop in the Community Garden where residents could meet, talk about their ideas, and work together to create a collective vision for food growing in the community for the next 5 to 10 years. Following this workshop, the community was able to apply for a small grant to secure funding to help with the next stage of the project. However, they were not awarded the funding.

6.2.2 Data collection and analysis

The initial field data collection started through field notes, observations and researcher reflections collected during the recruitment, events and skill-sharing sessions I attended over the summer of 2021 during the Green Communities project by Green West. The data captured intra-community interactions, discussions and reflections, on my design process and prototypes.

The recruited participants were provided with a recruitment pack, which included flags, badges and a booklet. Each booklet gave information about the research and contained consent forms for participants to sign. They were requested to take a photo of the completed consent form and send it back to me for the record. This was done in case people did not want to meet face-to-face as Covid-19 pandemic was still prevalent. If the participant did not know how to read English, the community coordinators read out and explained the information sheet and consent form to the participant.

After collecting written informed consent, participants were added to the WhatsApp groups if they didn't join it themselves using the QR codes provided in the booklets. To keep the conversations manageable, participants were loosely divided into two small WhatsApp groups. One had more experienced growers along with people who were recent volunteers. They were predominantly white in ethnicity and they self-identified as British, German and Spanish. The other group was of mixed ethnicity where participants self-identified as Afghani, Pakistani, Indian and British. These people were

predominantly who didn't join from the booklet's QR code, also most were either long-time residents or composed of the transitory population in the neighbourhood.

These two groups were also made to create safe spaces for people to be able to articulate and freely express their thoughts, especially considering participants who didn't have much food growing or lived knowledge of the neighbourhood or didn't have English as their first language. Also, the two community coordinators were divided into designated groups where they could offer support to the participants.

Figure 33: Participants during the walk

The participants were asked to be part of the situated speculative walks where they could choose to walk on their own time and with anyone they wanted (e.g. see Figure 33). During the walk, participants were asked to capture experiences, reactions and suggestions of related futures on the WhatsApp groups. The created WhatsApp groups were used for data collection in two stages. The first was during the walk, which contained pictures and conversations shared by the participants. The second was the week-long facilitated deliberation, which invited participants to negotiate and co-create neighbourhood futures for community food growing. Later the WhatsApp groups were opened up for deliber-

ation among the participants for a month. These had pictures, weblinks and conversations. The WhatsApp data was also supported by my observations during the situated speculative walks which captured participants' reactions and embodied interactions in space.

After the walks, one-on-one, semi-structured interviews were conducted on Zoom or face-to-face according to the convenience of the participant. Some participants chose to give their interviews with others. These were mostly couples. The interviews covered topics such as the experience of the walks, the conversations on WhatsApp, and the engagement with others. The data collection ended with a face-to-face workshop where generated ideas from the WhatsApp conversations were discussed with the larger community and placed into a timeline for actionable futures. However, this data has not been used in this Chapter to maintain anonymity towards the community. Table 6 gives more details on the collected data.

Field notes & Observations	Designed engagement	One-on-one interviews	Analysis
1. Multiple board and planning meetings, & conversations 2. Multiple community events, continuing to work as a volunteer	1. Situated speculative walks and WhatsApp engagement	1. 11 one-on-one audio recorded face-to-face or zoom 2. semi-structured interviews which corresponded with 14 participants 3. WhatsApp conversations of two groups with 18 participants	1. Narrative analysis of the WhatsApp conversations 2. Thematic analysis of the 11 interviews

Table 6: The details of the collected data in Case Study 3.

The data has been iteratively analysed at different stages of the project. During the initial stages, my researcher's notes and reflections were used in the design and development of the study. The initial reflections pointed to different place-based aspects, conflicts, materials, meanings and competencies for future food growing in the neighbourhood. These were used as part of the reflective iterative process that was followed for developing the situated speculative walks, related activities and WhatsApp interactions. Once the walks, WhatsApp conversations, and interviews were complete, participants were assigned pseudonyms to preserve anonymity. Audio data from the interviews transcribed and transcriptions were anonymised, and the data was analysed in two different ways,

similar to the bi-analysis of the last study (Case Study 2, Chapter 5).

Therefore, the findings section is divided into two sub-sections (6.3.1 Social cohesion and interaction in communities during digitally scaffolded participatory speculative processes and 6.3.2 Experiences of people in digitally mediated participatory speculative processes).

The analysis first addresses *in what ways did technology support social cohesion and interaction in communities during the undertaken participatory speculative processes?* through narrative analysis (Frank, 2010) which is applied to the WhatsApp data. It considers the chronology of conversations and events, identifying key characters and how they navigated co-speculation. It also helps surface tacit and place-based knowledge, which aligns with the complexities of my long-term ethnographic engagement with the community. The close reading of the WhatsApp data along with field notes of the walk and conversations in the workshop highlight the role of technology in community engagement and citizen participation. I segregated the data into sections by creating a timeline of activities and how the deliberation changes over a period of time. I focused on key conversations where a member activates a topic and how it engages the rest of the community. I looked at ways in which participants communicate, negotiate and navigate differences when looking at neighbourhood food growing futures. The accounts are written (Section 6.3.1) into a narrative to recreate an interpretative rendition of important moments of technology-mediated place-based speculation and dialectic negotiations to highlight chronological and semantic relationships between them. These narratives capture the different phases of activity, and triggers and conversations from one phase to another phase.

Secondly, the analysis responds to *What are the experiences of people around opening up a dialogue using digitally mediated deliberation in participatory speculation processes?* through thematic analysis (Braun and Clarke, 2019) of the semi-structured interview data to surface key concepts and patterns. This thematic analysis is helpful in bringing to the fore prominent themes around technology use for co-speculation emerging within the data through systematic reading and coding. It was applied to the interviews to understand the experiences of people around opening up dialogues using digitally mediated collaborative visioning. These accounts (Section 6.3.2) coded through thematic analysis (ibid) bring into focus the barriers and opportunities for longitudinal digitally mediated

deliberation in grassroots contexts. The data were assigned primary codes to describe the content, later reworked and iterated over time to arrive at the themes. The themes were then arranged into main and sub-themes through thematic mapping which illustrated the relationships between themes. The findings present an account of these.

6.3 Findings

6.3.1 Social cohesion and interaction in communities during digitally scaffolded participatory speculative processes

I present in this section a narrative account of the designed engagement which included - the speculative walks, followed by the week long WhatsApp deliberations and the conversations that followed after. I detail the instances of social cohesion and interactions experienced within the deliberations on the WhatsApp groups. In the narrative, I emphasise the form of the activities and how these affect the engagement and deliberation processes. I segregated the data into sections by creating a timeline of activities and how the deliberation changes over a period of time. These narratives capture the different phases of activity, triggers and conversations from one phase to another. It also combines the field observations by providing context to the interactions in the narrative, which influences the capacity of the community and limitations of participation. Each narrative focuses on key characters, surfacing negotiations and events to succinctly articulate interactions towards infrastructuring.

Initiating connections: Embodied speculation through walking the neighbourhood

People started walking at their own time and pace, mostly in pairs or with people they closely knew like their partners or in groups with their neighbours, friends or at times with the community coordinators. Generally, walking is experienced as a particularly companionable form of activity where the interacting parties are close to one another, sharing the same visible field and as if connected through some kind of bridging operation to correspond with the world (Lee and Ingold, 2020). With this invitation of correspondence with the neighbourhood's surroundings and the everyday lives of the people during the speculative walks, the participants visited the six locations across the neighbourhood where they could access technology-aided resources through the *timewindows*. The *timewindows* were to help them visualise alternative futures for food growing. How-

ever, the act of walking with intent invited residents to look at familiar places in their neighbourhood through the perspective of greening and food growing. For example, residents physically marked places with flags in the neighbourhood as sites they thought had the potential for growing. They took photos of these sites during the walk and shared them on their WhatsApp groups.

This act of noticing (Liu et al., 2019c; Tsing, 2015) while walking invites the walker to create relationality to place, look at it, through new perspectives and imaginings of the mundane everyday. This prompted noticing, triggering reflections, questions, and disagreements which participants were able to communicate to others who were not co-located through the WhatsApp groups.

The sharing of pictures of these sites in the neighbourhood on the WhatsApp groups also acted as an invitation for other participants. People shared where they were or their plans for the walk with others on the WhatsApp group, thereby opening dialogue for other people to comment, mark, and respond to each other's pictures. One such instance was Raza responding to Sara's image and idea of having raised beds in the green area next to the old general hospital; he responded with his own images of where he thought raised beds and fruit trees could also be placed in the neighbourhood. Raza's engagement also invited other participants from the Asian community to join in the discussion, like Bela. Bela appreciated the thoughts and sharing even if it was just to voice her agreement, and said *"Agree with you brother [Raza]"*. Within this conversation, she also took the opportunity to ask for a cutting of his plant.

> *Bela: Brother [Raza] when you will give me the flower cutting?*
> *Raza: You are allowed to take it any time it's just I don't like to cut them when they are in blossom.*

Previously in a face-to-face interaction, Raza had turned down Bela's request, however on the WhatsApp group he obliged. Similarly, there were other exchanges of grown produce and objects being documented on the WhatsApp groups. Therefore, these conversations scaffolded these exchanges of digital and material artefacts; acting as invitations for bridging, building and deliberating with others. Similarly, a broccoli plant was also observed, planted by an anonymous resident under one of the *timewindows* which suggested the use of community planters to grow food within a community scheme. This shows how situated speculations influenced material and place-based interactions, and

realising the actionable capacity of the futures depicted on the *timewindows*.

During the walks, participants encountered each other, shared pictures of each other while walking, had small conversations, talked and exchanged ideas. Some of these were also serendipitous encounters with other curious residents and onlookers in the neighbourhood who wanted to know what these signages in the places meant and what were people doing as they interacted with these *timewindows*. Residents came out of their homes to have conversations with the participants at the *timewindows*. These place-based interactions and conversations extended to include other people in the neighbourhood who were not part of the project. For some, the walk was also seen as an escape from the mundane everyday, as a fun activity done with kids and teamwork towards an achievement for the neighbourhood. For example, a group of Asian women and their children were walking together, taking out the time to engage with the neighbourhood as an act of play and sharing pictures as they walked. As seen in their description

> *Mosina: with teamwork, the area will get a lot better soon*
>
> *Bela: we [are] having a fun time in the evening*

So the walk, along with the *timewindows* speculative tropes and the WhatsApp groups sharing acted as a fertile ground for bringing people together; making them imagine possible place-based futures and creating the possibility of exchanging their experience with each other. Thus, forming connections between place, people and the larger project.

Opening up conversations: Digital deliberation on the WhatsApp groups

Residents joined the WhatsApp groups using the QR codes available on the recruitment booklets and walked to the 6 sites across the neighbourhood. On reaching the *timewindows* at specific locations they accessed technology-aided resources to help visualise alternative futures for food growing. The digitally mediated walks and WhatsApp groups aided in surfacing place-based contexts, issues and future possibilities, thus bringing the physical and digital together.

These place-based contextual triggers scaffolded conversations which were captured on WhatsApp. Participants could quickly document their first reactions and suggestions to what they were seeing and experiencing. They also shared quick updates about where they were walking in the neighbourhood and who they met on the walk. Participants

shared pictures, and compared spaces. The conversations on the WhatsApp groups did bring up vandalism, littering and theft. However, participants navigated these issues by indicating how they would like to upkeep or change these locations by adapting them to grow food, improve conditions for nature and wildlife, or making changes to the existing built infrastructure.

Non-white participants from different ethnicities, with English as their second or third language, used WhatsApp in unanticipated ways which were different to the native English speakers. Most shared pictures of places they were crossing, and of places or plants they thought were interesting on the walk. However, they did not provide much explanation as to what they were sharing and why, which may be due to the language barrier. Moreover, to accommodate participants who did not own a smartphone, they planned to walk in a group or with the community coordinators who would then capture their comments and discussions on the WhatsApp groups. There were also instances when inquisitive local residents would strike up conversations and in the process their feedback or comments would be captured by the participants on the WhatsApp groups. As captured by Ashley below.

> *Ashley: [place] looks like a great space and as [Christine] said above the kids I talked to were really keen on the idea of fruit trees and bushes [good for burying treasure under as well apparently]*

This expanded capturing and documentation extended to sharing of self-initiated projects, other people's gardens, and online links of successful projects. These acted as examples for opening up deliberation and building on each other's ideas. For example, for the boundary wall as a location, growing fruit trees was one of the suggestions. Building from there, Christine shared a picture of espaliers from the internet which sparked further discussions and connected different ideas and sites in the neighbourhood.

> *Christine: [shared picture from internet] something like this could look fab against the stone wall at point 3 [location] or along the backlanes*
> *Ben: there are a few of us that thought espaliers could work well across the area (...)*
> *Christine: [sharing another picture from the internet] (...) Are these similar to the ones you were talking about building @[Ben] (...)*
> *Ben: That looks like a linked system possibly hydroponics (...) a decent flow*

solar pump may well do it

Sharing of images and links of projects from the internet gave a sense of how the vision of growing fruit trees in the specific area can be achieved with the use of tacit knowledge and by leveraging the use of technology. This is an example of how the vision as an abstract idea could be translated into practice.

Tagging people in the chat within the WhatsApp conversations (like Christine did in the previous excerpt) encouraged people to read and respond in real time. Moreover, tagging was also used during the facilitation of conversations to showcase people's ideas or draw others into commenting and engaging. However, the digital platform also gave the possibility for people to read and respond in their own time. This capacity of immediacy and asynchronicity was created due to the bridging of physical and digital aspects within the design of the study. This made it possible for people to not be co-located, and capture and respond to comments on their own time. As a result, it eliminated the need to be physically present together, creating a positive, digital experience and deliberation with digital technology use.

Digital documentation on WhatApp also helped bridge the physical and digital by creating connections between people, places, lived experiences and historical memory. This sharing and capturing of tacit knowledge lead to the inclusion of the transient population and new members, within the neighbourhood and the community. For example, the discussion of future visions also surfaced earlier failed projects by the community on the WhatsApp group, which led to creating commons of knowledge of what would potentially work in the neighbourhood. This behaviour of journaling or documenting visions, ideas, experiences, and knowledge would become data on the digital platform to be used at a later time, or intergenerationally. Thus, creating a digital space for starting and retaining community conversations and ideas.

Situated futures: Infrastructuring longitudinal participation and engagement

After the walks and the digital documentation of the co-visioning process which had suggestions and ideas, the two groups were engaged in a week-long WhatsApp deliberation. For the first five days every evening, I opened a new discussion in the WhatsApp chat. The topic of a discussion was chosen from the ideas shared during the digital documentation of the walks to be used as tactics for engagement on the WhatsApp group.

This was an attempt to further the conversations, find concrete ways of implementing suggestions, and take them forward with the community's existing initiatives.

These conversations were geared towards creating spaces for collective speculation about what can be possible in the neighbourhood and creating the capacity for people to engage in conversation over an extended period. Facilitation was done by bringing together peoples' comments on specific places or topics, through prompts, tagging people and raising questions to create momentum. Participants responded by forming connections between different issues, these interconnections were action-oriented next steps that could be taken towards the topic in discussion. For example, when the discussion of growing fruit trees next to a boundary wall resurfaced, Delma suggested possible solutions like asking the council for permission to use the land, capital investment, community champions to plant and look after the trees, to develop specialised expertise like pruning espaliers, and someone to look after the project.

Other participants picked on these and weaved in their suggestions like engaging with different local stakeholders and groups like schools, creating gardening groups with older people, and engaging the youth. Opportunities to include new stakeholders also opened up the potential for new projects, which led to thinking about use by future stakeholders, creation of new infrastructures, skill sharing, and development of dedicated roles and expertise. For example, there was a suggestion of a community ranger scheme by Tom which was developed later into a youth community ranger scheme to include the youngsters and get them involved in taking care of the council planters and discouraging littering.

There were also suggestions of wanting to utilise unused buildings in the neighbourhood and do an audit of available space to collectively decide how to use them. Being a multi-ethnic neighbourhood there were suggestions of reaching out to the local religious establishments like Churches, Temples, Mosques and Gurudwaras; for example, to keep bees or to host a farmers market. These suggestions led to sharing of weblinks of other successful projects in the UK or the US. This, in turn, led to the discussions about the scale at which the community would like to operate at.

> *Ben: Yes small pockets of neighbours working together to produce as a group*
> *Christine: No more like subscribe to a hub to access resources to help you*

grow, source produce for your restaurant and even get a veg box @[Ashley]

thats another great idea

Ben: They didn't start big, they started small and developed (...) we start

with one or two and as knowledge and capacity builds you start to expand

slowly and at a pace you can manage (...)

Christine: What about a community food growing hub on the web or through

WhatsApp I know this would need resourcing but this could be used for ex-

changing seeds, plants, produce.

This suggestion of using technology to scale led to Ashley suggesting various digital platforms like WhatsApp, WordPress, Youtube and Instagram. This was to coordinate or create a library of resources and courses through curated content like videos on small-scale growing.

Most participants took to these discussions without much effort. There were a few who were very engaged in these online discussions. Some responded in their own time after reading and others were lurkers. Participants who acted as lurkers hardly responded during the week-long deliberation and at times did so through emojis and messages of agreement. These responses would indicate this is what they were comfortable sharing. However, there were also repeated instances of overpowering or shutting down conversations by powerful stakeholders in the community, like Delma, who suggested technology creates dysfunctionality and then went on to mention prior projects which have not worked in the community. She particularly commented on the failings of digital technology and the technical abilities within the community

Delma: Another challenge is the plethora of different platforms against a

mix of community competencies. Again, dull & mundane, but [Green-West]

board struggles with Google docs [myself included] - people assume we are

all equally digitally skilled but really we are not! Very varied skills/abilities

& access to tech out there.

Other participants tried to mitigate these instances on their own by sharing their projects and the need to create long-term plans and look at the intergenerational aspects technology can bring. They added suggestions of appropriating existing in-use digital platforms, creating support and training, and upskilling people. For example, a suggestion for a buddy system was made.

At this point, the participants were creating interconnections between various practices to create new infrastructures for future collaborations. They were also open to the use of digital technology for coordination, creating connections, documentation and sharing skills, like Ben who mentioned going back to using Zoom to do skill-sharing sessions and reaching a larger audience, as they did during Covid-19 pandemic lockdowns.

These action-oriented conversations led to the suggestion of reaching out to the new local councillor and the council's departments to talk about specific next steps, for example, funding and looking for permissions. There was also an acknowledgement of dysfunctionality within the local council and the lack of support from them over the years which created a debate among the participants. However, rather than this dampening spirits, participants started self-organising by suggesting tasks they can take up and work towards, like compiling the various events and social media channels of the community and applying for small pots of money.

After two weeks, there was a face-to-face workshop led by the community coordinators where these place-based futures and actionable suggestions were discussed within the larger neighbourhood community. This should have been the time that the WhatsApp groups as part of the data collection for the project would have ended. However, the participants continued engagement, and the conversation moved towards securing grants. At this point, the WhatsApp group was kept alive for a month to not dampen the momentum.

There was great enthusiasm among the participants, sharing various links to open grants they can apply for. There were instances of some participants shutting down these conversations as they felt their position being challenged by new residents who were part of these online conversations. On the suggestion of taking the plans further and applying for funding, Delma voiced her concerns *"I've rather lost track of what you are trying to achieve here (...) it feels to me there is a risk of duplicating conversations and plans"*. These complex politically driven conversations and dynamics were witnessed in many instances, both offline and online during the study, directed towards various participants and the researcher as well.

The participants did self-organise and requested me to help them to apply for a small grant as an outcome of the continued discussions. The small team of participants and I met on Zoom to discuss the application and write the grant. Thus, the project illustrates

some infrastructuring - including new residents in discussions, forming new connections and developing new projects in the community.

6.3.2 Experiences of people in digitally mediated participatory speculative processes

This section presents findings from semi-structured interviews. Participants were asked about their experiences of the walk and digital engagement. The presented accounts focus specifically on online engagement on WhatsApp which included the week-long WhatsApp deliberations and the month-long online conversations that followed it. The interview data was open-coded for themes and later thematically diagramed to make sense of the interconnections in data. Two stages of grouping were conducted, one to produce themes, and the second to produce clusters resulting in sub and meta themes. The findings related to these themes are presented as a written account in this section.

The findings focus on explaining the experiences of digitally mediated participation and interactions for future thinking. They capture digital behaviours, barriers faced by participants, the opportunities created by the use of digital technology for Participatory Visioning processes, and why some participants did not interact in the conversations.

Navigating situatedness in digital conversations for community-oriented action

The developed situated speculative walks brought in the possibility to engage the participants in embodied speculation, firstly with the use of *timewindows* and secondly through the act of walking with a purpose. The *timewindows* were physical artefacts that connected to the digital using printed QR codes through which the participants could access the futures associated with the locations. These futures presented through the QR codes were visualisations, recordings and written text as speculative tropes. However, speculation wasn't bound to the *timewindows*, it extended to the act of walking with a purpose, to imagine the neighbourhood differently. Christine explains her experience of walking with purpose.

> *Christine: I was expecting to go on a walk, into places that I hadn't necessarily explored in very much detail before and that experience allowed me to pay closer attention, I guess to areas like the planters, like the wall that's next to the [place] led me to think about that space in a different way. I think*

had I not done this walk, I might have just casually kind of walked past and

not necessarily thought about how that space could be used differently.

The walk invited noticing (Liu et al., 2019c; Tsing, 2015) of places within the mundane everyday. Participants looked at the everyday places they cross in their neighbourhood carefully, purposefully and through a new imaginative perspective. Moreover, the situatedness of speculative tropes and the act of walking with a purpose encouraged action-oriented imagination and sharing on WhatsApp. These WhatsApp conversations became bridges between the physical and digital worlds, collecting ideas and conversations about locations, and inviting others to join in digitally.

Sarah: I took out my phone while I was walking around and actually made a comment as I thought about it, just so I wouldn't forget it, you know, share my ideas. So, I was actually interacting on the phone, on the walk and reading other people's comments, as well.

As described by Sarah the use of WhatsApp while walking provided immediacy and gratification as people captured and shared while they walked the neighbourhood. It also acted as an invitation for others to join them on the walk as participants shared where they had arrived. Participants could do the walk in their own free time. WhatsApp allowed for asynchronicity in this respect. The activity was designed to be flexible, even within deliberations on WhatsApp as participants could choose to join in the discussions if they wanted, without being colocated. Bela explained that she used to engage in everyday WhatsApp deliberations while doing her household work and she sees a potential for its use going forward *"Technology will be used definitely as people don't have time to come out (...) you need to work at home, you have a meeting, you can take out half an hour, one hour (...) and discuss it in the [WhatsApp] group"* - Bela

However, some participants repeatedly felt that face-to-face meetings are essential in taking these discussions forward as digital discussions weren't doing justice to creating real on-ground action.

Raza: To be honest with you, everyone shared their ideas which is brilliant. You know, I have different ideas. Other people have different ideas and that's what itself is something, you know, the people who've got more motivation and want to implement these ideas, you know, obviously for them to happen. It's a good discussion, to discuss this in the group in WhatsApp

group. As I said, we need to sit down and we need to take a step forward. The only way we gonna make it a step further is by sitting down and discussing more, spending more time.

Raza and others thought face-to-face meetings are essential in taking things forward, however, there were few people who supported digital conversations but felt it has shortfalls. For instance, the community coordinators thought digital conversations are hard to facilitate.

Monty: conversations about change need to be facilitated and on a typed-up or even a voicemail snippet thing. It's difficult to facilitate that conversation because there isn't any emotional energy. It's difficult to gauge (...) I'm like, oh yeah, that sounds great tell me more but then the other person on the other end, I can't see them, I don't know I've got no body language.

Therefore, the use of digital technology did connect the material, physical world with the digital conversations and helped create convenience for the participants. It also brought in a continued sense of invitation, and flexible participation. However, it lacked the criticality needed for ushering conversations to fruition for real-world action as seen with prior face-to-face community engagements in the neighbourhood.

Opportunities and barriers for creating equitable participation through digital technologies

The *timewindows* and their QR codes were useful in extending participation by inviting and including the larger residential population to participate, offering the residents a way to access the place-specific visualised futures. This led to curiosity, conversations and serendipitous face-to-face interactions between participants and strangers. Furthermore, participants felt that WhatsApp was also instrumental in reducing engagement barriers and increasing involvement as compared to a face-to-face setting, as Tom explains:

Tom: Obviously, in a room full of people a lot of people don't like the sound of their own voice so to speak, and are shy or don't want to speak up for themselves. Well, I think this is easier when you just type in the message.

Similarly, Ben thought it was easier done this way, *"we need to discuss things with people without actually holding a physical [meeting] because it was live, we were still bouncing ideas off ideas, with each other"*. He has been a long-time member of the

community and is considered an elder and an expert. He further explained that working within communities often involves collaboration and coordination. For example, during activities, events, and sharing information and materials; technology is already used by the community members for these purposes. In addition, many participants described that digital technology offers greater potential for participation by larger groups of people.

However, there were various dimensions to consider for participation, especially within the month-long deliberation process. Managing power relations within WhatsApp conversations was an important consideration to create equitable safe spaces for everyone to be able to voice their ideas and opinions. Embedding community values in the technology-mediated participatory speculative process did appear helpful but it also brought forth socio-political conflicts by surfacing the installed base (Bødker et al., 2017; Karasti et al., 2010; Crivellaro et al., 2019) within groups (Chopra et al., 2022a) making it essential to manage power and agency within these settings. For example, WhatsApp conversations even if distributed and non-collocated saw power play.

During the month-long deliberation, the WhatsApp group offered a space to connect and converse within the group without any facilitation from me. These participant-led exchanges were usually initiated by a couple of people and they would be the major contributors to the conversations while others chimed in, adding a one-off perspective or becoming lurkers, as described by Steve.

> *Steve: I think there were a lot of people particularly interested in saying their opinion and they were like very good opinions and I don't think I have that level of expertise to suggest something apart from, we can put some plants there, or we can improve that area. So, I read with interest, I wouldn't dare to say something.*

These dominant contributors were participants who would usually have respected status as experts within the food growing community. However, the conversations also saw novices and other residents voice their opinions and concerns at times. Omar, who walked with his mom and a few other members of the Asian community in the neighbourhood, thought WhatsApp made it easier for him to be included in conversations without being part of the community or knowing anyone in particular.

> *Omar: Technology could be very helpful (...) like for me, I was possibly too*

nervous that if it wasn't for my mom, I probably would have never joined.
I'd be too scared if I actually said something wrong. So technology could
be very helpful for those, especially those who are shy and to be able to, for
example, organize some events.

Even if technology could to some extent even out participation by creating feedback and transparency within the engagement, there were still issues with it. The digitally-mediated conversations still had existing social structures and hierarchies in place, which can be linked to already existing power centres in the community. Moreover, there was also an engagement predicament as highlighted by Ashley where he observed a vocal member of the community not responding to conversations within the WhatsApp deliberations.

Ashley: Why they didn't get involved, that one particular person? I noticed
[on] WhatsApp that they didn't participate, but I know that they would find
some absolutely brilliant things to say (...) it's just really interesting how
technology and different apps and language and other issues can affect how
people engage digitally or have fear and anxiety around that.

These anxieties of digitally mediated conversations came up in many forms, primarily it was non-engagement, which could have been for many reasons, but there were multiple accounts of people who accepted reading the conversations but not engaging with them. This lurker behaviour was thought to be linked to competencies of language and knowledge as mentioned by Ashley, indicating the diversity within the participants. Also, access to technology was a consideration. This was not just linked to who has access to technology but also socio-political access within the neighbourhood. This access could be to resources, power and social capital, which lends to having a voice within the engagement. Christine expressed her concerns about how she thought people's use of technology was linked to their confidence, knowledge, education and income which she thought influenced whether or not someone interacted with the WhatsApp group as well. Similarly, Tom expressed his position of power:

Tom: Like I said, the loudest voices in the room are always the ones that
are heard. That's a problem I don't really think that can be solved, but I
suppose I've got to have an appreciation of that, but at the end of the day,
you know, I am a middle-class white male, so it's fairly easy for me to have

the confidence I suppose, to get my opinions across.

However, there were many participants, especially those who were new to the neighbourhood or to the food growing community, like Bethany, who expressed that she experienced a sense of community through the activity and the consequent digital interactions. For example, by walking together, discussing how the neighbourhood could be changed, where people could grow more food, and how and who could be involved. These conversations created introductions, and built bonds, social capital and a sense of being connected to each other. Therefore, the use of technology does present its opportunities and limitations in creating equitable spaces for participation. Therefore, digital participatory speculation should be navigated with care within community-focused settings.

Scope of WhatsApp as a digital platform for long-term community deliberation

WhatsApp was used as the digital medium to capture instances from the walks where people recorded their reflections on the speculative tropes, their ideas and related images of the neighbourhood. The platform offers multimodal capacity. However, the participants only used images and text to interact with each other, even after initially prompting through facilitation and training messages. Audio as a mode built into the online speculative tropes or its availability on WhatsApp did not influence participants' interactions. Ben explains his choice of medium in the quote below.

> *Ben: I've preferred pictures. I think I'd be a bit too self-conscious to do like artwork or to send voice memos. I think it was easier just to do the text and the pictures.*

Messaging apps are by design made for asynchronous conversations so it meant participants could join in the conversation at their pace and not necessarily everyone had to be present at the same time. This keeps the momentum going and participants chime in as they get time in their schedule or feel comfortable. Participants also thought WhatsApp was a good tool for information sharing, as described by Steve in the following:

> *Steve: Maybe if you want information, of course, it was a little bit better because you can go back to the group and read it. So you have kind of a written trace of what people said and what people thought, but, probably, for some, it's a bit difficult to follow all the conversations from the beginning to the end.*

As described by Steve on one hand, it is very handy to follow everyone's ideas and respond. However, when the conversation is going on participants felt it inconvenient to catch up with the entire conversation thread and pick something from the middle and respond, or as Michael explains:

> *Michael: I mean, it was not anyone's fault. It's just because it's very diffi-cult to interact. I think with the group when there are already 40 messages and as I said, it's quite difficult. It's not like a conversation, so you can just jump in. You have the feeling that I lost the moment when you don't manage to actually answer immediately. So it's just probably the form of interaction that it's a bit difficult to set. It's not because there were others prevailing or because I didn't feel comfortable speaking within the group.*

Participants described the conversation as like a moving train that once it crossed a point, participants could only join from where the conversation was at present. Thus, What-sApp had limitations in holding long conversations, it forced the participants to assume or accept the current context which caused confusion at times, for example, the difficulty in catching up and responding in time. However, as Monty described it *"I'll read the collected collated view"* the asynchronous capacity of WhatsApp was also helpful in documenting and record keeping for people to revisit the conversations at a later time. However, Steve thought there should be something more permanent and long-term which collects such visions for the community's future.

> *Steve: (…) this digital imagination behind the space, that obviously is not [but] what it could be so it was nice to see how someone might imagine this space to be used and then see how your imagination envisions the space and it would have been nice maybe to have the ability to have a panel online where you can add your visions of how to utilise the space.*

Furthermore, all the participants felt that the activity and the *timewindows* should have been deployed for a longer period of time. They felt that the activity should be carried out longitudinally within the neighbourhood for months together, and the use of technol-ogy and ideas developed should have the potential to be accessed when needed. These considerations were voiced to be related to the slow and continuous nature of community work and engagement, as Monty very eloquently described it:

> *Monty: (…) so I think that's infinite. It doesn't get to a point where all*

right, the community is okay now because as soon as you get to a point where right you are okay now, it starts to diminish. It's like tidying your house. You don't tidy it once in your life, do you? You have to keep tidying it.

This expression of community work being endless was reflected in Ben's feedback about the project, *"I think a project like this, it's quite ambitious and I think you'd need quite a lot of community involvement and technology can definitely help spread the word and kind of like rally people to get more involved"*. Therefore, inculcating longevity is essential when looking at co-imaging situated futures. It is an important value to bring to bear in creating socio-technical systems within sustainability-motivated community settings.

Temporal considerations for longitudinal technological interventions

Participants voiced different challenges with the use of digital technologies, such as being self-conscious, a learning curve, and anxieties about correspondence. Even after these challenges, participants also indicated the fear of missing out on conversations. Delma was quite concerned about catching up on the discussions *"I felt like I was constantly behind on it 'cause you know, (...) I suppose I was just trying to play keep up most of the time"*.

However, this constant keeping up also led to digital fatigue. Delma recounts how she found it quite stressful as there were a lot of other things going on so she had to find a workaround for limiting her engagement time.

> *Delma: Asynchronicity of message streams is slightly difficult because, you know, one person says one thing, somebody else responds, but then someone's off on another track and then, then someone loops back to a comment from further up the stream and, so I imagine it's quite interesting to scroll back through and look at the different ideas, but it's, for me, it's very stop-start.*

Such engagements are dictated by personal phone usage behaviours where people attempt to fit WhatsApp deliberation into their daily life. They made time to participate or WhatsApp provided the flexibility for most participants to engage in these conversations while they were doing household chores, cooking food etc. Raza mentioned he looked at

the WhatsApp conversations while he was waiting for a passenger in his taxi, however, did not respond most of the time: *"I am a taxi driver and the least I can do is read on through my WhatsApp, you know, rather than do nothing, I can read."*

Similar to Raza, participants did say life took over making it difficult to engage in the conversations continuously. However, they did acknowledge that it provided a reminder for action and also an escape from daily life, like for Bela where she could think and engage in something beyond her household chores: *"whenever I see the DP [group display picture in notifications] it gives a sense that something is happening in the group and gives a feel, a sense, activities are happening and I think about what can happen in the future"*. This thought-provoking, reflexive practice within the long-drawn engagement and conversations helped participants reflect and think about proposed futures over a period of time. As Bethany points out:

> *Bethany: (...) keep it in your mind kind of thing because I think it will be quite easy to go on the walk and then the next day you [would] kind of not be thinking about it anymore, but because the chat went on for a few days (...) I kept thinking about like all the possibilities and all the different things that people were suggesting.*

Bethany was a new resident in the neighbourhood who didn't know a lot of people and for her, the activity provided an opportunity to build new connections with people, places and imagine her life within the neighbourhood. Similarly, Steve had been living in the neighbourhood for a year and was a new volunteer with the food growing community. However, he felt he lacked knowledge and skills, and didn't have enough historical context of the neighbourhood or of Green-West initiatives. He speculated about a digital community board that could retain past and present initiatives for future generations.

> *Steve: (...) something without having the feeling that you may lose what has been said before. So something a bit more interactive, more than WhatsApp group that allows people to interact (...) upload comments or information without losing track of what's going on. You're giving people a bit more pace and time for making an intervention.*

As mentioned by Steve, the approach to visioning using technology and community engagement has to be created and maintained over a period of time. Similar thoughts

were echoed by Ben: *"I think it would actually be a long-term thing because you don't get results straight away."* With this, he opened various other questions linked to what next and where does it go from here.

> *Ben: How do you think these created futures or visions that people discussed can be implemented? And do you think it's important to then monitor it over a period of time? (...) it's going to require some sort of funding. So monitoring [of projects] goes side by side, the funders would want me to monitor anyway.*

These engagements also prompted participants to reflect on the larger use of technology within the neighbourhood and the larger pretext of its use towards their practices for sustainability. Monty comments on its role in intergenerational knowledge exchange: *"So if we want to educate young people about looking after, sustaining the planet, then we can use the internet (...) use the technology to help communicate."* He also comments on its detrimental effect on nature. He directs the conversation towards understanding technology holistically: *"The worm is a technology that breaks the chemicals, the nitrates into the soil. As technology, they are engineering an ecosystem."* This suggests a need to look at technology use and design through the values of the community.

Conflicts and compromises were noted between nature and technology in discussions that were prompted by the speculative tropes in the activity. However, the participants did give credit to existing technologies over the speculative ones like the use of drones. They recognised the potential for technology to help in their food growing practices, for example, they discussed the use of hydroponics, soil analysers, and plant-identifying apps. Many also suggested street cameras in the back lanes as ways of navigating social issues around food growing in the neighbourhood like littering and theft.

Therefore, adopting socio-technical systems in community settings needs to go beyond the integration of community values. Temporal considerations about individual life transitions, reflexivity, existing technology behaviours, the inclusion of new stakeholders, retaining histories and existing technological infrastructures have to be examined within the mix. Thus socio-technical systems in community contexts have to be defined through the ongoingness of historical context, built into everyday life with consideration for future generations and use.

6.4 Reflections

This case study presents the value of design-led, community-integrated iterative work, and also questions the role of digital technologies as a valuable resource for scaffolding long-term participatory processes and surfacing situated, bottom-up futures. This attempted to support the community in future thinking processes and create social cohesion, beyond the limitation of co-located facilitated workshops. Thereby, the study answers the question about the experiences of interactive technology as a platform to support a situated participatory speculation process. Specifically, it looks at the use of digital technologies for social cohesion and interactions within the local neighbourhood community and the experiences of opening up digitally mediated participatory speculation processes.

Technology is frequently seen as a mediator for well-defined and constrained interactions in collaborative systems (Norton, 2019) or as a silver bullet within community settings to solve existing problems. However, as seen in this case study, it has its shortfalls but can play an important role when considering long-term thinking or visioning within bottom-up community contexts. The use of digital technologies provides a way for people to be involved who wouldn't otherwise participate, as seen in the case of the inclusion of new members. Digital technology also often provides a safer entry point into the community for some people like non-members and new residents to voice their opinions, and shows promise in providing a way to sustain engagement over a long period of time. Thus, WhatsApp presents a possibility for distancing, voicing and dropping inhibitions considering participatory speculative engagements within community settings.

Sustaining engagement through digital technologies can be a valuable asset when considering sustainable futures as an ongoing conversation that can ebb and flow. As these conversations can be picked up and dropped according to the interests, life circumstances and resources of the community members, here asynchronicity is valuable for creating inclusivity. Combined with physical materials in place, as seen in the case of the situated speculative walks, asynchronicity can provide a way to include new or hard-to-reach members of the community, for example, the wider resident population. Also, considering the longitudinal nature of community work, digital technologies can create the potential for long-term documentation and retention of conversations and information to materialise sustainable visions. Thereby, considering their capacity for action and

creating real-life impact over the longer term.

However, digital engagements and deliberations often lose important qualities of in-person conversations, like body language and spatiality. Also, it is difficult to gauge the visibility of the experience or perspective of those who do not interact in conversations, like the lurkers in WhatsApp groups. Moreover, digital deliberations are also prone to power play and extending socio-cultural structures where some participants can take over conversations at the detriment of others. This can also affect face-to-face workshops. Furthermore, as seen during the WhatsApp deliberations participants, found it difficult to join ongoing conversations where the effort involved in catching up on context through scrolling was far too much.

Therefore, digital technologies used in participatory speculative deliberation should provide ways to structure and archive conversations, especially main arguments or insights, to account for longitudinal histories and abstract visions. This would make it easier for people to follow discussions, understand context, and include new stakeholders or members. These suggestions are based on what I observed in the face-to-face engagements, for example, the workshop conducted by the community coordinators at the end of my research (which is not part of my data due to anonymity reasons) to create a timeline for community projects out of the discussed ideas and visions on the WhatsApp group. This helped build a way forward to consider actionable capacity as it provided the participants with an opportunity to take up smaller actionable plans or goals. Compared to my approach, WhatFutures (Lambton-Howard et al., 2019)–which uses WhatsApp to design a large-scale forecasting engagement to develop a global vision–is a structured, top-down, expert-led, resource intensive and placeless activity which resulted in a vision. This structured, top-down approach can be a way of achieving more concrete outcomes which are easily archived, useful, and the community could come back to revisit them over time. However, I would argue that bottom-up community futures are diverse, resource-deprived, non-homogeneous, and situated visioning processes that require everyday tinkering. Thus, WhatsApp groups and discussions can add value for communities in speculating about their futures, but ultimately these should be integrated as tools that support place-based and in-person interactions.

Now, reflecting on the approach of Participatory Speculative Design and the use of reflexive praxis in the design of the research, I strongly propose the need for integrating

non-linearity into the reflexive praxis for developing the research process. This requires developing much tighter iterative cycles of analysing data and feeding into the research, to observe and develop, and observe again to concretise understandings as seen in this case study. This process would also align with the experiments in living (Marres, 2012) cycles within the community and would reflect their daily experimenting and tinkering. An example evident in the thesis is where the design and use of speculative tropes when not used properly (as seen in Case Study 2, Chapter 5) can lead to futile ideas and futures.

Considering Social Practice Theory and sustainability, for SHCI researchers I would also like to add that the process of visioning in this case study (Case Study 3, Chapter 6) pulls through key aspects of community practices from the last Chapter (Case Study 2, Chapter 5). This sensitisation helped make design decisions towards the development of the research and its activities. The situated speculation developed through the design decisions within this case study considers everyday practices of the community, for example, the developed illustrative situated speculations in the *timewindows* made visible the competencies, materiality and meanings of the community's food growing practices. However, these illustrations–rather than being hyper-realistic as is usually seen in architectural planning–in my work are kept suggestive, letting participants imagine and layer their ideas on top of them. Furthermore, the deliberation processes within the research engagement are built on tacit knowledge that the participants bring to the participatory process, for example, during the WhatsApp conversations. The engagement process also helped in developing further competencies and skills within the community, for example, participants' technology literacy and future-thinking capacity. Thus, building on considerations for infrastructuring (Star and Ruhleder, 1996), this can be especially said for participants who returned from the last case study to this one (Case Study 2, Chapter 5 to Case Study 3, Chapter 6). This emphasises the need for visioning processes to be ongoing speculative processes towards preferred futures.

Therefore, Social Practice Theory can be used as a valuable resource for developing visioning processes for sustainability outcomes through community specific materials, competencies and meanings along with considerations towards place. Moreover, visioning can also be positioned as a practice and designing tools for visioning through existing digital technologies, can develop, promote and support the (visioning) practice. Therefore, SHCI researchers and designers should think about visioning in the context

of existing everyday practices within the community, and how elements of existing practices might come together with newly designed materials to establish an acceptable and meaningful way of doing visioning (as a practice). Social practice theory can help us think about design and can help us explicate the beginnings of what might (or might not, and why) become established ways of doing community focused visioning with digital tools. This allows us to consider what visioning as a practice might start to look like when communities establish it themselves, rather than as a design activity or a method, facilitated as a structured activity by researchers. I will take these considerations and arguments further in my discussion (Chapter 7).

If technology and the needs of the economy are our starting point, then we have what we are faced with today—a model of development that is dangerously distanced from the needs of particular peoples and places and rigidly imposed from the top down.

(Helena Norberg-Hodge, 1991)

A radical rethinking of how we construct knowledge, models of development and understandings of sustainability is imperative to consider. Society needs new frameworks for imagining and practically creating futures which are related to marginalised voices and embedded in place.

Chapter 7

Negotiating sustainable futures in communities through Participatory Visioning

In the previous Chapters 4, 5 and 6, I presented my three empirical case studies, with two communities; one in the small town of Auroville in India, and the other in a deprived neighbourhood in Newcastle in the North-East of England. In this final Chapter, I consolidate and bring together the implications of my empirical findings from previous Chapters to inform design praxis for future thinking with grassroots communities interested in sustainable collective action. My discussion is focused on the implications of my findings for the Design and SHCI community engaging with urban sustainability.

HCI research within the past decade recognises the practice of food growing as a way of living sustainably and to collectively negotiate sustainability. Urban food growing has been identified for its potential to support sustainability practices in more reflective, situated and slow-paced ways, where these communities of practice (Wenger, 1999) bring to the fore the importance of living experiments (Marres, 2012) to build longitudinal on-ground change. However, the practice has been repeatedly positioned in relation to technology (Heitlinger et al., 2014; Norton et al., 2019; Liu et al., 2019b), where the development of new technology or its use can help fix sustainability issues (Comber et al., 2013; Altarriba et al., 2017). I argue that through my research on community action, this framing is problematic. Practices of food growing should be approached through its everyday potential for creating situated change. Positioning urban food growing as

a social practice that can disrupt hegemonic ways of growing and consuming food and thereby create publics for mobilising people, inspiring bottom-up future visions can operationalise long-term sustainability outcomes.

I present three discussion points contributing to SHCI that look at transitions towards technology infrastructures to support more equitable, sustainable and actionable futures through Participatory Visioning. My argument rests on shifting from conceiving urban food growing, one of many aspects of sustainable living, not as a sustainability problem to be fixed through technology but one of *'worlding'* (Haraway, 2003, 2016). As Haraway puts it in her earlier thinking around the conception of worlding in her *Companion Species Manifesto* (Haraway, 2003), drawing connections to reality says *'reality is an active verb, and the nouns all seem to be gerunds with more appendages than an octopus'* (Haraway, 2003, p. 6) and of course, these tentacularities rear their tendrils as active modes of thought when thinking about situated futures in messy contexts. This Chapter presents these tentacularities through the four key theoretical and conceptual threads that run throughout my thesis and weave together its contributions; these are - feminist theory, living experiments, Social Practice Theory, and visioning. I argue my Participatory Visioning process is as Haraway says *'a risky game of worlding and storying; it is staying with the trouble.'* (Haraway, 2016, p. 13). Participatory visioning is an active, ontological process; not simply a result of our existence in, or a passive encounter with, particular environments, circumstances, events or places but an iterative process. This process of setting up worlds, materials and semiotic qualities removes boundaries between subject and the environment. They are informed by certain experiences, places or encounters which are embedded in materiality and context in which events and interactions occur – a way of being in the world and attending to the world – by actively imagining it and materialising it in practice.

Aligned with this I present theoretical, socio-technical and methodological contributions that build Participatory Visioning in the thesis. The three main points and contributions are

1. *Theoretical:* reframing visions as experiments in living.

2. *Socio-technical:* the role of technology in sustainable futures.

3. *Methodological:* Participatory Visioning as an approach to grassroots sustainability.

Reframing visions as experiments in living: I am reframing visions as experiments in living as a conceptual contribution bringing in nuanced perspectives about theoretically approaching futures. Firstly framing futures through a bi-focal lens where the situatedness of the futures brings its close connection to reality which is essential in sustainability. Secondly, Infrastructuring place-based sustainability through a multi-scalar approach is essential in bringing about longitudinal change by recognising the constraints brought in by scalar politics. Lastly, the individual is part of the collective consciousness where I argue through my case studies that the role of specific individual commitment and expertise is important in bringing about collective action.

Role of technology in sustainable futures: I articulate the role of technology in sustainable futures as a socio-technical contribution where I present the possibility of approaching socio-technical futures through reappropriating and assembling high and low technology already existing or in use by the communities. The section also focuses on the need to engender community-driven technological visions for SHCI to understand and develop these values into existing or future technologies. Lastly, capturing the experiences of Participatory Visioning in community contexts, scaffolded through digital technologies is also important to support reflection and further discussion within the community. Here I explain the possibilities and limitations of digital technology when used in future thinking processes.

Participatory visioning: I present Participatory Visioning as an approach to grassroots sustainability as a methodological contribution. Participatory visioning can add value to future research, and be adopted and worked on by other SHCI researchers when approaching sustainability communities. I start by challenging the normative role of the researcher through reflexivity which is necessary when working in marginalised community settings. Later I bring into focus the need for surfacing and building relational civic agency, where I elaborate on what constrains agency and how it can be created in engagements. Lastly, I outline the necessity of balancing values, agency, politics, and deliberation in Participatory Speculative Design where I present a framework for Participatory Visioning - Invite - with care and companions, Situate with place and the installed base, Deliberate - with agonism and longitudinality, and Act - with consciousness and infrastructural agency.

7.1 Reframing visions as experiments in living (conceptual contribution)

The food growing communities I engaged with during this work have, for some time, been trying to create alternatives and operationalise sustainability values through their food practices. These values and practices are very much in opposition to mainstream food systems that rely on large-scale, intensive industrial monoculture. The everyday experiments in living (Marres, 2012) that take place through food growing within the communities, and the subsequent documentation and communication of it, are an attempt to practice, negotiate, and modify everyday habits and habitats through ongoing changes in routines and spaces, while also reaching out to include more people in them. Extending this approach, the following three sub-sections (sections 7.1.1, 7.1.2 and 7.1.3) look at visions and the potential Participatory Visioning presents in reframing SHCI.

7.1.1 Forging bi-focal connections to present and futures

The thesis looks at future thinking as a way to approach sustainability within HCI, within the context of urban food growing. It is accepted that cities and their food practices are interrelated (Choi and Blevis, 2010), therefore the thesis inspects urban visions through food growing practices and community-led bottom-up futures. However, scenarios and socio-technical visions related to city futures often premised on neo-liberal logic continue to permeate HCI (Gandino et al., 2009; Khan et al., 2013). Many researchers have criticised these approaches and asked to include marginalised citizen voices (Antoniadis et al., 2015; Balestrini et al., 2017; Foth et al., 2015; Thomas et al., 2016) such as urban food growing communities (DiSalvo and Jenkins, 2017; Heitlinger et al., 2013, 2019a, 2021).

These communities, as presented in this thesis, work towards building sustainable futures through everyday experiments where they collectively create practices of social and cultural change (Marres, 2012) as seen in Case Study 1 (Chapter 4) in the small town of Auroville, in the south of India. The residents of Auroville create bottom-up community-led knowledge paradigms that are built on diversity and lived experiences which are tacit in nature. For instance, the interconnected food system in the town is built up of different farms, establishments, organisations and practices like community kitchens. These are intricately connected to the everyday life, experiences, and practices

of the participants; ridden with real-life place-based issues and complexities concerning the lives of the citizens (Norton et al., 2019; Lyle et al., 2015; Heitlinger et al., 2013).

The everyday issues and complexities of life can be overwhelming and compel citizens to be locked into their present reality. Thereby making it perplexing to imagine positive futures as seen in Case Study 2 (Chapter 5) with the food growing neighbourhood community in Newcastle, in the North-East of England. The community approached future thinking through participatory speculation in Case Study 2, arguing that it is even more challenging to create spaces for critical dialogues based on rational approaches (Hollands, 2015) rather than rhetorical ones. This is a common issue with techno-solutionist visions (Mullins, 2017) and Speculative Design (Tran O'Leary et al., 2019; Rozendaal et al., 2016; Light, 2015). For example, during the activities of walking and playing the futures game, statements from participants about why a future could not exist brought ideas on materiality, social interconnectedness, and contestation of values in the series of Participatory Speculative Design workshops. However, the importance of practice, materiality and social interconnectedness when integrated into future thinking leads to an integrated approach which produces hyper-local, close-to-reality, actionable futures as seen in Case Study 3 (Chapter 6). The futures were negotiated and realigned with the community members over a period of time as circumstances evolved within the neighbourhood in Newcastle, England; as seen during the walk and the use of WhatsApp for deliberation. These negotiated futures considered material assets, infrastructures and competencies already available within the neighbourhood and the community rather than developing new ones.

The thesis grapples with these questions, when thinking about futures, whether one should break away from reality and look at the future in a new light as seen in science fiction (Haraway, 2013) or Speculative Design artefacts displayed in galleries (Dunne and Raby, 2013). If one does, will the outcome fail to make substantial changes in the present to influence the future? The thesis presents futures as radically plural; furthermore, there is nothing to suggest that one's preferred future situation will necessarily differ from the present status quo (Haylock, 2018). This is a constant struggle when approaching futures especially, when controlled and directed in a top-down manner concerning cities (Mullins, 2017) framed by so-called experts, policymakers and governments with a linear narrative of the future. There are attempts made to justify and amend

such visions through citizen involvement and planning consultations as in the case of smart cities, however, they fall short of making any considerable change to the already mapped trajectories. Therefore, it is not far-fetched to say that the notion of a *'smart city'* (Vanolo, 2016; Mullins, 2017) is an illusion as it distracts us from our existing challenges and presents a hypothetical and distant solution to our everyday problems. Such visions build on the predictable trajectories of technologies or how future societies can be rather than negotiating the complexities of everyday life, the diversity of futures and their ethical standpoints. However, to contribute meaningfully to society now, I argue it is important to ground speculations in the present reality where these instances might be looked at as drone footage fitting more closely with the analogy used by Halewood (2017); of momentarily leaving the Earth and returning with a new perspective on our return (Halewood, 2017). In this case, such an approach suggests potential glimmers of possible actions in the present future rather than the postponement of it into the distant future.

Within HCI and Design, I see these contestations through my thesis - between the present and futures, as bifocal connections rather than leading to an outcome. These connections can be created by interlinking future activities with current practices or embedding present-day progressive values to create positive outcomes, like through the integration of communities in discussions about futures (DiSalvo and Jenkins, 2017; Baumann et al., 2016) and understanding their political and ethical inclinations (Wakkary et al., 2013; Lyckvi et al., 2018). The present provides a format or protocol for probing and testing other ways of life, to explore collective practices of researching social and cultural change, which could be used by everyday citizens who do not necessarily identify themselves as *'social researchers'* (Marres, 2012) to build progressive futures in practice.

Therefore, visions in line with everyday experiments are abstract, interpretable forms of articulations that create imaginaries to form connections to individuals and communities. This is different to plans which are steps that need to be followed to achieve a defined goal. These goals can be problematic as they can be devoid of participation and on-ground realities to create the possibility for situated action. Thus, looking at visions through an ongoing longitudinal lens as experiments in living where they are negotiated in practice. Moreover, when aligning to experiments in living these practices are deliberate because people are trying to change them through continuous tinkering

thereby, building niche practices much in line with Social Practice Theory. The three-part practice framework by Shove et al. defines practices as consisting of materials, competencies, and meanings; they argue that practices emerge, persist, shift, and disappear when connections between these types of elements are made, sustained, or broken. These *'meanings'* include *'symbolic meanings'* in addition to *'entities'* and *'competencies'* (Shove et al., 2012, pg. 14) where these symbolic meanings are socially constructed ideas and aspirations linked to the practices. This interlinkage of material, mental, and performance, helps frame the argument for the role of visions in forming everyday practices and helps to support the capacity of visions as *'symbolic meanings'* or *'ideals'* held by a community that can influence the creation and perpetuation of change. Therefore, it is valuable to articulate the visioning process as experiments in living grounded by elements of Social Practice Theory. To illustrate this cyclical iterative visioning process, practices emerge or shift from the three elements of Social Practice Theory: meanings, materials and competencies; these practices are tinkered with using experiments in living which in turn results in alterations of the three elements. These altered elements result in the emergence of niche practices.

Applying this cyclical iterative visioning approach towards both top-down and bottom-up ways of looking at the futures would help ground far-fetched future visions in material and socio-cultural complexities. For example, sustainability, as taken up by designers and technologists when designing future technologies and systems for cities, need to integrate on-ground actions and values of present sustainability communities to create sustainable future cities (Norton et al., 2019; Heitlinger et al., 2019b, 2021) These communities bear evidence of working every day towards futures that challenge existing political ideology or present social context through daily slow actions. HCI researchers and interaction designers can develop alliances with these ideological alignments to create a shared value system over a period of time to imagine and build alternatives to the present hegemonic systems of control. By deeply looking for contestations in values and ideologies, operationalising design and creating safe spaces for exploring alternates to subaltern narratives (Spivak, 2012).

7.1.2 Infrastructuring place-based sustainability through multi-scalar approach

The thesis asserts that future thinking is influenced by various interconnected social and material aspects (Halewood, 2017) enacted in everyday practice. These practices are formed over a period of time through the influence of society, politics and economy, and futures are imagined through these socio-political-economic frames (Tran O'Leary et al., 2019; Baumann et al., 2016; Heitlinger et al., 2019b). In the context of sustainability and more specifically urban food growing, place-based responses are significant for creating longitudinal efforts. Since access to and use of specific pieces of land and soil is fundamental to the practice, in a way that isn't always relevant in HCI (Rosén, 2022; Liu et al., 2019b,a; Bardzell et al., 2021) nor previously taken place in infrastructuring and social innovation contexts (Lindström and Ståhl, 2020; Chopra et al., 2022a; Le Dantec and DiSalvo, 2013).

At the same time, the ability to grow food in urban areas is also impacted by a range of local and global concerns and influences beyond the control of the residents as seen in different case studies within the thesis. Within the context of Auroville, India (Case Study 1, Chapter 4) these concerns feed into how it functions as a town, with its indigenous self-governing and economic system presenting an alternative to the mainstream urban life. In comparison, the concerns of the neighbourhood community in Newcastle, in the North-East of England and its efforts, contrast with the hegemonic food system which forms the latter two case studies (Chapters 5 & 6). Both communities are affected by top-down policies, local and global in scale. I try to bring into dialogue the two community's ongoing efforts in sustainable food growing activities, in juxtaposition to multi-scalar issues. This helped focus the developed research, ideas and speculations around existing infrastructures and achievable place-based change (Crivellaro et al., 2019; Prost et al., 2019).

Thus, the overall thesis brings into dialogue different scales, one by engaging with communities operating at different geographical and functional scales. Taking into account a small town in India and a neighbourhood community in the North-East of England. Secondly, by creating a multi-scalar approach by moving between very intimate spaces of home gardens to a town and towards planetary care. Çağlar and Schiller argue a multi-scalar orientation does not consider scales as distinct from each other (Çağlar and

Glick Schiller, 2021), the case studies surface the interconnected relationships which span global processes, key geographical frames and draw together - both the situated necessity of community responses and the global inter-connectivity of their challenges. Thus, presenting deeper questions, about each community's current ways of living more sustainably, as they strive to sustain themselves within the context of a perceived-to-be-broken socio-economic system which in turn shapes them.

Prior work with local food growing communities working towards addressing ecological sustainability focuses on addressing global issues such as climate change (Heitlinger et al., 2013, 2018a) through place-based interventions responding to intra-community action or individual growers' values (DuPuis and Goodman, 2005; Heitlinger et al., 2019b). However, these examples of collaborative acts of growing do not outline the political multi-scalar complexities that affect local action through top-down trickle effects such as government policies. These complexities arise from negotiations of multiple stakeholders, conflicted values and the need for longitudinal sustained engagement beyond design interventions and workshops (Bødker et al., 2017). My multi-scalar approach looks at sustainability not as a design problem but as a way of *'worlding'* (Haraway, 2016) still involving complex issues around environmental degradation intertwined with social problems that must be explored and addressed over suitable longer time scales. In the context of ecological sustainability, this specifically pulls focus on how infrastructuring can help surface the multi-scalar political complexities of socio-material infrastructures that shape everyday practices and political action within the context of local communities.

Therefore, the complexities of social and material realities such as policy, economics, community participation, and infrastructure should not be overlooked (McPhearson et al., 2016; Gui and Nardi, 2015a,b; Björgvinsson et al., 2012a; Biørn-Hansen and Håkansson, 2018; DuPuis and Goodman, 2005) when thinking about the futures in SHCI. Rather thinking of them as constituents within the infrastructures of imagination which can be negotiated and reassembled for long-term multi-scalar actionable narratives.

7.1.3 Individual is part of the collective consciousness

There is a recent move in SHCI to distance itself from the neoliberal notion of the individual as the vehicle of change (Dourish, 2010) and the use of persuasive behaviour change technologies (Knowles, 2013; Brynjarsdottir et al., 2012). This critical departure

from the initial overwhelming reliance on individuals as a unit of influence builds on the systemic nature of sustainability (Hobson, 2002; Dourish, 2010; DiSalvo et al., 2010) rather than positioning behaviour change as individuals making informed, autonomous and rational decisions (Brynjarsdottir et al., 2012). Such research identifies limitations in the capacity for individual action due to different socio-political scales, the complexity of long-term negotiations and material challenges (Dourish, 2010; DiSalvo et al., 2010; Dillahunt et al., 2010).

In response, SHCI's recent Social Practice Theory turn takes practices to be *'embodied, materially mediated arrays of human activity centrally organized around practical understanding'* (Schatzki et al., 2001, pg. 2). Moreover, Shove et al. explain practices to be the fundamental unit of social existence which influences both social order and individuality. They also explain the relevance of social order by arguing *'Rather than existing in mental qualities, in discourse or interaction, the social exists in practice'* (Shove and Walker, 2007, p. 12). For example, Warde's (2005) work suggests consumption habits as part of daily practices, thus making it possible to study practices such as laundry (Shove, 2003), showering (Gram-Hanssen, 2007) and energy use (Strengers, 2011), empirically and analytically. Practices like these are complex bundles of activities that invariably involve human and non-human participation but are not entirely dependent on human intentionality and action (Schatzki, 1996; Reckwitz, 2002; Shove, 2003).

However, through this research, I am arguing that sustainable practices are established over a long period of time through careful adaptation and negotiation, acting as *'system builders'* (de Boer et al., 2009; Smith, 2007), through intentionality and action. These intentions can be diverse as seen in the three case studies where the individual makes a conscious decision to change their behaviours and sustain them over a period of time through daily efforts and experiments in living (Marres, 2012). It is important to acknowledge that these practices emerge, take hold, and diffuse, but require a social network (community) to do so, thereby, building capacity to help translate niche practices into amenable forms for a larger audience. It's also worth noting that in *'The Dynamics of Social Practice'*, Shove et al. (2012) note that individual practices are at the same time defined by others and reconfigured in a small way with every performance. This accounts for diversity of performances, experimentation, learning, etc. So practices can evolve slowly over time, but also niche innovation can occur within the right circumstances that allow new practices to emerge, and spread. For example, the small individual experiments and

efforts as seen in the first Case Study (Chapter 4) in Auroville, India, especially, within individually managed farms form the basis for the interconnected ecosystem of practices. One can look at these individual daily experiments in living (Marres, 2012) and tinkering (Mol, 2008) as microcosms that can be replicated and interconnected to others, forming ecosystems of social cohesion and practices. Further, the first Case Study (Chapter 4), offers perspectives on the role of the individual, being vital in creating systems and operations within interconnected practices in Auroville, India; where the onus is on the integrity and ingenuity of the individual in leading a minimal sustainable life as there is no governance enforced on the individual resident.

Comparing this to the role of the community expert in the other two case studies (Chapters 5 & 6) within the neighbourhood in Newcastle, in the North-East of England, the local expert is essential in navigating community settings, and uncertainties and creating spaces for alternate thinking, beyond the capacity of the researchers. The case studies also present the importance of navigating individual points of view and imagined futures for agonistic (DiSalvo et al., 2008) co-speculation beyond consensus. The individual is important in carrying out and maintaining the practices in a slow manner as part of everyday life. Also, the community experts, such as experienced growers and community coordinators, were essential in recruitment, coordinating participation and scaffolding speculation in both case studies. For example, John, the community champion in Case Study 2 (Chapter 5), was an important member of the community who helped other community members during various workshops by pushing participants to further their imagination.

My work in the thesis evidences the role of the individual in creating and leading, experiments in living Marres (2012), and later sharing it with the larger collective. This creation and communication of knowledge by the individual engenders connectedness and collective knowledge generation as a community. Through the lens of Social Practice Theory individual competencies are pulled through into material collective acts like in the various case studies through iterative, slow and meaningful changes. I would like to now pull in ideas from feminist theory and care, looking at the interconnectedness and interdependence of all life (Haraway, 1987; Escobar, 2011); within these ideas, the individual is positioned as part of a whole. Therefore, I argue these emerging individual differences are essential in creating diversity and richness necessary for breaking normative ways of thinking (Shiva, 1993) and creating agonistic public spaces (Björgvinsson

et al., 2012b). This is essential in collaborative visioning practices where individual singular visions are negotiated and deliberated within a collective setting to create action. These complex acts of negotiation and deliberation are necessary in community settings for Participatory Visioning to take place to better address marginalisation and create equity. Bringing to the fore the importance of individual action in creating and materialising sustainable visions positions the individual as an expert, is not only necessary in imagining new futures, and alternatives to existing practices but also in upholding these practices over a long period of time and negotiating the created futures within everyday reality. I, therefore, argue that SHCI should look at individual competencies in particular as an essential and critical element in imagining sustainable futures and enacting them within a larger social eco-system.

Here I draw attention to Dourish he insists the focus on individual behaviour change (Brynjarsdottir et al., 2012) within SHCI is because of the unexamined underlying socio-cultural, political and economic factors that drive research (Dourish, 2010). He is particularly referring to academic research and its alignment with the ideological framework of a neoliberal capitalist system, which pervades every aspect of life, including environmental management and therefore the logic of future research is automatically geared toward individual action (Dourish, 2010). Therefore, I argue a reframing of SHCI research is needed to not just look at the monitoring, education or persuasion of the individual to make change happen (Brynjarsdottir et al., 2012), but rather to create agency and safe spaces for individuals to deliberate, imagine and enact change as an important part of the community. As the saying goes, *'the whole is greater than the sum of its parts'*; in this context, the parts are individuals, who are necessary for the whole as they bring in a diversity of ideas, perspectives, actions, and value systems to the community. Consequently, the individual is still the vehicle for change but within a collective setting, this presents an opportunity for the SHCI community to assimilate resources for the individual to build momentum, create publics (Le Dantec and DiSalvo, 2013) and thereby, infrastructuring longitudinal sustainability (Chopra et al., 2022a).

Hence, I position sustainability communities as a collection of diverse individuals who are already motivated through value systems (Busse et al., 2013), political views (Prost et al., 2014), self-transcendence (Knowles, 2013) or religion (Rifat et al., 2020); creating the possibility of alternate futures and, thereby, change (McPhearson et al., 2016). These motivations can be looked at as research areas within SHCI research to further imagine

and inspire individuals to be able to transition towards sustainability rather than just persuade behaviour change.

7.2 Role of technology in sustainable futures (socio-technical contribution)

This section takes up the sociotechnical contributions of the thesis which looks at developing an understanding of future technology use in community sustainability contexts. I address this through assemblages of high and low technology (phrase I use in Section 7.2.1), engendering community driven technological visions and scaffolding Participatory Visioning through digital technologies.

The thesis starts with an agnostic approach to the design of future technologies as prior research within SHCI has focused on techno-solutionist (Lindtner et al., 2016) approaches to sustainability (Holmes, 2007; Cueller and Danielson, 2007; Petkov et al., 2012) through behaviour change (Comber et al., 2013; Clear et al., 2013b; Prost et al., 2013) or else focused on jotting values necessary for the development of future technologies (DiSalvo et al., 2012; DiSalvo and Jenkins, 2017; Norton et al., 2014, 2019; Mitchell Finnigan and Clear, 2020).

This contribution elaborates on the understanding of technology within the communities engaged in the research delving deeper into values and needs attached to existing technology use. The section also discusses technological futures envisioned by the participants in the process of speculation, throwing light on their reactions, reflections and negotiations on these technological futures. Lastly, I provide insights into the role of digital technologies in scaffolding visioning processes to create long-term engagement and deliberation. I discuss these in detail in the following three subsections (sections 7.2.1, 7.2.2 and 7.2.3).

7.2.1 Futures through reappropriating and assembling high and low technology

At present, technology is inherently linked to preferable futures (Simon, 1969; Wangel, 2011; Lindtner et al., 2016), with its promise of a better life. My research reveals the landscapes of future technologies within community contexts are predominantly populated through values and ideologies, popular culture, and addressing present challenges

and practices. These are related to the participant's ways of thinking about the future; as discussed in the three case studies (Chapters 4, 5 & 6). The understandings of the word technology are interrelated to the practices of food growing and two community's (Auroville, India and Newcastle, England) use of various technologies in daily life. These are predominantly hardware or digital technologies used for coordinating, researching, documenting and circulating knowledge about their daily practices with others. For example, solar panels, and drip irrigation, support the physical acts of food growing, alongside communication technologies such as phones, emails, messaging apps websites, and YouTube that help support information sharing about food growing.

However, these communities recognise and have repeatedly voiced the detrimental effects of technology on the environment but also acknowledge its potential to support participation, coordination and positive change when used with consciousness. Through this thesis, I present insight into how communities think and conceive future technologies through their everyday practices where these technologies would already be part of everyday use or imagined to be in the future.

As described in Case Study 1 (Chapter 4) in Auroville, India, conscious life practices and the use of technology are understood to be driven by an individual's decision and motivation for self-transcendence and spirituality. The individual makes a decision for technology's use towards an expected outcome like staying in touch with family or the use of petrol-driven machinery on the farms. However, all participants see technology and science to be intermingled with spiritual and holistic living towards the purview of collective sustainable living. Therefore, technology with a conscience is often thought to be interlinked with conscious living. This contrasts the mainstream meaning of technology, synonymous with neoliberal corporate control. At the same time, it's not necessary that minimal sustainable living has to be technology agnostic; rather, it can be seen as a negotiation with technology adoption, as seen in Auroville. Thus opening the context within SHCI to be aware of not just how technology should be consciously used but also its potential harm and the design of future technologies with a conscience.

In Case Study 2 (Chapter 5), the neighbourhood community in Newcastle, England, approached technology either through problem-solution framing or far-in-the-future unconstrained speculation. The problem solution framings were generally incremental and related to the problems faced everyday by the community members in carrying out their

practices. However, when engaging participants in unconstrained speculation about the future, the community members built fanciful technologies, such as the intergalactic internet, which enables sharing of seeds and information. However, the intergalactic internet's use is still embedded with community values similar to the dandelion zapper. The dandelion zapper as a device suggested for weeding, quickly turned obsolete as the participant found ways of using the dandelions rather than the dandelion zapper.

Extending it to Case Study 3 (Chapter 6) the understandings of technology come from the digitally mediated engagement coordinated using the messaging platform WhatsApp, QR codes, and place-based speculation. Through these interactions, the participants in a practical sense understood the use of digital technologies for co-speculation of technological futures, supported conversations, created deliberation and scaffolded participation during the community engagement. Moreover, the imagined community-led futures were also populated with existing everyday technologies and even when someone suggested fanciful ones these suggestions were moulded to create a relationality to existing food growing practices.

Therefore, futures are thought to be assemblages of existing technologies and practices, where existing technologies are simple, part of everyday life within the agency and control of the participants. The community members are accustomed to using it and thereby have a low barrier to adoption. The community futures comprised of these everyday technologies are numerous and I would like to call these low-technology futures.

High technology futures, on the other hand, are fanciful future technologies imagined by the community, with their roots in the technological promises of the corporations but re-imagined by the participants through their values and everyday practices. Work in interaction design and HCI has looked into technological solutions for communities and their food growing practices (Lyle et al., 2014; Norton et al., 2014, 2019; Heitlinger et al., 2013). However, they sometimes fail in adoption as they do not integrate long-term sustainability or food growing community values shared by members. Moreover, there are only a few examples of how they might be successfully integrated practically.

Both low and high-technology futures enable visions of urban food growing within grassroots community contexts. In response to this dilemma, I want to introduce the conceptual practice of creating *'assemblages of high and low technology'*, to create the possibility of integrating incremental change (Halewood, 2017; Marres, 2015) within

the integration and creation of larger systems. For example, if we look at existing systems already in use by the communities to grow food, like polytunnels, solar panels and communication technologies, can there be ways to create DIY assemblies for the communities to integrate into these larger systems? These could be used to later create by the community themselves giving them autonomy and sovereignty over technological infrastructures. For example, I take the analogy of surveillance devices like street cameras in cities in reference to Case Study 3 (Chapter 6), to present an argument for sustainability, and ask the question in line with my participants: Should we build new devices or what can we do to enable existing ones to be able to create socially just ecosystems for sustainability outcomes? How can the ubiquitous street camera be used to provide the much-needed defence against vandalism and stealing in the neighbourhood? These questions invite design and technology research narratives to be moved away from resource-intensive, inclined towards newness and narratives of growth (Mazé, 2019; Lindtner et al., 2016).

Also, to look at the definition of technology a little more vastly than what is understood as Silicon Valley technology controlled by corporations and rather embracing technology as a way to apply tacit and implicit knowledge through practices and the use of technological tools in everyday life. To look at repurposing as a value within food growing, I propose an assemblage of high and low technology, reconfiguring existing technologies such as through *'unplatforming'* (Lambton-Howard et al., 2020) in sync with the community members' technological and economic capacity which aligns with their values for future adoption and stickiness. Hence, looking at the active involvement of the community members engaged in urban food growing in creating sociotechnical systems as assemblages for sustainability. Thus, integrating slow (Odom et al., 2014; Jacobs et al., 2013), long-term (Biørn-Hansen and Håkansson, 2018; Gui and Nardi, 2015a), place-based (Foth, 2017; DuPuis and Goodman, 2005), resilient (Heitlinger et al., 2019a, 2021) and autonomous (Escobar, 2011) as attributes to the development of community-based technologies for everyday use in opposition to Silicon Valley start-up futures.

7.2.2 Engendering community-driven technological visions

Visions of the future embody ideologies, norms and priorities often shaped by policy planning, market economies and cultural imaginaries (Mazé, 2019). This is mostly in line with current sustainability research in HCI which often outlines the interconnect-

edness of sociotechnical systems. For example, Dourish highlights how technologies designed with sustainability in mind necessitate connections with other structures operating at multiple scales across a number of stakeholders and agendas, which can make communities often feel disempowered (Dourish, 2010). These multi-scalar structures embed normative values and usually position future technology as the silver bullet to all problems. However, value-imbued technologies as discussed by Norton et al. (2019) are imperative for building community sociotechnical systems. This is a sound suggestion, however, to get there I argue understanding and embedding values in speculative approaches can also scaffold more reflective discussion, to move beyond the obvious spatial-material conflicts and the normative tropes which can restrict community imaginaries.

Within Case Study 2 (Chapter 5) with the neighbourhood food growing community in Newcastle, England, during the walking workshop for instance, the discussion highlighted how existing technologies could be repurposed, a key value that growers in the community find important when responding to limited space and waste. Here, in order to form new uses of public spaces for growing, as seen through the use of mundane everyday technologies like hydroponics, solar panels, soil analysers and monitors. During the futures game, the introduction of technology into the lands such as the Land of Robotic Farmers, speculations focused on versions of what was already out there and the idea of a robot similar to a dishwasher. This highlights the perceived functionality linking to time efficiency and increased production, while this is also linked to the growth narrative (Hobson, 2002; Meadows et al., 2004; Pargman and Raghavan, 2014) it also fed into the existing narratives of fears around technologies taking away jobs, deskilling people and the loss of local knowledge. However, the introduction of the opportunity card Hare of Intergenerational Exchange helped counter this perception and open up discussion on how the robot could be managed to allow for skill sharing so as not to lose growing expertise across generations. The card was a direct call to action representing a shared value in the community.

However, when distanced from the neighbourhood as during space travel in the crafting workshop there was an emergence of magic technologies which were used for intergalactic seed sharing, more than human governance and intelligent machines to help in food growing practices. These technologies seemed like a leap from the mundane every day, but were still linked to the grounded values, needs and concerns of the community. I

saw the discarding and redundancy of technology like, in the case of the dandelion zapper, the values of self-sustenance overtook the need for technology through creatively looking at the problem of weeds and creating a workaround presenting a more holistic view of food growing that suggested balance and sharing. This is an indication of the possible fallouts with technology as seen in numerous sustainability-driven technologies as well (Brynjarsdottir et al., 2012).

Few of these technology-based futures from Case Study 2 (Chapter 5) were used to develop situated speculative tropes in Case Study 3 (Chapter 6), to create continued involvement and interactions in the community. These were in alignment with the ongoing nature of their work and aspirations, for instance, inviting the larger neighbourhood food growing community to react to these futures. Furthermore, these futures were grounded in the neighbourhood, creating familiarity and building from there. For example, the multi-species device for more than human governance was part of the food forest next to the boundary wall, extending the idea of inviting wildlife and insects. Or the use of hydroponics was used to extend the idea of using shipping containers for growing. These were place-based speculative tropes developed through previously conceptualised as high and low technological futures by the community.

Furthermore, these were in contrast to existing community visions which are regularly articulated through distributed communication practices at regular events and via social media. This takes place through an ongoing process of long-term experiments with community growing (Marres, 2012). These conversations and ongoing acts of tinkering were placed in close dialogue with more speculative acts in commensurate ways for a diversity of possible contested visions and ideas during walking and deliberations using the WhatsApp groups. This unregulated sharing of ideas and practices was made possible on WhatsApp through the creation of safe spaces for people to re-imagine themselves and the world around them when seeking ideas and social support for practising solutions (Blythe et al., 2015).

This led to understanding and finding points of connection between the experimental nature of the research and the wider community as they engaged in their own ongoing *'sustainable living experiment'* (Marres, 2012) and was crucial for highlighting these more nuanced and diverse community-based socio-technical imaginaries Mazé (2019). It is, therefore, important to recognise how my research was running alongside wider com-

munity experiments in sustainable living within the neighbourhood. These inevitably brought with them multiple political, social and sustainability considerations including issues of power and governance, vitally important for understanding the potential and limits of technologies. I argue that it would not have been possible to understand these considerations more fully if I had not built long-term relations with the community and my research was disconnected from the everyday practices of tinkering (Mol, 2008) and larger efforts of the community to bring about ways of living a more sustainable resilient and self-sufficient life. However, I argue the evaluation of the outcome of such sociotechnical research is challenging as it is not limited to the timescale of a discreet research timeline, especially when considering sustainable (Remy et al., 2018) community initiatives (Björgvinsson et al., 2012b) within HCI research.

7.2.3 Participatory visioning scaffolded through digital technologies

As discussed in the previous two sub-sections (Section 7.2.1 and 7.2.2), the thesis looks at reuse as a value for technology use and is inclined towards the appropriation of existing technology. Focusing on Case Study 3 (Chapter 6), with the neighbourhood food growing community in Newcastle, England, the study design appropriates social media technologies through the use of WhatsApp as a messaging platform much in line with Lambton-Howard et al.'s a unified approach to appropriation of social media technologies for coordinated participation (Lambton-Howard, 2021; Lambton-Howard et al., 2020, 2019). Moreover, the approach examined the material qualities of WhatsApp which extends to - morphology, role, externalization, and process using it to design a large-scale forecasting engagement called WhatFutures (Lambton-Howard et al., 2019). Lambton-Howard et al. explain that unplatformed design can be leveraged by organisations to work at scale, particularly in contexts that are resource constrained or where the barriers of participation need to be lowered (e.g. NGOs, developing contexts, and distributed populations). This allows directing resources on participation rather than software development which is particularly valuable in contexts of limited resources like organisations that are constrained financially and technically (Bettega et al., 2022) like the one I was engaging within.

I took this as a building block to look at appropriating existing technologies and assembling them to form interactions to engage participants like using QR codes, WhatsApp, and Google maps. This was geared towards lowering barriers to access and looking at

participants' experiences of technology-scaffolded visioning processes. However, my work is in contrast to unplatform design especially considering Whatfutures - it uses WhatsApp to run a game for engagement with a large-scale audience distributed across five different geographies (Lambton-Howard et al., 2019). This is a coordinated, top-down resource-intensive future forecasting engagement for the International Federation of Red Cross and Red Crescent Societies (IFRC) to create future scenarios (Lambton-Howard et al., 2019). However, community participation is very much different because it is smaller, situated, embodied, and carries tacit knowledge, where the participants do not take roles or identities but in my research are treated as local experts who hold more knowledge and agency than the researcher to make decisions for their neighbourhood.

The thesis approaches the creation of visions in a bottom-up situated way, where even if the participants aren't colocated they are situated within the setting of the neighbourhood and the use of WhatsApp created coordinated as well as asynchronous behaviours. Hence, the futures are situated within a place - noticing (Liu et al., 2019a; Tsing, 2015) the neighbourhood, participants walk the neighbourhood while sharing their reflections, ideas and reactions to these situated speculative tropes, grounding them on how these futures are feasible or not, through their everyday practices. For example, participants shared pictures of different sites while walking with each other on the WhatsApp groups, inviting others to react and build upon their ideas.

Furthermore, within the deliberation phase on WhatsApp, I acted as a facilitator initially however, participants took over the discussions thereby creating provocations for each other to respond, for example, the repeated bringing up of planting fruit trees for the creation of a fruit forest or issue of access to public spaces. Therefore, the participant is the expert within the local setting of the neighbourhood and WhatsApp creates an agency and safe space for participants through the unregulated sharing of ideas and practices.

WhatsApp deliberation was also successful in providing longitudinal asynchronous participation where technology brings ease and participation as part of daily life where the participant can engage and disengage at their will. This longitudinality is also necessary for approaching a long-term view of sustainability and coordinated action by the community, like the use of WhatsApp to circulate and coordinate a grant application by

the participants during the research. This is in line with the need for SHCI to consider longer timescales for sustainability (Norton et al., 2017; DiSalvo et al., 2010; Silberman et al., 2014) and create capacity for using digital technologies to be able to provide these.

Digital technology also provided the possibility of documenting and record keeping for longitudinal intergenerational exchange, and including new members within the speculation process and beyond. Additionally, it fostered sustainability of results when I left the field, contributing to spreading and retaining knowledge within the community through a separate WhatsApp group. This is now managed by the community members on their own where they share individual and collective updates and ideas. Thus, infrastructuring participation beyond the length of my research.

In contrast, in prior work in coordinated participation within distributed contexts using social media technologies (Lambton-Howard et al., 2019, 2020; Celina et al., 2016; Prabhakar et al., 2017) participant engagement is controlled through homogeneity. It does not take into account the diversity of participants and as in my research participation was also affected by the engagement predicament, learning curve and socio-political access which creates further marginalisation. These approaches are part of the *'the planning model'* (Suchman and Suchman, 2007) driving HCI and interaction design which describes people's behaviour in terms of goals and the cognitive plans formed to achieve these. Suchman argues that this model is flawed, as it distracts us from the ways in which people act and interact. The planning model enables an abstract, disembodied, asocial approach to modelling action, where behaviour is only interesting in so far as it betrays underlying processes (Suchman and Suchman, 2007). Suchman points out that human action and interaction are inevitably and irrevocably *"situated' (...) is not to say that action is constructed somehow always de novo or in a vacuum. On the contrary, human activity invariably occurs in circumstances that include more and less long-standing, obdurate, and compelling layers of culturally and historically constituted social and material conditions.'* (p.51).

Therefore, there is a need to look at differentiating visions from plans for longitudinal situated actions where the argument is that a plan does not drive or produce the action of following the plan, but rather it is followed, reformulated, worked around, or abandoned in *'situated'* ways (Suchman and Suchman, 2007; Rooksby, 2013). Thus, following

any plan requires work beyond that which can be specified in the plan much in line with the community-led sustainability work which is an everyday process. Therefore, I would like to see designers and researchers as facilitators and shapers of social dreaming (Sanders and Stappers, 2014; McBride, 2005; Gosling and Case, 2013; Lawrence, 1991, 2003) and to be agents of public imagination (Dunne and Raby, 2013; Farias et al., 2022). Here I would like to articulate social dreaming as a philosophical viewpoint where the community gets together to co-speculate about futures through discussions, negotiations and deliberations interpreting what they can materialise in practice. Thus Participatory Visioning through technology is different from participatory future forecasting (Whatfutures) as it considers various political, social and cultural conflicts that arise over a long period of time within an uncontrolled *'in the wild'* environment.

Thus, the creation of technological futures should be looked at as a political question - who do we want, to be as part of the world we happen to share with other things and beings—a holistic ethical-onto-epistemological perspective (Barad, 2007). Thus bringing to the fore questions of being (ontology), knowledge creation (epistemology), and responsibility and purpose in the world (ethics) as inseparable from each other (Frauenberger, 2019). Making researchers and designers question the technology they develop, its impact on the world and if it is needed (Frauenberger, 2019).

I connect this to the need for *'collaborative survival'*, a concept coined by anthropologist Anna Tsing. Tsing takes the context of multispecies and describes the human ability to persist as a species as deeply entangled with and dependent upon the health of a multitude of other species (Tsing, 2015). I bring forth this concept as a way to look at creating technology in accordance with nature as a way to collectively survive. Much in line with Case Study 1's (Chapter 4) community in Auroville, India which surfaces interlinkages between spirituality, nature and technology and explores how HCI can help forge and sustain human life in sync with nature and technology. Therefore, asking the HCI community to act as technology creators, and political actors, who must create democratic accountability to let marginalised communities have a voice in shaping technological futures.

7.3 Participatory Visioning as an approach for Grassroots Sustainability (methodological contribution)

In the process of examining visioning as an approach in SHCI to address long-term grassroots sustainability concerns, I used Participatory Speculative Design (Chopra et al., 2022b; Farias et al., 2022). It combines both participatory and speculative methods. Participatory Design derives expertise and relevance within the community (Bannon et al., 2018), surfacing implicit norms and conflicts, and looking at long-term change. Additionally, speculation builds on this by breaking away from current ways of thinking and doing, moving away from constraints and opening up new possibilities for change (Ehn, 2014) through criticality. Within the latter two, Case Studies (Chapters 5 & 6), I attempted to balance these positions during my engagement with the neighbourhood food growing community in Newcastle, England. However, this was often a difficult balance to strike when looking at grassroots communities which I explain in this contribution using examples within the three case studies (Chapters 4, 5 & 6) and elaborate on Participatory Visioning as a methodological approach for undertaking bottom-up sustainability work in the next three subsections (sections 7.3.1, 7.3.2 and 7.3.3).

7.3.1 Challenging the normative role of the researcher through reflexivity

Researchers at times can articulate a perspective rather than being an observer (Le Dantec and DiSalvo, 2013) this often reflects the power held by designers and researchers in the field. This was evident in the design of the workshop series in Case Study 2 (Chapter 5) with the neighbourhood community in Newcastle, England, for example, in the design of the speculative tropes. This reflects a tension experienced by me (as a researcher) during this work where on one hand, I was conscious of my position and on the other prior research in HCI that highlights thinking about the future can be overwhelming and takes time to develop for novices. I saw this develop with returning participants during the workshops, as they became more comfortable imagining alternative realities as the series went on. This was considered and integrated within the design of the engagement in Case Study 3 (Chapter 6), with the same neighbourhood in Newcastle, England, which used the futures developed in Case Study 2 (Chapter 5) to develop situated speculative tropes for the walks. I also used an iterative approach to engage the participants in future

thinking rather than overwhelming them in a single attempt of speculation. Here the drawn-out long iterative approach creates momentary safe spaces for thinking about the future (Halewood, 2017) over a period of time through reflection and discussion using digital technologies.

On the other hand, I was conscious of being perceived as an *'expert'* and was careful not to impose my own values on the outcomes of the two research engagements in Case Studies 2 & 3 (Chapters 5 & 6). To reflect back, my role within the community had evolved from being an outsider to being an integral part of the community and its functioning where *'being helpful'* became part of the long-term engagement (Agid, 2016a; Irani, 2019; Irani and Whitney, 2022) often these lines between what is research or data and just being helpful as a member gets blurred. However, I did not get a chance to build this relationship in Auroville even after working as a volunteer, this can be because I was in the field for a short duration and I did not fit into the Aurovillian population either as a resident or a visitor. Therefore, it is important to understand the context specificity of research as not all organisations or communities have similar membership mechanisms - for being included into the community and getting involved. These mechanisms of membership to specific communities in relation to my standing as a researcher needed to be negotiated in relation to the differences between Auroville and Newcastle. It was, therefore, important for me to reflect on my positionality throughout the process, keeping in mind my background, developed relationships with different community members, cultural understandings and connections to the site of inquiry along with my socio-political views.

Particularly where longitudinal forms of social engagement (Manzini, 2015, 2016) takes precedence over technology, drawing attention to the importance of engagement between the researcher and the participants through caring relations when thinking about researchers' ethical obligations (Light and Akama, 2014). Thereby, examining the design of future technologies beyond the accumulation of wealth and towards community-based participation, to look at the ways in which those at the forgotten margins like urban food growing communities can build resilience, preserve their practices, and sense of community. Christina Harrington proposes that *'one way to shift from damage-centred research would be to seek out how individuals frame their community narrative and elevate those stories'* (Harrington, 2020).

Therefore, when using participatory speculative methods, design practitioners and researchers can try to combine or move attention away from concerns for efficiency and production, with care for the environment and alternative food systems. Thereby, helping break down *'wicked problems'* and structuring discussions towards big socio-ecological questions bringing it to the level of people's everyday experiences for citizens to reflect and imagine. This slower, careful and patient process reflects the nature of food growing itself which is the context of the thesis. These instances meant, staying with and maintaining curiosity about the conflicts arising within the groups when discussing futures, for example, personal politics, mitigating power dynamics, fear and the creation of dystopian ideas. The ongoing reflexivity also helped in the iterative creation and curation of safe spaces for voicing concerns, equity in participation and the impoverished thinking linked to dystopian futures, fear and anxieties. I argue that HCI researchers working in ecological and social sustainability contexts can build community capacity for thinking about futures through this ongoing negotiated articulation work. This is also inline with the everyday experiments in living (Marres, 2012) already being carried out by the communities.

Furthermore, as Choi et al. put forth, being aware of one's own status and other baggage, as a researcher, is important (Choi and Light, 2020). Therefore, I suggest HCI researchers should make explicit their researcher positionality, integrating this within an active design process and making dedicated scheduled time for collective reflection and articulation with communities. *'Feminist positionality theories are useful for the necessary sensitising, but then it requires constant self-examination'* - Ann Light (Choi and Light, 2020). During my research, I reflected on workshops, community events, and feedback from community members on prototypes and speculative tropes. Making reflective notes, documenting what aspects of the activities worked and which ones didn't, and my role in these issues by discussing them with my supervisors. This helped reorient my aims for developing the following engagements and acknowledge the evolving positionality of my role (Bannon et al., 2018; Hansson et al., 2018), ensuring I was *'staying with the trouble'* (Haraway, 2013).

This helped in respond reflexively with criticality and care to disrupt any unintended influences I might have had on the research outcomes as a result of my role. I see this reflexivity as accentuating my role as an ally (Hansson et al., 2018) opening up the liminal design space between the rigid hierarchy of local government and the growing and

innovative scene of grassroots organisations (Dow et al., 2019). Especially when engaging in community-based work within SHCI practice which has to also navigate eco-anxiety, emotional labour and catharsis of participants; and the need to hold onto and stay with people's emotions (Mol, 2008). However, such long-term engagements also impact emotional wellbeing. HCI more broadly has recognised that the ethical process considers the wellbeing of the participants while often leaving out the researchers (Moncur, 2013). Therefore, the ethical process of these engagements needs to consider the intricacies of collecting data and the effort involved in community-based work beyond the data collection and its emotional impacts on the researcher. Other HCI researchers have recently highlighted the particular kinds of *'emotion work'* necessarily associated with design challenges where interventions can have potential impacts on people's daily lives (Balaam et al., 2019). However, I bring into focus that SHCI research increasingly needs additional forms of feminist ideas of care (de La Bellacasa, 2011; Toombs et al., 2017) and emotional work that require further attention associated with eco-anxieties and restorative forms of connection with nature in addition to the mechanisms described by Balaam et al. (2019). As sustainability research moves between the scales of local community action in relation to the global impacts of the Anthropocene, navigating such multi-scalar issues can often leave the participants and researchers overwhelmed and feeling burnt out.

Within my own work, this often involved stepping back from research and taking time to pause, by volunteering with various community organisations and attending events, learning permaculture, and through my own growing and cooking practice at home. It was also important to nurture myself and my soul during this time to tune into my own needs and voice. Therefore, with my research, I make explicit that this kind of research opens up more questions specifically relating to Sustainable HCI research around the emotional labour of long-term engagement, and caring for the community, planet and oneself. Here everyday living through sustainable practices moves beyond following a definitive process and is part of the interrelatedness of life itself, this should be considered within the design process (Escobar, 2011). I take this up in Section 7.3.3 (Balancing values, agency, politics, and deliberation in Participatory Speculative Design) where I suggest a Participatory Visioning framework. The framework even if written as steps is not linear but iterative, reflexive and cyclical.

Therefore, I think it would be useful for researchers to ask critical questions before con-

sidering work in this space. Questions such as, *What time is needed to realistically do the research alongside other necessary aspects of supporting the community and self-care? How could researchers best divide their time between self-care and emotional work? What boundaries could be useful to protect both parties engaged in the research? What constitutes data within these complex engagements in the field? When do you stop being a researcher and start just being helpful?* (Agid, 2016a; Irani, 2019; Irani and Whitney, 2022). Moreover, *what support will help sustain relationships for a longer duration of time beyond the length of the research?* These are some of the open questions I would like to present to the SHCI research community who want to engage in community contexts.

7.3.2 Surfacing and Building Relational Civic Agency

Futures arise from the complex interrelation of social and material realities where futures can be enacted through different actors (Wangel, 2011). Through the three case studies (Chapters 4, 5 & 6), the thesis engages with the complexity of civic agency, and how it is essential in enabling and imagining change. These actors are residents, governments, councils and other stakeholders within the interconnected food system, as seen in the case studies.

Auroville, India in the first Case Study (Chapter 4) brings to the fore the role of the individual in creating change through their calibre, resourcefulness and ingenuity. The established vision of the town plays a role in defining the functioning of the town and is dependent on the motivation of these individuals to create alternatives to the hegemonic way of life. However, working together is an essential element of community life where the individuals have the capacity to bring their ideas and imaginations to co-create a life together. This collective way of life is governed by systems that create equity and systemic agency; thereby offering possibilities to contribute and create everyday practices to live sustainably. Therefore, this collective civic agency, I argue is infrastructural in nature and is built by the interconnected systems and practices within the town. For example, the food system lays emphasis on creating organisational structures and practices, for instance, the farms even if run on individual capacity by the farm stewards are still connected to the equitable distribution system and the community kitchens. Therefore, building concrete forms of sustainable life through conscious living, inner transformation, spirituality and empowering its residents.

However, these structures are also affected by state and national policies, legislations and governance therefore, invoking the complex interconnectedness of sustainability work; but these arising multi-scalar issues are navigated through the collective civic agency of the residents in Auroville. This is in contrast to the multi-scalar approach of the workshops developed in Case Study 2 (Chapter 5) with the neighbourhood community in Newcastle, England, which helped surface people's agency and how different actors, and their practices at local, national and global scale shape possibilities for action at the local scale. As seen across the workshops, participants' sense of their own ability to effect, and imagine change (e.g. their civic agency) varied according to the different actors, and structures (and their relations) which were invoked through different multi-scalar scenarios. Furthermore, agency is dismantled through the movement of scale in terms of stakeholders, which differ in value systems and hold more power than the community members. For example, taking away the allotment sites and neglect of public spaces such as council planters is directly affected by austerity policies of the national governments, where councils, corporations and various government bodies create systemic limitations thus disabling futures and taking away agency from the citizens (Knowles et al., 2018; Norton et al., 2017). Hence, the emergence of scalar politics (Dourish, 2010; Lampinen et al., 2019) where the policy is created in a top-down manner, and its effects trickle down to the local council and communities, thereby, affecting the community and their practices of everyday sustainability. Overall, the multi-scalar approach made visible variations in feelings of civic agency as they play out when relating community-based localised action corresponding to tackling challenges arising from national and global scale politics.

There is also danger, however, that if the initial engagement is not followed up with more sustained actions (Iversen and Dindler, 2014; Simonsen and Hertzum, 2012) (as per infrastructuring) people may be left feeling more disempowered than before. Therefore, particular attention was placed in Case Study 3 (Chapter 6) within the neighbourhood food growing community in Newcastle, UK, on fostering agency through explorations of relational practices and existing attachments (or indeed estrangements); towards people, and material things, and addressing complex norms of social and material realities such as policy, economics, and community participation. It was primarily through the use of situated speculation and digital technologies such as the use of a messaging platform WhatsApp where people could express their ideas or build on each other's ideas. I

argue, the use of a digital messaging platform such as WhatsApp, even if not completely inclusive, did create a sense of collective agency similar to the one experienced in Auroville, through social engagement; even new community members, novice growers and residents in the neighbourhood could voice themselves and their concerns. It also built a common site for the documentation of ideas and speculation without the involvement of the researcher through WhatsApp groups. In doing so the project helped in building community momentum over an extended period of time which was geared towards giving agency to individuals to express, imagine and propose ways of building community engagement for ecological outcomes in the neighbourhoods.

I would like to put forth in particular, for advancing future research in HCI to look at long-term continued community engagement rather than one-off research interventions. Connecting localised community setting to different hierarchical political and practical domains and developing ways to tie into existing networks and systems to surface complexities of civic agency. With an ability to bring to the fore how these issues were perceived differently by different members of the community, sparking debates and emotionally charged contestations. Thereby, exploring how participatory infrastructuring can engage across scales, and agency and initiatives might be dispersed within these networks (Bødker et al., 2017; Crivellaro et al., 2019). Thus shifting attention towards relational agency and how delicate it is to craft spaces trodding a fine line between reinforcing a feeling of disempowerment and opening spaces to recover un-constructive relations. The value of doing so is the need to find appropriate formats for people to participate in this process of agonistic struggle for desirable futures (Mouffe, 2013).

7.3.3 Balancing values, agency, politics, and deliberation in Participatory Speculative Design

As seen in my citizen-centred community work, ideals for the future have various contestations (Mazé, 2019; Manzini, 2016) and the Participatory Speculative Design approach´ scaffolds agonistic participation (DiSalvo et al., 2012) which can highlight underlying differences in agendas and power dynamics. Particularly when working collectively with groups who are considered marginalised or politically inclined (de O. Martins and de Oliveira, 2016) like the communities engaged in my empirical work (Chapters 4, 5 & 6).

Investigating, developing and using the Participatory Speculative Design as an iterative

methodological approach respectively in Case Studies 2 and 3 (Chapters 5 & 6) with the food growing community in Newcastle, England, I used 4 modes - invite, situate, deliberate and act as ways to surface and explore participation, politics, agency and negotiation which affect future thinking. In this section, I explain how each of these modes was essential in Participatory Visioning to engage the neighbourhood grassroots community in Newcastle, England through instances from my research. I present ways in which I have used these and how they hold value as a framework which also consolidates my theoretical, conceptual and socio-technical contributions. I would like to emphasize that this framework is partial, iterative and non-linear in nature.

Invite - with care and companions

I argue the need for creating invitations when engaging with sustainability communities in Participatory Visioning processes. It is to invite the community to know more about the research, and the researcher's positionality, and to be invited into their world to understand their values and motivations. To start the process of sharing and understanding to build relationships during the research where the community is positioned as an expert (Chopra et al., 2022b).

For example, the first workshop in Case Study 2 (Chapter 5) was designed as an invitation (Lindström and Ståhl, 2020) for the community in Newcastle England, through the activity of mapping the neighbourhood. This was essential in allowing local knowledge to surface, and to challenge researcher and participant assumptions and expectations about the community and the project, respectively. The mode of the workshop was to invite co-creation, acknowledging that collaborative activities and speculation can sometimes be uncomfortably demanding. The mapping activity was envisioned as a space for enabling participants to share and negotiate points of interest, perspectives, and values. This was partly to ease participants into potentially more demanding ways of thinking about the future in later workshops within the series.

Also, seen in the use of speculative stories in Case Study 2 (Chapter 5) provided in Workshop 2 and 3, were not received as companions but were refuted, rejected and challenged. As researchers we found this difficult in the moments we were negotiating these contestations and frustrations in the workshop, these were valuable in highlighting that these narratives were not considered to be taking good care of the growers in generous ways and not well aligned with their sensibilities to encourage alternative future imag-

inings.

Therefore, taking these as learning in Case Study 3 (Chapter 6), in the food growing community in Newcastle, England, invitations were created throughout the process where iteratively the community members were invited to give feedback, respond to speculative tropes or be part of the online deliberation processes. This was essential in making the community members feel included, thereby creating agency for them to imagine and respond. For example, the act of tagging and using the participant's suggested futures as speculative tropes for others to respond in the deliberation process was important in giving agency and creating participation in the online discussions. Moreover, looking at invitations and speculative tropes as stories engages the participants to imagine a different world. Frank (Frank, 2010; Haraway, 2003) describes stories as material-semiotic companions highlighting that *'good companions take care of one another (...) shaping the other (...) each companion enables the other to be'*(pg. 43). Therefore, researchers and designers should consider - *'It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories'* (Haraway, 2016, pg. 12).

Situate - within place and the installed base

The thesis brings to light how sustainability research needs to be place-based (Choi and Blevis, 2010; Odom et al., 2014; Goodman et al., 2012; Foth, 2017; DuPuis and Goodman, 2005) as well as looked at through a longitudinal lens (Norton et al., 2017; DiSalvo et al., 2010; Silberman et al., 2014). As Choi et al. explained in their HCI design framework, place-based considerations encourage sustainable food culture in the city via ubiquitous technologies through the perspective of context awareness and context specialisation (Choi and Blevis, 2010). However, the framework does not consider grassroots communities that grow food in cities and their considerations towards building sustainable futures.

My research brings in place-based considerations as local, tacit and situated knowledge which are essential in working with grassroots communities. For example, Case Study 2 (Chapter 5) with the community in Newcastle, England, particularly the activity of mapping and walking the neighbourhood, focused on situating speculation within specific

sites of special interest. This engagement with the neighbourhood surfaces the gritty articulations of the valued and problematic relationships between community members, available resources, and constraining forces. Exposing place-based issues that embodied multi-scalar conflicts, like land ownership, conflicts of private-public spaces, government policies, the buy-in of future local stakeholders etc. In the process, this surfaced tacit, taken-for-granted norms and politics embedded in mundane community infrastructures and their installed base (Bødker et al., 2017; Karasti, 2014). In turn, this raised more profound questions as to what and who can benefit from community food growing, and how the practice is affected by scalar issues beyond the control of the community.

Infrastructuring efforts have previously sought to surface the installed base that underpins community values, with the intention of using this understanding to make visible a network of relationships to mobilise collective future action (Crivellaro et al., 2019; Karasti et al., 2010). Infrastructuring processes and their relevance to the exploration of messy intertwined political layers affecting sustainability within place-based urban food growing are therefore important.

Taking these considerations within Case Study 3 (Chapter 6), engaging the neighbourhood food growing community in Newcastle, England, I devised an audio-guided, walking activity inviting noticing (Liu et al., 2019c; Tsing, 2015) the neighbourhood through the lens of future thinking. Subsequently, developing the situated speculative walk, taking inspiration from previous walking methods (Tomkins, 2012; Springgay and Truman, 2017) , while also incorporating fictional scenarios in a place like Stals et. al (Stals et al., 2019; Baumann et al., 2016). These were related to specific places highlighted by residents as existing or potentially new social spaces for growing food during the course of the engagement. Thus, engaging with place-based taken-for-granted implicit norms and surfacing conflicts within the neighbourhood. To further scaffold place-based imaginings, invite the participants to look at creating place-based action-oriented outcomes, where the speculation is not far out into the future, separated from reality but within the actionable ability of the community members within the neighbourhood. Therefore, I suggest building situatedness within sustainability-related speculative work to create close-to-reality actionable futures. In line with the everyday experiments in living (Marres, 2012) by the community members as they build resilience towards adversities affecting them

Deliberate - with agonism and longitudinally

Deliberation processes are important in Participatory Visioning as it enables co-imagining among participants, thus leading to shared agreeable futures as compared to bifurcated and disconnected individualistic ideals (DiSalvo et al., 2012; Dourish, 2010; Brynjars-dottir et al., 2012). However, I want to stress that co-imagining is a complex process as it contains numerous contestations from different participants (Chopra et al., 2022a,b).

Specifically taking the example of the board game played by the neighbourhood food growing community in Newcastle, England, in Case Study 2 (Chapter 5), opened up the possibility of several different kinds of narratives to be constructed, interpreted and presented by the participants. It required the group to make sense of each land and then imagine themselves living and growing food in these specific places as they worked towards an ambiguous future. The sense-making process, as in the case of most speculation, took time. Often the most vocal of the group started talking immediately, often inducing fearful responses. The awkward dynamics of this meant we were challenged when trying to facilitate or introduce new ideas, in an attempt to change the tone and offer alternative interpretations and ways to open up discussion. The lands we introduced in the game were very much based on grand societal narratives much more like wicked problems, influenced by current affairs (e.g. Brexit / Climate Change). These appeared to induce fear and frustration, which led to ideas being closed down through overpowering conversations or more comfortable well rehearsed normative tropes being brought forth (e.g. dig for victory in WW2).

Being caught up in the political discourse as seen in the case of Brexit (Land of Brexit) as something immediately looming while playing the game, can be difficult to think beyond, especially when it was not something the participants agreed with. This seemed to activate fears and worries associated with the uncertainty of what would happen if Brexit was to take effect, thereby obscuring or de-emphasising significant values that were important for the community. Concepts like sustainability and at the time Brexit are also quite abstract and are themselves speculative in nature. This combination appeared to be experienced as disempowering because the actual future significance wasn't quite clear at the level of the neighbourhood and everyday life. In this sense, these modes of speculation using grand societal, national or global narratives, if imposed on the participants, could exacerbate feelings of limited agency affecting imagination, lack of engagement

and limited benefit for the community.

These when taken up as considerations in Case Study 3 (Chapter 6) with the same neighbourhood community in Newcastle, England. Situating the speculation and engagement within the neighbourhood for co-imagining futures for particular locations, created civic agency as participants found it easy to suggest futures and ideas throughout the deliberations which are open and free-flowing. Especially in the case of longitudinal WhatsApp conversations which created safe spaces for people to share and build on each other's ideas. People shared their own creations and innovations from their backyards as ideas that they thought would be feasible in particular places in the neighbourhood. However, these technology-supported deliberations did face issues of inclusion and participation but were more open and considerate towards including new members, documentation of ideas, creating longitudinal deliberation and sustaining it over a period of time to be further carried on by members and non-members alike.

Therefore, co-imagining is a demanding, time-consuming process which requires significant deliberation and facilitation. To emphasise, even to begin this process, it needs considerable consonance with the community values, challenges, struggles and stories. Besides, the process is highly political since much rests on the power dynamics created at different instances during the research along with existing power struggles within the community.

Therefore, it is important to remind ourselves, as Choi et al., puts it, none of us does research on our own. *'We rely on others' teachings, on networks of support and promotion, and, at times, on people's willingness to be researched'* - Ann Light (Choi and Light, 2020) . Therefore, deliberation within the co-imagining phase of the Participatory Visioning process has to navigate conflicts, negotiate outcomes and place importance on the hard work of participants as they manoeuvre confounding and fearful futures.

Act - with consciousness and infrastructural agency

Creating everyday change is part of community action towards addressing sustainability challenges like working towards climate action and changing monocultural industrial food through localised food growing and informed consumption (Håkansson and Sengers, 2013; Heitlinger et al., 2013). Material-based action is an essential ability in sustainability work, I created this possibility in the two case studies (Chapter 5 & 6) in the food growing community in Newcastle, England in various capacities. However, these

considerations of materiality came from Case Study 1 (Chapter 4) in Auroville, India, where the community looks at the materialisation of the spiritual top-down vision of the town through action. For the community, material action is necessary to live a holistic life while still keeping to the values and ideals of the vision.

Case Study 2 (Chapter 5) with the community in Newcastle, England, was limited in its capacity to create on-ground and longitudinal action however, during the speculation process material making brought the capacity for participants to translate their practice into future thinking. Crafting and material making appeared to make it easier for participants to think about the futures more experientially and viscerally. It linked directly back to their practical skills expressed through growing, in turn bridging the experiential gulf (Candy and Dunagan, 2017) between the present and the future. Here the physical making was carried out by the participants rather than the designer. Especially, in Workshop 4 which asked the participants from the neighbourhood in Newcastle to create a community food growing settlement on a new planet. This one main narrative explicitly foregrounded the community's expertise as growers, asking them to speculate through making, later sharing their creation of multiple different kinds of worlds. These were defined through materials and refined through words and descriptions that had come from participants in previous sessions that pointed to more preferable futures. The act of material making also took away the dialectic co-speculation which was the case in other workshops, easing out the creation of new socio-material dimensions and their meanings, in the new perceived life. The embodied and experiential outcomes of the speculation were to capture the re-imagining of place through making rather than critical deliberation.

Yet the narrative of space travel as introduced in workshop 4, while familiar, also tapped into problematic narratives of the earth's devastation and possible escape to new planets. This prompted ideas of colonial pioneering contracted by community growing space, where crafting this new planet slowed down participants' responses allowing for a readjustment of life and growing to reflect more long-term social and technical governance structures.

Case Study 3 (Chapter 6) with the same community in Newcastle, England takes these social and material relations towards place-based action, however, in a different light. Here the focus was on action that built new social relations and place-based futures

within the neighbourhood, particularly looking at the role of infrastructuring (Star, 2002; Bødker et al., 2017; Crivellaro et al., 2019; Karasti and Blomberg, 2018) and new connections to residents, members, organisations and other stakeholders and opportunities for creating place-based actionable futures. This situated action is engendered through the creation of agency within the speculation and deliberation processes where participants when walking the neighbourhood could connect the materiality of the place to envisioned futures and deliberate in the process how they could be realised in the material practice of food growing (e.g. the suggestion of espaliers in the creation of the fruit forest next to the boundary wall.) The study also pays particular attention to building longitudinal relationships and activities within the community. Linking the research to the extended everyday experiments and reactions carried out by the food growing community in the neighbourhood.

With this in mind engendering particular kinds of agency through rhetorical, artistic, material or literary devices is important. These devices can establish critical distance beyond a *'preformed version of the real'* (Grosz, 2001). They can also bring their own agency for exploring different realities and deliberation of and with others upon the *'overarching politics of the real'* (Inayatullah, 1990). Therefore, it is important to design in a way that is responsive to where communities position themselves in their own stories and how they are being positioned in new stories for particular forms of community engagement and speculation. Moreover, paying attention to embedding these stories in research, considering sustainability work in community settings longitudinally is critical for the overall success, and has been a deficit within sustainability research in HCI (Silberman et al., 2014; Remy and Huang, 2015; DiSalvo et al., 2010; Biørn-Hansen and Håkansson, 2018; Gui and Nardi, 2015a).

Addressing challenges of future thinking is political (Mazé, 2013, 2019), especially when working with marginalised populations who are politically inclined to challenge the status quo and therefore need to be participatory in nature (Baumann et al., 2016; Bray and Harrington, 2021; Chopra et al., 2022b; DiSalvo et al., 2008, 2012). Therefore, for future research in SHCI, it is essential to create ways to bring stories and political intent together through materiality and situated longitudinal action which is based on local placed-based change created by communities.

The approach and experience of doing Participatory Speculative Design work has il-

lustrated that longitudinal action is important for the researchers and designers working with communities, to move away from being extractionist (Liang et al., 2021; Spiel et al., 2019). This research leads on from experiments in living (Marres, 2012) to look at visions as slow everyday experiments embedded in practice that create sustainable futures. I propose this as an initial framework - invite, situate, deliberate and act, and open it up for further investigation when developing Participatory Visioning design research as a way of engaging grassroots communities and organisations. However, this research addresses these issues at the scale of the neighbourhood or the town, and future research needs to look at scaling Participatory Visioning to include various communities and geographies. For a larger footprint and a wider sustained action towards ecological sustainability with considerations towards social innovation (Le Dantec and DiSalvo, 2013; Prost et al., 2019; Manzini and Rizzo, 2011; Björgvinsson et al., 2010) for longi-tudinal engagement and on-ground action.

7.4 Contributions

I now summarise the key contributions again to consolidate the learnings in a succinct way to be able to provide a valuable overview for others to learn from.

7.4.1 Reframing visions as experiments in living

The thesis advances SHCI by offering insight into future thinking and daily practices where it introduces the relationship between them through three case studies and empirical data. The thesis elucidates the importance of motivating future thinking through collaborative creation and negotiation of ground-up meanings *'ideals/visions'* to bring about change in daily practices. This is achieved by demonstrating the importance of Social Practice Theory and experiments in living in SHCI research for transitioning towards actionable sustainable futures. The thesis outlines how researchers, practitioners, and grassroots communities themselves can work together to adopt methods, and existing technologies and develop sensitivities to support participatory practices for envisioning urban futures.

This conceptual contribution underlines thinking about sustainable futures is not abstract but worked through as a web of interconnected socio-material practices, which are closely related to the complexity of social and political scales (Hollands, 2015; Mullins,

2017; Çağlar and Glick Schiller, 2021). I argue the collective negotiations of various values, ideas and ideologies within grassroots communities can create bottom-up futures as resistance to hegemonic visions. Moreover, looking at these close-to-reality, situated, participatory visions as collections of abstract ideas and ideals about the futures can create opportunities for negotiations with on-ground material realities that are constantly renegotiated over a long period of time.

The complexity of scalar politics can help to mobilise or restrict change within these community futures and their everyday practices. Therefore, the motivated individual is the smallest and the most effective place to start, however, this needs to be within a close connection to grassroots community work, through its potential for creating resistance, resilience and abundance. Inviting the technologist or designer to act as allies in these conversations to help enable slow, tinkered and close-to-reality community futures by not ignoring the role of the individual and their expertise but enabling and drawing attention to it.

However, I do recognise the limitations of the slowness of community work and the scale within which the individual functions, some recognise that it is not enough (Pargman and Raghavan, 2014) given the urgency of the environmental crisis. In turn, I urge the SHCI community to not look at the individual in isolation but in its entirety as a microcosm of what can be possible within the bigger picture through slow, painful, everyday experiments. Rome wasn't built in a day and humanity won't be saved by one but the efforts of the many who are able to transcend the limitations of existing social, cultural and economic systems.

7.4.2 Role of technology in sustainable futures

My thesis examines the design space for digital technologies, particularly in the role they can play in the co-creation, negotiation and enactment of ground-up food futures in the context of sustainability practices and future thinking. The thesis therefore presents a socio-technical contribution for SHCI to demonstrate how socio-technical futures can be developed through reappropriation and assembling of existing technologies, be it hardware or digital information sharing, already being used by the communities of practice. Here it is important to understand how technology is perceived by the grassroots communities as holistic rather than technocentric and is deeply embedded in the practice of food growing. At the same time, it is important to recognise how these perceptions

would be different and specific to various communities and I present my insights through the two communities I engaged with in my work. My communities defined technology as a tool for carrying out their daily sustainable practices, while still being aware of its detrimental effects on the environment, therefore, making the case that sustainable living is not technology agnostic. Therefore the thesis proposes to engender community-driven technological visions with community-specific values that can open new pathways for developing new socio-technical systems within SHCI. However, I do acknowledge that this has been taken up in previous community work within HCI where technology is already seen as a valuable resource in supporting relational connections and experiences between members both online and offline (Carroll and Rosson, 2007, 2013; Taylor et al., 2013; Taylor and Cheverst, 2009); for example, the inclusion of community values, politics and practices in the design of future equitable technologies and systems (Dourish, 2010; DiSalvo et al., 2008; Bødker, 2015b; Light, 2010, 2011; Norton et al., 2014, 2019; Raghavan et al., 2016).

My contribution focuses on the role of digital technology in Participatory Visioning processes, where participatory speculation is scaffolded through the use of existing technology that builds on community competencies. This in turn supported longitudinal deliberation, participation and inclusion within the community. Despite this, it is important to acknowledge some limitations in focussing only on technological participation that can limit socio-economic and political access.

7.4.3 Participatory visioning as an approach for grassroots sustainability

This section summarises the methodological contribution of the thesis. The thesis uses the sustainable living experiment (Marres, 2012) as a way to frame and research the slow everyday practice of food growing in urban grassroots community settings. Moreover, experiments in living are important to move away from business as usual (Light, 2022; Light et al., 2017) context of food sustainability research in SHCI in questioning and developing alternative methodological approaches. I contribute a methodological standpoint by developing methods for participatory speculation to engage grassroots communities in future thinking practices, using a series of four Participatory Speculative Design workshops. These in turn feed into a final Case Study that iteratively feeds community dialogue and speculation back into the community.

This study contributes to Participatory Design and its existing lineage of designing technology with communities (DiSalvo et al., 2008; Light and Akama, 2014) through methodological insights on the tensions of collaboratively opening up socio-technical alternatives when engaging in situated co-speculation. I do admit that I built my approach through the engagement with one multi-ethnic community in the North-East of England which can be viewed as limited.

This study contributes to Participatory Design and its existing lineage of designing technology with communities (DiSalvo et al., 2008; Light and Akama, 2014) through methodological insights on the tensions of collaboratively opening up socio-technical alternatives when engaging in situated co-speculation. I acknowledge there are limitations in building my methodological approach through a long-term engagement with one multi-ethnic community in the North-East of England, empirical insights on Social Practice Theory in an international food growing community in Auroville from Chapter 4 helped build foundations for this methodological contribution.

My methodology in developing a design praxis weaving together feminist theory, experiments in living and Social Practice Theory to develop an approach to Participatory Visioning is necessarily incomplete, complex, abductive, iterative and reflexive, purposefully to challenge the normative role of the researcher when engaging in community contexts. The use of Participatory Speculative Design processes surfaces the installed base (Bødker et al., 2017; Karasti, 2014) and other socio-political conflicts within contexts which directly affect citizen agency in thinking and materialising local futures. Thus, the surfacing and building of relational civic agency becomes imminent within co-speculation processes, as in the case of sustainability the different scalar issues such as government policies and various stakeholders affect the ability of the citizens to create situated change.

My methodological approach and associated methods operationalise at the scale of the neighbourhood and a town while also exploring how different scalar issues affect geographically situated sites. My contribution includes balancing values, agency, politics, and deliberation in Participatory Speculative Design by proposing a framework for participator visioning - invite, situate, deliberate and act. While I formulated this framework during my final Case Study (Case Study 3, Chapter 6) within the food growing community in Newcastle, the framework would benefit from further application to other

contexts to explore its relevance for future visioning in further grassroots communities working towards sustainable futures. Participatory visioning is a broader contribution towards the SHCI community in bringing transdisciplinarity to action to create actionable futures with communities of practice.

Chapter 8

Journey without a destination

I present my thesis as a transdisciplinary approach to Sustainable HCI, and it focuses on practices of *'visioning'* in grassroots communities. It lends from the areas of Design research through Speculative and Participatory Design, and Future Studies through the idea of future thinking and participatory speculation.

It also opens up the design space of how visions can be operationalised to look at complex sustainability issues. My thesis responds to challenges of - social justice, marginalisation and longitudinal change when looking at sustainable futures by engaging grassroots communities and their ability to address ecological issues through local action. I am taking grassroots urban food growing as a context to interrogate the research praxis of SHCI for relevant tools and approaches for supporting longitudinal urban sustainability. My research foregrounds citizen participation and long-term thinking as experiments in living and looks at scaffolding the messy side of collaborative practices to create sustainable ecological futures.

The three empirical case studies in the thesis delve into visioning as an approach for community-led bottom-up food futures. The research in the thesis first explored the technology-agnostic material landscapes of future thinking processes in a town in India. Secondly, the co-creation of socio-technical visions for community contexts using Research-through-Design and Participatory Speculative Design as an approach in Newcastle, England and thirdly, opening up the design space for the role of digital technologies within the context of Participatory Visioning. I propose the praxis of Participatory Visioning as a reflective, iterative and situated process for SHCI practitioners and researchers to undertake community-led work for sustainability outcomes. I strive to sup-

port and sustain socio-political actions to foster - visions, plans and situated actions as a space for the design of sustainable futures. I proposed Participatory Visioning as part of this design space, which engages with community-led, place-based practices, with a hawk-eye view on the larger scalar issues, to build community movements and develop long-term situated sustainable impact. I want to emphasise that I developed Participatory Visioning as one of the approaches within SHCI and Interaction Design to look at the design of sustainable futures, and it would need future research and collaborations with other disciplines to open this design space further.

8.1   Future research

Now, reflecting on my contributions, I would like to outline future research which I would want to consider or open up to the broader SHCI community. SHCI research has problematise persuasion, behaviour change and individual-focused interventions (Brynjarsdottir et al., 2012); and has shifted towards practice perspectives (Shove and Walker, 2007), longitudinal considerations and the need for radical research and design in this space (Knowles et al., 2018). However, it still falls short in addressing issues like social justice, marginalisation, tacit knowledge(s) and non-Western perspectives. Therefore, there are still so many open questions about how SHCI research can better look at complex multi-scalar systems and strive to create actionable futures. My thesis started by looking at *'How can digital technologies support grassroots communities in imagining and planning, meaningful and practical actions for grappling complex and longitudinal sustainability challenges?'*; and made an initial attempt to tackle the burgeoning issue of the food system through grassroots urban food growing. It opens up Participatory Visioning as a design domain in SHCI research to examine co-imagined sustainable futures.

In a more contained articulation, I presented the first iteration of my Participatory Visioning framework, and I acknowledge that the framework has not been tested in its entirety. However, it offers excellent potential to be adapted and generalised to suit other contexts to address urban sustainability or community-focused research. It would be beneficial for others to apply the framework in developing case studies, using *invite*, *situate*, *deliberate* and *act*, to create integrative reflexive design-led engagements for working in collaboration with communities of practice for example, transition towns and the tran-

sition town network Hopkins et al. (2008). These communities provide fertile ground to conduct future research on Participatory Visioning as they are already conducting 'Experiments in Living', attempting to live more consciously and sustainably.

Even after so many years of my PhD research, the questions that still haunt me are: What would be the methodological considerations for engaging a larger global audience in co-speculation, opening up considerations of place and situatedness for such an extensive engagement? If sustainability research is context and place-driven, how can we develop local microcosms, still connecting them to a broader global network of practices needed for sustainability? How can digital technologies help with this, which is particularly relevant when we are connecting non-collocated communities? How can designers or researchers look at social dreaming as a way to navigate Participatory Visioning by considering indigenous ways of future thinking? How can the metaphysical, otherworldly and spiritual practices of approaching nature and the world around us be used to improve the SHCI community's understanding of sustainability to look at collaborative survival?

I would propose that the SHCI research community take up these questions to engage in non-Western and global-south contexts to widen the structures of knowledge production and include voices that haven't been heard yet. Taking inspiration from Watson et al. (2019), she looks at indigenous knowledge as a means of developing more ecologically sound architectural infrastructure (Watson and Davis, 2019). I propose researchers include more indigenous and activist voices outside the SHCI and HCI community who do the actual groundwork in marginalised communities throughout the world. For example, indigenous populations that still forage and conserve sacred lands and nature, and activists who work in particularly contested geographies of land use (Shiva, 2001; Escobar, 2011). These contexts present ways of looking at the world through the lens of everyday struggles and within more-than-human ecologies (Liu et al., 2018a).

I am a strong advocate for empirical studies and design engagements which include communities of practice. These communities can help contribute to significant future sustainability work in the context of landscapes and geographies most at risk of being lost. I also look at urban food growing at risk of being lost at the hands of urbanisation, which is evident through this thesis. It encounters internal and external issues ranging from working with self-motivated people to negotiating with multi-scalar stakeholders.

These issues in cities have recently come to the forefront and affect the lives of everyday citizens, considering the food shortages being faced worldwide at the moment. Urban food growing thus presents an opportunity to reconsider cities as a site for everyday resilience and resistance. Therefore, SHCI researchers and practitioners can look at ways to support communities of practice in their endeavours as they work towards citizen-led resistance, community building and creating positive change in cities. Furthermore, within this context, consider the potential of digital technologies to be developed or assembled to cater to their existing bottom-up, community-led visioning practices.

Ending note: When I started, many of my friends working as activists in varying capacities in India said that I was an *'unlikely academic'* and initially, I didn't understand what they meant. Now, after going through the journey and reflecting on the process, I acknowledge the thesis to be the *'academic makings of an unlikely academic'*.

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Appendix A

Post Food: Looking at Sustainability Through Design Futures

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Abstract

Current food consumption patterns are unsustainable. They are a result of the influence of politics, economics and sociocultural constructs. Food is an everyday mundane that we need to decide on three or four times in a day. This decision rather than building on an informed choice is built on the complexity of demand and supply, governed by the principles of industrial revolution. In a post digital, "post food" scenario, we propose a fictional technology called 'Essen'. 'Essen' has the capacity to sustain a human being without the need to eat food. In presenting it, our aim is to question the trajectories of food through design fiction to understand current food practices better and to broaden our thinking on sustainable food futures.

Author Keywords

Speculative Design; Design Fiction; Futures; Evolution of Technology; Sustainability; Food; Human Computer Interaction.

ACM Classification Keywords

H.5.2 Information interfaces and presentation (e.g., HCI): User Interfaces; H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Figure 1: Integration of technology with food and the transitions.

1. https://ubereats.com
2. http://www.startrek.com/database_article/replicator
3. https://www.media.mit.edu/research/groups/personal-food-computer
4. https://www.wired.com/story/the-impossible-burger/
5. Leon Festinger coined the term in his 1957 book, A Theory of Cognitive Dissonance. He describes it as 'the feeling of psychological discomfort produced by the combined presence of two thoughts that do not follow from one another'

Introduction

Food is essential to life. Relatively, now technology has also become part of the basic needs in urban scenarios. Our life and our food are becoming increasingly integrated with technology e.g. Uber eats[1], RFID embedded in food items, taste patch, loyalty card schemes; a trend that we might expect to see continue in the post-digital and beyond as seen in Figure 1.

The future of eating in the 21st century has been imagined before in popular culture e.g. pills and food popping up in machines whenever one wishes [2]. Also, with the food computer at MIT [3], it is already possible to manifest desired qualities or tastes in the vegetables through the control of moisture and nutrients. Dunne et. al. have also imagined speculative food future in [2]. How might life change if such technologies were commonplace? What other more and less desirable trajectories might we imagine food taking in the future? What benefits might they bring to existing food practices, or what new challenges might they introduce? Answering such questions about the future of food requires engaging with the present.

The food landscape is rapidly changing and is beyond control and perception of consumers. Industrial farming, fast food, ready meals, climate change and a burgeoning population are some of the reasons that make people wonder about the future of food and food security. Technology also adds to this dilemma, with 3D printing of food, in-vitro-meat made for consumption in laboratories, plant based burgers that bleed like real meat [4], being some of the recent technologies that open up questions about what food means. It is becoming increasingly difficult to imagine what food will look like in the next century, or even in 20 years time. In this paper, we present a design fiction called "Essen", an artefact designed to prompt critical engagement with current food practices and future trajectories through reflection on a particular food design future.

The design task that we take up is to design a future scenario that would fit within existing trajectories but that do not rely on present technological possibilities (i.e., to avoid constraining design thinking and to open up possibilities for design, sustainability and society). But fiction has to be relatable to the audience because fiction can be provocative and provocation can result in revulsion or shock. So, the design solution should be provocative whilst at the same time familiar. Sigmund Freud (1990) described this paradoxical reaction humans have that invoke a sense of familiarity whilst at the same time being foreign as 'uncanny' or the term used by social psychologists, cognitive dissonance[5].

The proposed artefact and the narrative surrounding it would provide the required context to elicit responses from people who interact with the fiction. The intention is to steer towards questions about current practices, technological trajectories, and effects on social life and the environment, to imagine a plausible future.

Design of the artefact

We take a "post food" approach as an attempt to reconsider, to provide an alternate to the present-day culture leading to a new world, not defined by economy and eating as necessity. While "post digital" might make opaque the ways that our food practices rely on and are shaped by digital technology, which takes care of the practical work involved, in "post food" the economic and physiological burdens no longer exist. The famous saying: *you are what you eat* would not hold true anymore. When there is a choice between to eat something specific and not eat at all, it is more probable that one would think more intrinsic about how, why, and what, around eating. There would be considerations that would be deeply rooted into the

Figure 2: Essen logo describing the character of the device. It is an integration of technology, ecology and humans.
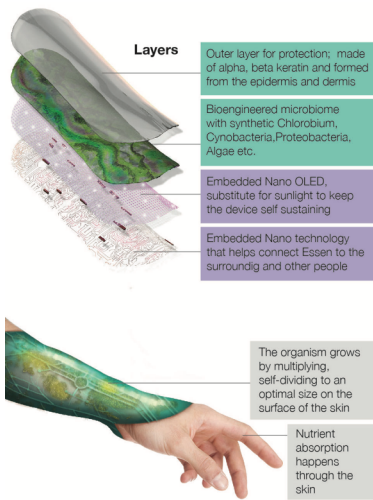

Figure 3: Layers of the device and its constituents. Describing its functionality. It has been shown here on the arm of the person.

cause, effects, sensibility and would be independent of monetary or environmental cost, and nutritional requirements.

We have to consider the design of a new reality to imagine eating in the post digital world. 'Essen' is the essence of the future, food to the human of the 22nd Century. An embedded, embodied device, a fusion of synthetic biology and nanotechnology that automates the provision of human nutritional requirements without the need to eat. As Hayle says [4], the post human view privileges information over materiality, considers consciousness as an epiphenomenon and imagines the body as a prosthesis for the mind. Essen would provide the answer to move from materiality making it possible to move up Maslow's hierarchy of needs [7].

Essen is a microbiome (drawing inspiration from Oxman et. al. in [8]) that works symbiotically to our body forming a Holobiont. The Holobiont as coined by Lynn Margulis describes the entire cluster of individuals [6]. Essen is a symbiotic microbiome, combination of bioengineered microorganisms that live on the surface of our skin forming an outer layer as shown in Figure 3. The organisms survive on our body heat and in return gives us the micronutrients that are required to survive, detoxify and live. The microorganisms are engineered to produce life-sustaining elements, absorbed by the body's cells through its skin. Designed to evolve and interact with specific environmental characteristic to generate sufficient quantities of biofuel, water, oxygen and light necessary for sustaining life. Some of the properties of these organism is to photosynthesize, converting daylight into energy, others bio-mineralize to strengthen human bone. It transforms specific elements or metals found in the environment to convert to life sustaining essentials of the body. Like a dip in the ocean would help it to

absorb water, sodium, calcium, mercury and other minerals needed by the body but in small quantities. The bioengineered microbiome needs daylight but can be self-sustaining through embedded OLED Nano technology. The organism grows by multiplying, self-dividing to an optimal size. When it meets the requirements of the human being wearing it, stops growing. It is a film like organic matter but embedded with Nano technology connecting our technological surroundings to us. The device communicates to us through signals to the brain telling us if our body is depleted in any mineral, nutrients or matter, indicating what should be eaten or done to replenish. The organism can be torn, reduced, styled, shared and reused. These organisms will help us live like the ancient microbes have inhabited the earth for millions of years living in synergy with nature, environment and human built. Through a reductionist point of view of the device and the technology, it would be a promise of health and optimism but technologies are without meaning, the meaning of right or wrong is given to it by humans. So, the question to answer would be how will social interactions change. How will the Post Food society be? Now it is for us to understand how would such a device influence thing. How would a human's visceral need to consume be satisfied?

Approach
We hope to create provocation through design fiction (a prototype, a video, and a narrative) that would instigate questions and an openness to discuss a plausible future. As Augur argues in [1] that speculative design serves two distinct purposes: first, to enable us to think about the future; second, to critique current practice.

Engagement with the likelihood of radical change in food practices in a short period of time can be an

Figure 4: Initial prototype with transparent adhesive dressings and live moss between the layers.
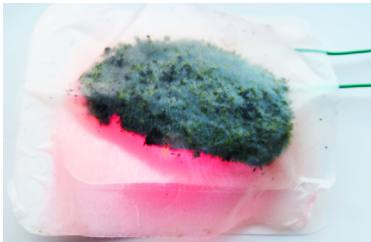

Figure 5: Prototype with embedded strips of LEDs, micro vibrator motor and Arduino. The prototype will evolve to encapsulate the vision of the concept through 3D printing or other mold making methods.

effective way to provoke responses, connecting the imagined future to the believable present. The transformation projected has to be connected to historical change. The design fiction would help open up a dialogue to understand the trajectories for the future and reflect on the present; of bigger processes and systems that positioned with the possibility of evolution.

The design approach is speculative in nature answering the 'what if' as a question. Engagement is an important element, we would encourage people to wear the device as shown in the initial prototype in Figure 4 and 5, and think about living with Essen in the future, reflecting on what it is about the present that might be different. The imagined functionality of Essen might evoke rational and emotional responses from the onlooker. We intend to engage various stakeholders such as sustainability experts, food consumers and policy makers with Essen. The design of the fiction will evolve as it is shared and displayed in different contexts. So, it's future will depend on people's imagination, similar to how Pargman et. al. have mentioned in [9].

Discussion

It is not impossible to imagine a future that would sustain us in our best of (vitality) health. People today are open to self-tracking and taking on different diets to feel healthier. The current wearable technologies are already able to map our body's vitals and physical requirements. Also, there are technologies for alternate ingestion of chemicals whether it is nicotine or detoxification patches. Technology can help satisfy the basic needs of human beings as seen in Maslow's pyramid taking away the burden and struggle of the everyday. In considering sustainable food futures, this is complicated by factors like money, time, and natural resource. By considering if eating was optional in the 'post food' scenario, we ask more broadly what are the

important considerations in the future design of food, and how we might open this up as a design space.

We perceive food as mundane and stable and although Essen is a radical change, it exaggerates this quality of stability through automation. In this way, we think it might help challenge such perceptions and highlight the instabilities and frailties in our current food systems, including the natural cycles of seasonality and the effects of climate on crop yields. Essen is fully decentralised and sustainable, which we think might bring to attention the unsustainability and insecurities associated with the control that huge corporations have on the food we eat right now.

Also, it would expose the role of the individual, the required system and policy change needed for creating sustainable solutions. For example, in [10], Thomas et. al. talk about possibility of HCI influencing policy change. The main aim of the project is to question the possibility of a future that is not dependent on food, demanding people to think of an alternate future. Food is a central part of being human, and the post digital perspective provides us with an opportunity to examine what qualities of this we wish to design for in 'tomorrows world'.

Conclusion

We are looking for alternate narratives that would help people envision and design for a sustainable future. This would guide us into making suggestions, frameworks or principles on which future technologies should be based on. Food is complex having layers of socio - cultural, geographical and economic factors. We need to try and understand the role technology might play in the future to construct food, society and the nuances of it. We presented the design fiction, Essen, a bioengineered device that allows the wearer to be in good health without the need of eating. Our aim in illustrating this is to bring into question current structures that shape how and what we eat, and their

social and environmental impacts, so that we can more clearly think about designing for sustainable food futures.

Acknowledgements

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Nodes

Name	Description	Files	References
act of rebellion		2	2
agnostic deliberation		3	4
alternate economic system		1	5
Anchor roles critical for functioning of the ecosystem of practices		6	8
belief and manifestation		2	4
bottom up goverrnance to influence change		6	13
broadening community to be resilient		10	33
bureaucracy due to scale		4	9
Challenges in realising the vision		9	24
challenges to keep participation equitable		6	12
change in socio-economic status by integrating with community		4	8
cities being unlivable		2	3
city as an experiment		4	5
community kitchen		2	4

Name	Description	Files	References
complexities of scale		10	31
comprehension of change is difficult		2	2
connection with family outside		1	2
consensus at every step		1	1
consensus through voting with consciousness		1	1
contextual vs perscriptive interpretation		6	15
coping with hegemony		11	33
creating an alternate lived reality to mainstream		11	32
crisis brings community together		3	3
daily uncertainity		2	2
data as an enabler	Sustainability passing on to someone Organic Certification For production and management	3	6
developing a microcasm in an ecosystem of practices		8	20
digital divide	access to digital technology	4	9
digital tools help in scaling		5	8
dilution of vision due to external influx of people	Double edge sword as it brings monetary value	6	10
disputes in working together		3	15
credibility	Credibility as a moral measure to live collectively	1	1
disputes in personal view points		2	5
diversification to be resilient		2	3

Name	Description	Files	References
early challenges in starting community		1	1
eating habits - part of practices - hard to change.		6	12
economic numbers exclude cost to the planet		1	5
economic viability by creating alternate markets		8	22
education of consumer		4	4
ension in economic viability and ecological sustsianbaility		10	32
established behaviours and lifestyle is difficult to change		7	19
every day negotiation		4	4
evolution of vision over time		5	11
exploitation of volunteers		2	4
feedback loop within the ecosystem		4	6
food is connected to human consciousness		4	9
gaming the economic system		3	4
Governance and conflicts in community		7	24
grower autonomy		3	6
high inter-personal communication		4	6
holistic awareness	Sustainable farming needs to have more awareness	11	41
individual ingenuity for the existing		7	12

Name	Description	Files	References
vision			
individual ingenuity to create new systems		1	5
individual interpretation	you find what you are looking for in the vision	8	13
individual life transitions	affect collective management and protection of land for future and economic viability	10	32
Individual responsibility within a collective ecosystem	Agency of the individual to choose what they want to do or responsibility within a collective	10	39
individual view on sustainability		13	39
individual vs shared interpretation		2	5
influencing hegemonic practices		3	6
inner transformations		9	21
interconnected practices		9	13
interconnectedness of the food system		7	32
intergenerational longitudinal integration		7	22
interrelation of vision and practice		12	33
interrelation scientific practice and spirituality		10	16
Land concerns		5	5
limited access to land	Large pieces of land isn't available to make the farm sustainable	4	5
Passing Land to future generations	Intergenerational concerns about the future of land	1	7
Protecting the land		5	6
lived experience important in relaisation of vision		6	9

Name	Description	Files	References
lived experience leads to individual sustainability		10	25
local currency		1	1
longitudinal sustainability		6	22
longitudinal translation of vision		5	20
longitudinal water management		4	8
longitudnal interrelation of vision and everday practice		11	38
Mapping history		2	7
materia evolution of place		4	7
materiality is part of consciousness or vision		3	10
modifying existing vision		2	4
Monetary challenges for land transition	Money coming in from outside as an investment which hinders future transitions	1	6
mother on ecology		1	1
mother on food		3	10
naturalisation		1	1
negotiation of practicalities within community		8	26
open source		1	1
passing on practice based sustainability knowledge		3	6
percieving practices as experiments		6	10
personal inquisitivness about vision and		4	7

Name	Description	Files	References
place			
personal is part of collective		7	29
personal vision		3	3
practicalities overrule abstract vision		1	9
practice based lived knowledge surpassed theoretical knowledge		4	9
practice influences translation of vision		9	17
replication of vision and practice by external people		4	5
research has agendas		4	9
restricted commerce outside the community		5	10
roadblocks in long term planning		4	8
scale leads to conflicts in vision		4	6
scope and limitations of digital intervention		8	27
self actualisation as a building block		1	1
sense of community within the ecosystem		7	16
setting up institutions in parallel to mainstream		6	11
shared history helps in negotiating present		2	6
shortcoming of the vision		2	2

Name	Description	Files	References
slow transitions		2	2
socio cultural economic differences	Out of the local population - change in social status	9	16
conflicts with locals		6	11
settler colonialism		4	7
spirituality manifests in technology		3	6
support ecosystem for communities		10	29
sustainability not technology agnostic		6	13
system of hidden money		3	6
systemic change requires individual transformation		5	9
systemic desensitization		3	6
systemic translation of vision		7	14
tech use for communication		6	19
technology as a tool for change		9	22
technology with consciousness		3	10
tensions in top down vision		4	6
time as currency		1	6
top down govt led systemic change		4	6
top down policies disconnected with on ground reality		5	6
tradeoff between practicalities and technology		1	1
uncertainty in food production		5	8

Name	Description	Files	References
Untitled		0	0
value system of community affects tech adoption		8	16
vision and practice creates extended invisible communities		8	10
vision creates shared value system		10	26
vision creates urban myth		3	3
vision integrates people in the community		11	27
vision vs plan		7	18
Wary of technology		4	8
western knowledge structures are limiting		1	3
working with locals		5	11

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Nodes

Name	Description	Files	References
access to technology		9	24
activity as an invitation	Invitation to invite new people and residents	3	4
activity triggered memories		1	3
anxieties in digital conversations		3	4
appreciation for activity		5	16
building a sense of community		7	24
building capacity		5	24
building community momentum	WhatsApp group conversations built momentum in action and discussions	9	41
burnout	exhaustion with community work	1	1
challenges in implementation	challenges in implementation	4	16
challenges with using technology	challenges with using technology	4	5
Change comes through example		3	5
citizen agency	citizen agency	4	16
clarity of information	quality of information was more than expected	4	8
collaboration and coordination through technology		7	30
community expert		5	12

Name	Description	Files	References
community is more than sum of individuals		5	9
conflicts and compromises with nature and technology use		5	8
Confusing Information	walking to the locations were sometimes confusing	5	6
confusions around whatsapp chat sessions	confusions around whatsapp chat sessions	1	2
connecting across timescales	Doesn't matter how long it takes to create community engagement	1	2
connecting physical and digital conversations		10	33
connecting scalar actions and politics		3	12
connections to future stakeholders	connecting to other non associated groups	5	17
costs associated		2	3
creating agency through activity	Encouraged looking at possibilities through envisioning	5	17
creating support systems for volunteers		1	5
deeply understanding problems		3	9
detremental effects of technology on nature		1	1
developing context	developing context	1	1
difficulties with new staeholders	Addition of new people tends to lose context of whats been done	3	5
digital conversations assume context	digital conversations assume context	1	2
digital conversations can be overwhelming	digital conversations can be overwhelming	1	4
digital conversations cant be facilitated		3	6

Name	Description	Files	References
well			
digital fatigue		2	2
digital lacks criticality	critical discussions can be hard to navigate in digital mediums	1	1
digital vs f2f		3	10
disadvantages of walking in a group		3	3
displacement brings feelings of disempowerment		1	1
dystopian future	dystopian future	1	1
embedding community values in tech		3	5
embodied interactions	Embodied-ness of technology use within physical digital interactions	2	6
enagaement predicament with technology		10	12
encouraging inclusion and diversity		1	3
encouraging intergenerational values		5	8
engagement on whatsapp		5	38
escape from daily life		1	2
exceeded expectations		3	6
failings of existing tech		3	7
fear of missing out		1	3
feedback and transparency embedded into tech	feedback and transparency embedded in techology for build infrastructure	2	7
finding time to participate	finding time to participate	1	6
finding ways to increase participation		10	40

Name	Description	Files	References
fitting digital in everyday life	fitting the digital conversations into everyday activities of life	8	18
food growing microcosm	food growing microcosm	1	5
including children in food growing		1	1
including local organisations	including local organisations	1	1
inclusive participation	inclusive participation	2	6
indifferent citizens	indifferent citizens	3	6
individual view of future of food growing		1	1
influence of locations	Different locations	7	13
infrastructuring effect		4	15
Interacting with strangers	Residents got inquisitive with the boards in locations and interacted with the participants	6	10
interaction flexibity	Creating interactions with technology that can be flexible	3	4
intergenerational nature of sustainability work		1	2
keeping engagement going	need for engaging people over a longer period of time and in a much more relaxed way	5	12
keeping it real	keeping it real	3	16
learning curve		3	7
Life takes over	Life takes over the activity and the task	6	13
limitations of messaging apps for documentation	limitations of messaging apps for documentation	1	1
long texts lose context		4	8
longevity of the project		4	17
longitudnal asynchronicity	Content available in different ways adjusting to people's availability and lifestyle	10	26

Name	Description	Files	References
longitudnal enaggement and reflection	whatsapp provided longitudinal engagement and reflection	4	12
longitudnal nature of community engagement		10	31
making connections accross different topics		1	4
Managing conflicts and diversity	Understanding what different people want	5	14
multi modal visualisation		1	2
Nature and technology symbiosis		10	19
navigating multi ethnicity		3	5
necessary community facilitation	Need for facilitation in community conversations, discussions and conflicts	7	16
negotiation of vision and practice		1	1
new to the area		1	3
phone usage behaviours		5	12
placebased expertise	History and lived experience of the neighbourhood	2	2
politics in community organisations	politics and hierarchy in community organisations	3	11
positioning to external bodies	positioning to external bodies	1	1
possible growing ideas		4	21
prescriptive nature of activity		1	1
radical ideas		1	2
resolving community conflicts		5	7
reward as motivation	reward as motivation	1	1
richnesss of conversation	WhatsApp group conversations were full of different examples and ideas etc	1	1
role of technology to discuss		5	9

Name	Description	Files	References
sustainability			
scope of technology	scope of technology	3	7
self conscious	nervousness being new stakeholder	5	11
serendipitious encounters	Meeting others on the walk	4	8
setting of expectations	The material set out clear expectations in the activity	3	3
Shortfalls in digital conversations	whatsapp is an informal and quick medium to discuss critical issues	3	14
situatedness encourages action oriented imagination		7	19
smaller groups have better interaction		3	6
socio-political access in digital engagement		1	4
sparked conversations and coflicts	conversations and conflicts around the use of space	3	5
staying away from multimodal interactions	Typing voice etc	2	2
surface and resolve barriers or problems		1	2
surfacing of implicit norms	Surfacing of taken for granted norms	4	17
sustianbility is a pluriversal	Everything is connected to everything else	2	3
technology brings in convenience		9	26
technology for growing food		3	6
technology is already a symbiosis of organic and inorganic		2	3
technology is already more than human		2	2
technology is misunderstood	Technology is many things, it is complex socio-material in nature	3	4

Name	Description	Files	References
textual lurkers	Reading and not responding	3	5
thinking about the future		2	7
Too much information		1	1
tracking past projects for future action	Keeping a record of what has failed and worked in the past	3	5
tragedy of commons	tragedy of commons	3	8
uninterested in activity context	not clued into the activities context	1	1
use of technology for participation	Communication tech	10	59
use of technology for record keeping		4	11
use of technology manages power		3	5
use of technology to engage large groups of poeple		5	6
usefulnes of group interactions	usefulness of walking in groups as the data gets collated and passed on physically and digitally	6	13
visualisation aids in future thinking		4	14
walking encouraged discovery	Walking encouraged finding of places within the neighbourhood not discovered before this especially for new residents	3	6
walking encouraged noticing	Walking the neighbourhood from one location to another encouraged noticing and looking at them differently	5	25
Whatsapp as a reminder for action		2	4
workarounds within physical digital interactions	workarounds for accommodating different modes of interactions and need to give attention to different things	6	16
workshops as time commitments		4	4

Auroville Research Plan

Observations
   a. Existing farms and their functioning
   b. Observations of food system related practices around Auroville
   c. Participation dynamics and social cohesion
   d. Sustainable practices their understanding and impact

Interviews

- **Interviews with farm owners / managers X 3**
  Understand food growing practices, future visioning, sustainable development and the participation involved

- **Interview with Auroville residents X 3**
  Vision of the city and its evolution, sustainable practices that are part of everyday, citizen participation and the integration of citizen voice for the development in the town, its food production and consumption practices

- **FOOD LINK / FOOD GROUP / SUSTAINABLE LIVELIHOOD INSTITUTE / sustainable development plan X 3**
  Understand policy making practices concerning food in Auroville

- **Interviews with low socio-economic class, paid workers X 3**
  Understand social cohesion and understand food practices of under-represented communities and their participation in the food system

- **Tourists/volunteers X 3**
  Understand volunteering and participation in the farms and their point of view on Auroville's food system and the vision.

Interview - Farm management staff/owners

Opening

A. (Establish Rapport) My name is Simran Chopra and I am a PhD candidate at Northumbria University, and I am looking at how grassroots communities work together to imagine, plan or create visions for future food growing also how the vision impacts on what these communities do, day to day.

B. (Purpose) I would like to ask you a series of questions about your farm, what you do to grow food and the cycle of growing, distribution and consumption of food within Auroville.

C. (Motivation) With this interview I am looking to understand challenges and opportunities for sustainable practices of food production and consumption, and how Auroville's approach to sustainable food might be adapted and translated in mainstream cities. Helping people think about the future in a more sustainable way.

D. (Timeline) The interview should take about 60 minutes and you are free to exit at any time just let me know and are you okay if I audio record the interview? Do you have any questions before we start?

(Let me begin by asking you some questions about your farm's journey)

A) [section about the farm's Journey and functioning] (20 minutes each)

1. Can you tell me about your farm. What is produced on it? Who are your customers? Who works on it?
   a. Who are the different people involved in the operation of the farm?
   b. What roles do people play on the farm?
   c. Who is involved in the decision making processes on the farm (what is grown, how things are grown (e.g. fertiliser use?), what will be grown next season, the economics of the farm)
   d. What is involved in day-to-day management / operation of the farm? (If growing, rearing or preserving changes with the season, describe what different times of the year would involve).
   e. How do you decide what to produce? Does this stay the same year on year or has it changed since you began farming? Why? Does anyone else influence what you produce? Who? Why?
   f. Does anything else affect what is grown (e.g. weather, consumer preference)?
   g. How does the guest season affect the food growing and participation on the farm?
   h. What is the role of Auroville consumers in any of these decisions?
   i. Do you supply to anyone outside of Auroville? Who? Why?

2. Can you tell me how you initially got involved in the farm?
   a. How did the opportunity come about?
   b. What were the challenges associated with this?
   c. Auroville is a relatively new city, and somewhat different from other cities in the region - how does your farm fit into the history of the city? Would you say your farm is similar/different from other farms in the region outside of Auroville? Why?

3. How would you describe the value system of your farm? (what is important to you in terms of what you produce and how you produce it? Prompts: Profit? Feeding a community? Ecology? Ancestry?)
    a. How can you describe the practices on the farm? (traditional organic, permaculture, bio dynamic)?
    b. Is sustainability / self sufficiency of the farm important?
    c. What does sustainability / self sufficiency mean to you?
    d. (If relevant) How can you achieve self sufficiency on the farm?

4. How do you coordinate with people who work on the farm, with customers, and with suppliers? What means of communication do you use? Prompts: Email, post, in-person, etc.?
    a. Can you describe a typical day and what your communication with others might involve for the operation/management of the farm?
    b. What kind of information is shared that is important for the operation/management of the farm? Is this formal (spreadsheets, reports) or informal?
    c. How much of this is done online/in person?
    d. Do you use social media? For what?
    e. Do you use phones/messaging? For what?
    f. Do you coordinate with other farmers or people in the industry about what to produce or how to produce it? How? (email, phone, in person, FB, etc)?
    g. Do you educate yourself about agricultural practices? How?
    h. Do you educate yourself about consumer demand? How?
    i. Is it done on an everyday basis?

5. Can you tell me how information technology or any other technology is used in the operation of the farm?
    a. Was it always used or how did it come to be in use?
    b. Do you think IT is important for the operation of the farm? Why?
    c. Do you think IT has particular advantages/disadvantages?
    d. Would you like your farm to have/use more/less IT? Why?

6. Do you know about the farm group? What is the role of the farm group?
    a. Who is part of the farm group and how many members are there?
    b. How is the participation monitored?
    c. Can non Auroville farmers be part of the farm group?
    d. Has the farm group benefited your farm in any way? How? Does it influence what you produce? Does it provide relevant information about agricultural practices and what to produce that is useful for the management of your farm?
    e. Is planning and coordination part of the food group? Do farms in Auroville coordinate to meet consumer demand? Do you coordinate to avoid surplus produce/waste? If no, how do you deal with these? Do you think you could coordinate better? How?
    f. Do farms in Auroville all practice a particular kind of agriculture (e.g. organic)? How did this agreement come to be? Is it monitoring in any way (formally/ informally?)

       g.   How often is this interaction? What kind of information is shared or discussed? In what way do you mostly communicate (email, phone, in person, FB, etc)

7. Do you know about FOOD LINK? What is the role of FOOD LINK in the auroville's food system, production, demand and supply?
   a. Who is part of food link? Who decides the participation?
   b. Does the FOOD LINK use a community based information system to estimate demand and monitor production?
   c. Is there a long term strategy for collaboration with non AV farmers
   d. Training outside farmers through organisations like sustainable livelihood institute, harvest and palmyra bring to the farm group?
   e. How was the local organic certification brought in place? What lead to the idea of it?
   f. How is the local organic certification monitored?

8. What is the policy behind commerce/trade with outside Auroville? Does Auroville governing body prescribe how much produce can be sold outside of Auroville.

B) [section about food and sustainability] (20 minutes each)

9. What does good agricultural practice mean to you?
   a. Who is involved in this exchange?
   b. Do you learn from others? Who? How? Do you share your own best practice with others? Who? Why? Can you give me an example of when you learned from others and applied it to your own farming practice? Can you give me an example of when you shared your own practices with others?
   c. Do you exchange this knowledge with the wider community outside Auroville?

10. How important is food sovereignty / selfsufficiency to you and in the wider Auroville region? (Auroville website states Auroville can only manage 15% of its current food consumption)

11. What does "food sustainability" or "sustainable agriculture" mean to you? How will you describe sustainability in the Pondicherry state and the larger indian context?

12. Do you act on to any food policies, if so which ones (local, national, international)?
    a. Who is involved in this process?

13. In 2004 after the farm assessment the 5 year Auroville sustainable agriculture plan (ASAP) was developed, do you know about it? What do you think the vision was for the 5 year Auroville sustainable agriculture plan (ASAP)?
    a. What do you think worked and didn't work in the plan?
    b. What efforts were made to link it to everyday practices?
    c. How did you realign your farm practices to the sustainable agriculture plan?

14. Would you say economic or ecological sustainability can go hand in hand?Is there anything that you find easy or difficult to create a balance?
    a. Do you think the market cost is different than the production cost that you incur?
    b. Is there a financial gap that needs to be filled while maintaining the farm?
    c. How do you supplement your income?
    d. What is Auroville's contribution towards the economic viability of the farm? Does the agriculture development fund help in filling the gap or starting a venture?
    e. Do other farms compete for this pool of resource?
    f. Do other farms cooperate in the daily functioning or economic viability of your farm?
    g. Are there government subsidies available to the Auroville farmers?
    h. What is the contribution of the farm towards the economic viability of Auroville?

15. Is growing (scaling up) your farm important to you, or do you wish it to remain as it is? Why? What are the main considerations for expanding your farm and its functions?
    a. What does scaling up mean to you?
    b. What are the main challenges according to you?
    c. How do you think this will affect the current functioning?
    d. How will it affect the participation of people or volunteers?

C) [section about visioning and future-thinking process] (20 minutes each)

16. Auroville was set up with Mother's vision/agenda/charter. Can you tell me about this in relation to food production?
    a. How relevant is this vision today? Why? Has this vision changed/evolved at all since then?
    b. How has this impacted farming? How has having the original vision benefited the food system in the city?
    c. If that vision wasn't there, how do you think things would be different? Do you think it has had any negative impacts? (e.g. slowing progress?)
    d. How does the larger Auroville community coordinate to achieve the planning and implementation of the larger vision?
    e. What are the main challenges in relation to food for Auroville today?

If given a chance, would you like to imagine Auroville in the future. We will now do a short visioning exercise "If you can close your eyes and imagine that you have time travelled to Auroville 25 years from today. You are in the same spot and let us take a walk around auroville to try and look at the new developments in the area (if any). Look at the environment around you, Its sights, sounds, smells. Walk on the earth, look at the plants, the people passing by, houses, the mode of communication and transportation. After a short while come back to your starting point. "
    a. How would you describe to a friend what do you saw and felt in a postcard? (you can draw, explain or enact)
    b. What were the three main changes that you saw?
    c. What's the same? What's different? Why?

d. Do you think the food production has changed in Auroville?

17. Talking of visioning today, do you think people need to participate in creating the future vision of Auroville? Is it important for citizens to plan for the future?
    a. What do you think are the appropriate ways to participate in creating this citizen led vision? Are there existing mechanisms for the same such as town hall meetings etc.?
    b. Do you think the vision should include perspectives of different people? From different socio economic groups etc.
    c. Do you think technology can play a role?

18. Auroville has been quite successful in creating part of its own food system. Would you agree?
    a. In today's date what are the factors involved in creating 100% self sufficiency?
    b. What has changed since the 60's when Auroville was set up?
    c. What might be involved in replicating Auroville somewhere else?

19. How is the Auroville's established vision by the mother being realised in your work? (link their practice to vision)
    a. What was the vision for your farm? And how did it evolve with the daily practice?
    b. How did the vision come into being and how has it evolved?
    c. What were the factors or people associated with it?
    d. Do you make future plans for what you will produce on the farm? What kind of timescales do you consider? What do you see as the main challenges for this?
    a. Does any future plan impact how you produce food today?

20. How does your farm's value system / principles or practices align to the original Mother's vision? Are there negotiation / tensions within the vision and value system that you set up for the farm?

21. The original vision was spiritual. Since then, science has shaped many practices. Do you think the spiritual vision and scientific practices work together? If yes could you describe how and why you think this? If not could you describe how and why you think they don't?
    a. Do you think about it while adopting new technology?

        Method that ur using that ur using to understand their understanding around auroville.
        Future thinking rather than visioning
        Visions and what people perceive of them

Closing
A. (Summarize) I think we have gone through all my questions and have answered everything around the planning and coordination that goes behind food growing in Auroville. I will end the interview now.

B (Maintain Rapport) I appreciate the time you took for this interview. Is there anything else you think would be helpful for me to know that would be important for me to consider?

C. (Action to be taken) I should have all the information I need. Would it be alright to email you if I have any more questions? Thanks you again.

Interview - FOOD LINK / FOOD GROUP / SUSTAINABLE LIVELIHOOD INSTITUTE / sustainable development plan

Opening
A. (Establish Rapport) My name is Simran Chopra and I am a PhD candidate at Northumbria University, and I am looking at how grassroots communities work together to imagine, plan or create visions for future food growing also how the vision impacts on what these communities do, day to day.
B. (Purpose) I would like to ask you a series of questions about your organisation, what you do and the cycle of growing, distribution and consumption of food within Auroville.

C. (Motivation) With this interview I am looking to understand challenges and opportunities for sustainable practices of food production and consumption, and how Auroville's approach to sustainable food might be adapted and translated in mainstream cities. Helping people think about the future in a more sustainable way.
D. (Timeline) The interview should take about 60 minutes and you are free to exit at any time just let me know and are you okay if I audio record the interview? Do you have any questions before we start?
(Let me begin by asking you some questions about your organisation's journey)

A) [section about the organisation's Journey and functioning] (20 minutes each)

1. Can you give me an overview of how food is produced in Auroville and the people involved?
    a. Does the farm production meet the demand of the consumers in Auroville? If not, why?
    b. Are there measures taken currently to meet demands or increase in demand such as in the tourist season? If so, what are they?
    c. Can you describe the food system in Auroville?
    a. Who do you think are the main players?
    b. What practices do you think are important to consider while looking at the local food system?

2. Can you tell me how you initially got involved in the [organisation]?
    a. How did the opportunity come about?
    b. What were the challenges associated with this?
    c. What involves in the daily operations

3. How is Auroville governed?
    a. How involved are the governing body of Auroville in the ground realities and the everyday decisions?
    b. How does it affect food consumption and production?
    c. Do you have a crop plan for auroville?

4. What is the role of Auroville finance and asset management committee?
    a. How is the agriculture development fund managed under it?

5. Can you tell me about [organisation] and what it does? Who is part of the [organisation] and how many members are there?
    a. Who are the different people involved in the operation of the organisation?
    b. What roles do people play in the functioning of the organisation?
    c. Who is involved in the decision making processes (what is grown, how things are grown (e.g. fertiliser use?), what will be grown next season, the economics of the farms)
    d. How does it influence everyday practice like food growing in Auroville?
    e. How do you create impact in what is grown in Auroville through the [organisations] work?
    f. How is participation decided/monitored in the [organisation]?
    g. Can non Auroville farmers be part of the [organisation]?

6. How would you describe the value system (principles/guidelines) of your organisation?
    a. How did you decide on them and why?
    b. Is sustainability / self sufficiency important?
    c. What does [the value] mean to the organisation within the larger context of Auroville?

7. Do you know about FOOD LINK? What is the role of FOOD LINK in the auroville's food system?
    a. How is the participation decided in food link?
    b. I have heard, FOOD LINK uses a community based information system to estimate demand and monitor production? If so, what does the consumer data help you figure?
    c. Would you want the consumers to be more involved in the decisions around food practices and growing? If so, why?
    d. Do you supplement the food demand like in (guest, non season) with non Auroville production?
    e. Is there a crisis management strategy in terms of the food production in Auroville?
    f. Is there a long term strategy for collaboration with non AV farmers?
    g. Training outside farmers through organisations like sustainable livelihood institute, harvest and palmyra bring to the farm group?
    h. How was the local organic certification brought in place? What lead to the idea of it?
    i. How is the local organic certification monitored?

As part of my research, I'm interested in technology, data, and how information is exchanged, and how this affects the functioning of the organisation and the food system in Auroville. So I've got some questions about communication and technology.

8. How do you communicate with members of [the organisation or outside] [FARM GROUP or FOOD LINK]?
    a. What sort of things do you communicate about?
    b. What kind of information is shared? Is this formal (spreadsheets, reports) or informal?
    c. How much of this is done online/in person?
    d. In what way do you communicate (email, phone, in person, FB, etc)?
    e. Is it done on an everyday basis?

9. Can you tell me how information technology or any other technology is used in the operation of the food system in Auroville?
    a. Was it always used or how did it come to be in use?

B) [section about food and sustainability] (20 minutes each)

10. How do you inform yourself about good food practices or values (mentioned above)?
    a. Who is involved in this exchange?
    b. Do you exchange this knowledge with the wider community outside Auroville?

11. How important is food sovereignty to in the wider Auroville region? (As the website states Auroville can only manage 15% of its current food consumption)
    a. How do you think you can achieve self sufficiency in Auroville?
    b. What does food security mean in the larger auroville area?
    c. How do you think you can make the food system more resilient or risk immune?
    d. How do you think a sustainable food system can be set up?

12. What does "food sustainability" or "sustainable agriculture" mean to you? How will you describe sustainability in the Pondicherry state and the larger indian context?
    a. Do you think the Auroville consumer have a local sustainable diet?
    b. How sustainable are the current practices in Auroville?
    c. Can you compare these to the outside world?
    d. What do you think people in urban areas need to change in their practices to be more sustainable?
    e. How can we help people transition to sustainable practices in cities?

13. How are new food policies (if any) established?
    a. Who is involved in this process?
    b. What is the policy behind commerce/trade with outside Auroville? Does Auroville governing body prescribe how much produce can be sold outside of Auroville.

     c.   If a new economic structure / policy was built to support the farmers what would it be like?

14. What do you know about the 2004 farm assessment? After the 2004 farm assessment what do you think was the vision for the 5 year Auroville sustainable agriculture plan (ASAP)?
     a.   What do you think worked and didn't work in the plan?
     b.   What efforts were made to link it to everyday practices?
     c.   How did you realign your farm practices to the sustainable agriculture plan?

15. Would you say economic or ecological sustainability go hand in hand, or are they difficult to balance in Auroville?
     a.   Do you think the market cost is different than the production cost incurred by the farms?
     b.   Is there a financial gap that needs to be filled while maintaining the farms?
     c.   What is Auroville's contribution towards the economic viability of the farm? Does the agriculture development fund help in filling the gap or starting a venture?
     d.   Do other farms compete for this pool of resource?
     e.   Are there government subsidies available to the Auroville farmers?
     f.   What is the contribution of the farm towards the economic viability of Auroville?

16. What are the main considerations for scaling up farm production and its functions?
     a.   What does scaling up mean to you?
     b.   What are the main challenges according to you?
     c.   How do you think this will affect the current functioning?

17. **C) [section about visioning and future-thinking process] (20 minutes each)**

18. Auroville was set up with Mother's vision/agenda. How much of it is being included by the organisations? Can you tell me about this in relation to food production?
     a.   Do you think these visions are outdated or need to be changed? Why? Has this vision changed/evolved at all since then?
     b.   How is the original vision important in influencing auroville today? How has this impacted farming? How has having the original vision benefited the food system in the city?
     c.   If that vision wasn't there, how do you think things would be different? Do you think it has had any negative impacts? (e.g. slowing progress?)
     d.   How does the larger Auroville community coordinate to achieve the planning and implementation of the larger vision?
     e.   If visions are so powerful to bring about change, How important is the mother's vision right now to plan for the 25 or 50 years and from now or would a new vision be required?
     f.   What are the main challenges in relation to food are for Auroville today?

If given a chance, would you like to imagine Auroville in the future. We will now do a short visioning exercise "If you can close your eyes and imagine that you have time travelled to Auroville 25 years from today. You are in the same spot and let us take a walk around auroville to try and look at the new developments in the area (if any). Look at the environment around you, Its sights, sounds, smells. Walk on the earth, look at the plants, the people passing by, houses, the mode of communication and transportation. After a short while come back to your starting point. "

    a. How would you describe to a friend what do you saw and felt in a postcard? (you can draw, explain or enact)

    b. What were the three main changes that you saw?

    c. What's the same? What's different? Why?

    d. Do you think the food production has changed in Auroville?

19. Talking of visioning today, do you think people need to participate in creating the future vision / planning for the future of Auroville? Is it important for citizens to plan for the future?

    a. What do you think are the appropriate ways to participate in creating this citizen led vision? Are there existing mechanisms for the same such as town hall meetings etc.?

    b. Do you think the vision should include perspectives of different people? From different socio economic groups etc.

    c. Do you think technology can play a role?

20. Auroville has been quite successful in creating part of its own food system. Would you agree?

    a. In today's date what are the factors involved in creating 100% self sufficiency?

    b. What has changed since the 60's when Auroville was set up?

    c. What might be involved in replicating Auroville somewhere else?

21. Is the mother's vision relevant to your organisation? How is the Auroville's established vision by the mother being realised in your work? (link their practice to vision)

    a. What were the factors or people associated with it?

    b. How do you make future plans for food production? What do you see as the main challenges for this?

    c. Does any future plan impact how you produce food today?

22. How does your planning for the future align to the original Mother's vision? Are there negotiation / tensions within the vision and good practices that you set up for the wider Auroville food system?

23. The original vision was spiritual. Since then, science has shaped many practices. Do you think the spiritual vision and scientific practices work together? If yes could you describe how and why you think this? If not could you describe how and why you think they don't?

    a. Do you think about it while adopting new technology?

24. Have you ever made an effort to document the evolution of the vision of Auroville?

a. Do you think technology will be a viable choice to do so? What is the role technology can take in this process?
b. What kind of technologies do you think will suit this? Any of the existing technologies that you use currently that you think has the potential for same?

Closing

A. (Summarize) I think we have gone through all my questions and have answered everything around the planning and coordination that goes behind food growing in Auroville. I will end the interview now.

B (Maintain Rapport) I appreciate the time you took for this interview. Is there anything else you think would be helpful for me to know that would be important for me to consider?

C. (Action to be taken) I should have all the information I need. Would it be alright to email you if I have any more questions? Thanks you again

Interview schedule - Residents
Supporting participatory visioning or long-term thinking and its reconciliation with everyday practice for grassroot sustainable communities through digital tools

Opening
A. (Establish Rapport) My name is Simran Chopra and I am a PhD candidate at Northumbria University, and I am looking at how grassroots communities work together to imagine, plan or create visions for future food growing also how the vision impacts on what these communities do, day to day.
B. (Purpose) I would like to ask you a series of questions about your food practices and the cycle of growing, distribution and consumption of food within Auroville.
C. (Motivation) With this interview I am looking to understand challenges and opportunities for sustainable practices of food production and consumption, and how Auroville's approach to sustainable food might be adapted and translated in mainstream cities. Helping people think about the future in a more sustainable way.
D. (Timeline) The interview should take about 60 minutes and you are free to exit at any time just let me know and are you okay if I audio record the interview? Do you have any questions before we start?
(Let me begin by asking you some questions about you)

B. (Purpose) I would like to ask you a series of questions about your farm, the food growing practices and the food system within Auroville.
C. (Motivation) With this interview I am looking to understand challenges and opportunities for sustainable practices of food production and consumption, and how Auroville's approach to sustainable food might be adapted and translated in mainstream cities. Helping people think about the future in a more sustainable way.
D. (Timeline) The interview should take about 60 minutes and you are free to exit at any time just let me know and are you okay if I audio record the interview?
(Let me begin by asking you some questions about your farm's journey)

A) [section about life in Auroville] (20 min each)
1. Are you originally from Auroville?
   a. If not how did you find out about Auroville?
   b. How long have you lived here?

2. What drew you towards Auroville and the decision to live here?

3. How is Auroville governed?
   a. How involved are the governing body of Auroville in the ground realities and the everyday decisions?
   b. How does it affect your daily activities and decisions?

4. How would describe the food in Auroville?

     a.   Do you think [the way Auroville is governed] affects your food choices?

5. How do you decide what to eat?
     a.   Where do you buy most of you food from?
     b.   Do you know where the food in Auroville comes from?
     c.   Do you know about food link? Is Food link important to you as a resident?
     d.   Is there a reliable or consistent supply of Auroville fresh food at food link?
     e.   What do you prefer getting at the food link? Why?
     f.   What do you buy locally and what do you buy outside auroville? Why?
     g.   Do you try to eat more local varieties (like locally grown millets) or its more according to your food choices and culture?

6. Can you describe the food system in Auroville?
     a.   Who do you think are the main players?
     b.   What practices do you think are important to consider while looking at the local food system?
     c.   How sustainable are the current practices in Auroville?
     d.   Can you compare these to the outside world?
     e.   What do you think people in urban areas need to change in their practices to be more sustainable?
     f.   How can we help people transition to sustainable practices in cities?

7. How are new food policies (if any) established?
     a.   Who is involved in this process?
     b.   Do residents have a say in the functioning of Auroville?
     c.   How is it coordinated and planned?

8. Do you have a say (feel that their buying habits shape local food) in what the farms do or grow?
     a.   How engaged are the residents in influencing the farms?
     b.   Would you like to be more involved?
     c.   Do they know their auroville farmers?
     d.   Have you spoken to them about the food grown on the farms?
     e.   Have you ever visited the farms yourself?
     f.   Anything you would like to eat that is not available or grown on the local farms and why?

9. Is celebration a part of the community building in Auroville?
     a.   How does the celebration happen (e.g. do you have things like harvest festivals)?

10. How would you describe the economic system within Auroville? What do you use to buy/get food?
     a.   How do you as a resident contribute to the larger Auroville society?
     b.   How do you earn your sustenance?
     c.   How does the Auroville membership work while buying food?

As part of my research, I'm interested in technology, data, and how information is exchanged, and how this affects the functioning of the organisation and the food system in Auroville. So I've got some questions about communication and technology.

11. Do you think, technology can improve how decisions are made / improve operations in Auroville? (FB, instagram, websites, smartphone apps) [like social networks, etc.]

12. Is community engagement important part within the functioning of Auroville?
    a. What are the challenges involved in collaboration and community engagement?
    b. What are the different communities that engaged in this interaction?

13. What are the different activities for social interaction?
    a. How are they organised and planned?
    b. Where do these happen in Auroville?

14. How do you communicate or coordinate with someone from Auroville?
    a. How often is this interaction?
    b. How much of this is done online/in person?
    c. In what way do you communicate (email, phone, in person, FB, etc)
    d. Is it done on an everyday basis?

B) [section about food and sustainability] (20min each)

Auroville has been a pioneer in sustainable food growing practices and planting forests. What does sustainability mean to you? Would you consider sustainability as an important aspect to consider as a resident in Auroville?

15. How do you inform yourself about sustainable practices?
    a. Who are the important people who inform you about the same?
    b. Do you exchange this knowledge within the wider Auroville community?
    c. Would you describe your eating as a sustainable practice?

16. How important is ecological sustainability to you as compared to economic viability?
    a. Are ecological and environmental benefits less valued why?
    b. What in your opinion is sustainability?
    c. Do you think Auroville products are sustainable?
    d. Is it economically priced in accordance to your lifestyle? Or do you think it is a luxury product?
    e. Do you know about the Auroville sustainability agenda?
    f. Do you think your food practices align to this agenda?
    g. Would you be willing to change your food habits to support Auroville's goal of self sufficiency?

17. The 2004 Auroville consumer survey showed that Aurovillians do not have a sustainable diet in accordance to the planned 5 year sustainability agenda. What are your thoughts on it?
    a. Do you think consumers can play a role in bringing about sustainability or self sufficiency in Auroville? How?
    b. Would you be willing to share your food practices or buying behaviour data with the larger food body in auroville to manage demand and supply?
    c. How would you like to share this food consumption data?

18. How will you describe sustainability in the Pondicherry state and the larger indian context?

19. What are the main considerations for you to consider for your family or yourself to live for your lifetime in Auroville?
    a. What are the main challenges according to you?
    b. Do you think food is a concern?
    c. Are nutrition or ecological benefits important to you?

C) [section about visioning and future-thinking process] (20min each)
20. Auroville was set up with Mother's vision/agenda. Can you tell me about this in relation to food production?
    f. Do you think these visions are outdated or need to be changed? Why? Has this vision changed/evolved at all since then?
    g. How has this impacted farming or the food you eat? How has having the original vision benefited the food system in the city?
    h. If that vision wasn't there, how do you think things would be different? Do you think it has had any negative impacts? (e.g. slowing progress?)
    i. How does the larger Auroville community coordinate to achieve the planning and implementation of the larger vision?
    j. What are the main challenges in relation to food are for Auroville today?

21. How is the Auroville's established vision by the mother being realised in your work or everyday life? (link their practice to vision)
    a. Do you think the farms and organisations are influenced by the mother's vision? If so, how?

If given a chance, would you like to imagine Auroville in the future. We will now do a short visioning exercise "If you can close your eyes and imagine that you have time travelled to Auroville 25 years from today. You are in the same spot and let us take a walk around auroville to try and look at the new developments in the area (if any). Look at the environment around you, Its sights, sounds, smells. Walk on the earth, look at the plants, the people passing by, houses, the mode of communication and transportation. After a short while come back to your starting point. "
    e. How would you describe to a friend what do you saw and felt in a postcard? (you can draw, explain or enact)

   f. What were the three main changes that you saw?

   g. What's the same? What's different? Why?

   h. Do you think the food production has changed in Auroville?

22. Talking of visioning today, do you think people need to participate in creating the future vision of Auroville? Is it important for citizens to plan for the future?

   d. What do you think are the appropriate ways to participate in creating this citizen led vision? Are there existing mechanisms for the same such as town hall meetings etc.?

   e. Do you think the vision should include perspectives of different people? From different socio economic groups etc.

   f. Do you think technology can play a role?

23. Auroville has been quite successful in creating part of its own food system. Would you agree?

   d. In today's date what are the factors involved in creating 100% self sufficiency?

   e. What has changed since the 60's when Auroville was set up?

   f. What might be involved in replicating Auroville somewhere else?

24. The original vision was spiritual. Since then, science has shaped many practices. Do you think the spiritual vision and scientific practices work together? If yes could you describe how and why you think this? If not could you describe how and why you think they don't?

   a. Do you think about it while adopting new technology?

Closing

A. (Summarize)

B (Maintain Rapport) I appreciate the time you took for this interview. Is there anything else you think would be helpful for me to know that would be important for me to consider?

C. (Action to be taken) I should have all the information I need. Would it be alright to email you if I have any more questions? Thanks you again.

Interview schedule - Paid workers
Supporting participatory visioning or long-term thinking and its reconciliation with everyday practice for grassroot sustainable communities through digital tools

Opening
A. (Establish Rapport) My name is Simran Chopra and I am a PhD candidate at Northumbria University, and I am looking at how grassroots communities work together to imagine, plan or create visions for future food growing also how the vision impacts on what these communities do, day to day.
B. (Purpose) I would like to ask you a series of questions about you, your work, food you eat and the cycle of growing, distribution and consumption of food within Auroville.
C. (Motivation) With this interview I am looking to understand challenges and opportunities for sustainable practices of food production and consumption, and how Auroville's approach to sustainable food might be adapted and translated in mainstream cities. Helping people think about the future in a more sustainable / planned way.
D. (Timeline) The interview should take about 60 minutes and you are free to exit at any time just let me know and are you okay if I audio record the interview? Do you have any questions before we start?
(Let me begin by asking you to imagine a future)

If given a chance, would you like to imagine your life 20 years from now. We will now do a short visioning exercise "If you can close your eyes and imagine that you have time travelled 20 years from today. Let us take a look around to try and see the new developments in your life and the area around. What are you wearing, look at the environment around you, its sights, sounds, smells. Walk on the earth, look at the plants, the people passing by, houses, the mode of communication and transportation. After a short while come back to your starting point. "

   a. How would you describe to a friend what do you saw and felt in a postcard? (you can draw, explain or enact)
   b. What were the three main changes that you saw?
   c. What life is like for you now and how are everyday practices different in the vision for the future?

A) [section about visioning and future-thinking process]

1. Do you know who founded Auroville?
   a. Do you know why was Auroville set up?
   b. Does it affect you? Has it benefited you in any way?
   c. Do you prefer to work in Auroville rather than Chennai or Pondicherry? Challenges and opportunities in auroville that are not there in other cities.

2. Auroville's vision was developed in 1954. Do you know about it? Can you describe what you think it is?

a. Perspectives on the vision been realised or not " Auroville belongs to nobody in particular. Auroville belongs to humanity as a whole. But, to live in Auroville, one must be a willing servitor of the divine consciousness." "Auroville wants to be the bridge between the past and the future. Taking advantage of all discoveries from without and from within, Auroville will boldly spring towards future realisations.

b. Do think the same vision is still relevant today? Could you say how?
c. If auroville was not founded with this vision would you still work there?
d. What are the things important to you in mother's vision?
e. Is equality part of the vision? How successful has it been or not?
f. What do you think are the challenges or reasons for success or unsuccessful nature of the vision?
g. If things need to be changed going forward what do you think is required? (widespread cultural change / fundamental issues)
h. Do you think technology can help you in participating in discussions within auroville? If it was anonymous and you can voice your concerns. How will you participate with them?

3. If Auroville was establishing a new vision now what is the most appropriate way of doing that now?
    a. Do you think you will or not be part of it? Their reasons for not participating
    b. What do you think are issues around participation in India as a whole?
    c. How is auroville governed? How is the system working or not for them and what are the challenges associated?
    d. How will you participate in the implementation of the vision?

4. How do you think life would be in the next 10 years within auroville?

B) [section about food, work and participation] 15 min

5. What do you think are the challenges around food in Auroville? What do you think are the challenges around food in India?

6. What might be involved in creating a self sufficient food system in Auroville?

7. What might be involved in replicating Auroville somewhere else?
    a. In today's date what are the factors involved?
    b. What has changed since the 60's when Auroville was set up?

8. Do you think the food production has changed in Auroville?
    a. Who decides what's produced and why?
    b. Do you get involved in the decision process?
    c. If the farm /organisation scales up what do you think would be the changes that will impact you? maybe a better pay?

9. What do you say are your values/ important aspects around food?
    a. What does sustainability / self sufficiency mean to you?
    b. What do you think organic or ecological agriculture / food food practices mean to you?

10. Where do you live?
    a. How far is your place from Auroville?
    b. Can you tell me what it is like to live there?
    c. How long have you lived there?
    d. How did you get to know about Auroville?
    e. How did you get involved in the activities around Auroville?

11. What do you eat?
    a. Do you eat local grains like millets?
    b. Have your food choices changed due to Auroville?
    c. What are the reasons behind you choosing it?
    d. Where do you buy it from?
    e. Do you know where it grows?
    f. Do you grow something on your own for your family?

12. How educated you are?
    a. What your ideal professional job would be?

13. Do you consider yourself as a member of the larger auroville community?
    a. If so why or why not?
    b. What is your role within Auroville?
    c. Social mobility - what is unsustainable (quality of life, labour issues)How did you get involved?
    d. What do you like about Auroville and the people here?
    e. Do you participate in activities around auroville? What is your favourite?

14. Do you own a phone?
    a. If so what kind?
    b. What do you use it for?
    c. Do you know about internet and do you use it? (movies, songs etc.) If so for what?

Closing
A. (Summarize) I think we have gone through all my questions and have answered everything around the planning and coordination that goes behind food growing in Auroville. I will end the interview now.

प्रतिभागियों के लिए सूचना पत्र

परियोजना का नाम: ऑरोविले में टिकाऊ भोजन और खाद्य प्रथाओं के भविष्य को भी समझना, भूमिका प्रौद्योगिकी इस समर्थन में खेल सकती है।

इस शोध परियोजना में एक प्रतिभागी के रूप में हम एक स्वैच्छिक साक्षात्कार में भाग लेने के लिए कह रहे हैं। परियोजना आपके समुदाय और उसके भविष्य में बढ़ने के बारे में है। यह शीट अनुसंधान, साक्षात्कार और क्षेत्र के अवलोकनों के बारे में जानकारी प्रदान करती है।

हमें आशा है कि यह आपके किसी भी प्रश्न का उत्तर दे, लेकिन यदि आपके पास कोई और प्रश्न है तो कृपया संपर्क करने में संकोच न करें:

सिमरन चोपड़ा	एड्रियन क्लीयर
डॉक्टरेट छात्र	सीनियर रिसर्च फेलो
कंप्यूटर और सूचना विज्ञान विभाग	कंप्यूटर और सूचना विज्ञान विभाग
कक्ष 310, सी आई एस बिल्डिंग,	कक्ष 310, सी आई एस बिल्डिंग,
नॉर्थम्ब्रिया विश्वविद्यालय,	नॉर्थम्ब्रिया विश्वविद्यालय,
न्यूकैसल अप टाइन	न्यूकैसल अप टाइन
T: +44 7588753921	T: 0191 227 4253
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शोध क्या है? मेरी भागीदारी में क्या शामिल होगा?

हम शहर खाद्य प्रणाली के विषय में ऑरोविले शहर में साक्षात्कार की एक श्रृंखला चला रहे हैं, और कैसे, आपके परिप्रेक्ष्य से, खाद्य बढ़ने के भविष्य के दृष्टिकोण ऑरोविल में आत्मनिर्भरता और स्थायित्व का समर्थन कर सकते हैं। साक्षात्कार एक सामान्य परियोजना का एक हिस्सा हैं जो रचनात्मक अन्वेषण और दृष्टि और डिजिटल प्रौद्योगिकियों के सहयोग के माध्यम से, स्थायी शहरी वायदा की चर्चा और डिजाइन में नागरिकों और जमीनी खाद्य पदार्थों के बढ़ते समुदायों को जोड़ने के तरीकों को विकसित करना है। हम पूछते हैं कि यदि संभव हो तो आप खुले अंत प्रश्नों की एक श्रृंखला के साथ 60 मिनट साक्षात्कार में भाग लेंगे, जिसे आप अपने आराम के अनुसार उत्तर दे सकते हैं। प्रश्न खाद्य प्रथाओं, उत्पादन और खाद्य वितरण, भविष्य की योजना और दृष्टिकोण, पॉलिसी निर्माण और ऑरोविले शहर में भागीदारी के बारे में होंगे (विवरण की पुष्टि की जाएगी):

आपको एक अवलोकन अध्ययन में भाग लेने के लिए आमंत्रित किया जा सकता है जहां शोधकर्ता खाद्य संबंधित प्रथाओं का निरीक्षण करेगा जिसमें आप शामिल हैं और अनुसंधान के दस्तावेजी साक्ष्य के लिए चित्र लेते हैं।

आपको ओरोविल में बढ़ रहे भोजन के भविष्य के बारे में साक्षात्कार के बीच साक्षात्कार के बीच ड्राइंग, लेखन, भवन, वीडियो या ऑडियो रिकॉर्डिंग के रूप में एक छोटे से विजन अभ्यास का हिस्सा बनने के लिए भी आमंत्रित किया जा सकता है।

हम यह शोध क्यों कर रहे हैं:
वर्तमान खाद्य खपत पैटर्न अस्थिर हैं। खाद्य प्रणाली को कुछ बड़े संगठनों द्वारा वैश्वीकृत और प्रभुत्व दिया जाता है, जो लोगों को इसमें बदलाव करने की अनुमति देता है। हालांकि, निचले स्तर से सकारात्मक परिवर्तन को बढ़ाने में जमीनी समुदाय महत्वपूर्ण हैं। लंबी अवधि की सोच इन समुदायों को आत्मनिर्भरता और पारिस्थितिकीय प्रथाओं के प्रति संक्रमण में सशक्त बनाने की कुंजी है जो वर्तमान की जरूरतों को पूरा करती है, भविष्य की पीढ़ियों की अपनी जरूरतों को पूरा करने की क्षमता के समझौता किए बिना समझौता किए बिना। साथ ही, टिकाऊ खाद्य प्रथाओं के लिए दीर्घकालिक सोच और योजना का समर्थन करने में प्रौद्योगिकी की भूमिका को समझें।

वर्तमान शोध परियोजना भारत के ऑरोविल शहर के भीतर खाद्य प्रणाली में नागरिक भागीदारी और दीर्घकालिक सोच प्रक्रियाओं को देखना चाहता है। सामाजिक आर्थिक संदर्भ, शहर के भीतर स्थापित दृष्टि, रोजमर्रा की खाद्य प्रथाओं और भविष्य की स्थिरता एजेंडा के साथ इसकी बातचीत।

गोपनीयता और गुमनाम:
साक्षात्कार ऑडियो रिकॉर्ड किए जाएंगे और आप किसी भी बिंदु पर साक्षात्कार से हट सकते हैं। यदि आप साक्षात्कार के बाद बाद के चरण में वापस लेने की आवश्यकता महसूस करते हैं, तो कृपया शोधकर्ताओं से संपर्क करें, उनकी जानकारी ऊपर सूचीबद्ध है। आपके द्वारा एकत्र की गई किसी भी जानकारी को गोपनीयता के साथ माना जाएगा। इसका मतलब है कि केवल प्राथमिक शोधकर्ता के पास किसी भी कच्ची जानकारी तक पहुंच होगी जिसे विशेष रूप से आपके साथ जोड़ा जा सकता है। उसके बाहर साझा की गई कोई भी जानकारी अज्ञात हो जाएगी, जब तक कि आप अपना असली नाम इस्तेमाल नहीं करना चाहेंगे। इसका अर्थ यह है कि जब तक अन्यथा आपके द्वारा निर्दिष्ट नहीं किया जाता है, तो आपके नाम जैसे व्यक्तिगत विवरण हटा दिए जाएंगे, और इसके बजाय एक छद्म नाम का उपयोग किया जाएगा। यह किसी भी प्रकाशन या प्रस्तुतियों या विश्वविद्यालयों में अन्य सहयोगियों के साथ किसी भी चर्चा पर लागू होगा।

डेटा का उपयोग कैसे किया जाएगा और संरक्षित किया जाएगा:
हम आपके द्वारा प्रदान किए गए डेटा का सामान्य डेटा संरक्षण विनियम 2018 और किसी भी बाद के डेटा संरक्षण कानून के अनुसार व्यवहार करना चाहते हैं। इसका मतलब है कि

भौतिक प्रारूप में संग्रहीत कोई भी व्यक्तिगत जानकारी (उदाहरण के लिए, पेपर पर) नॉर्थम्ब्रिया यूनिवर्सिटी या न्यूकैसल यूनिवर्सिटी परिसर में लॉक ऑफिस पर लॉक फाइलिंग कैबिनेट में संग्रहीत की जाएगी। इलेक्ट्रॉनिक रूप से संग्रहीत कोई भी व्यक्तिगत जानकारी सुरक्षित, पासवर्ड-सुरक्षित कंप्यूटर पर संग्रहीत की जाएगी। मोबाइल डिवाइस (लैपटॉप या मेमोरी स्टिक) पर इलेक्ट्रॉनिक रूप से परिवहन की जाने वाली कोई भी व्यक्तिगत जानकारी एन्क्रिप्टेड और / या पासवर्ड-सुरक्षित होना चाहता है।

ऑडियो फाइलों के रूप में साक्षात्कार के दौरान एकत्र की गई जानकारी प्रतिलेखन पर हटा दी जाएगी और प्रतिलेखन अज्ञात होंगे। फील्ड नोट्स और अवलोकन संबंधी डेटा अनामित रूप से दर्ज किया जाएगा। शोध उद्देश्यों के लिए केवल 5 वर्ष की अवधि के लिए केवल अनामित जानकारी बरकरार रखी जानी चाहिए। शोध के दौरान कब्जा कर लिया चित्र दस्तावेजी सबूत के लिए हैं, इसका उद्देश्य खाद्य प्रथाओं को पकड़ना है और प्रकाशित होने पर गुमनाम रूप से इस्तेमाल करना चाहता है।

एकत्र की गई जानकारी आगे के विकास को सूचित करने की मांग करती है शोध और प्रकाशन, प्रस्तुतियों और पीएचडी सिद्धांतों में अज्ञात रूप में शामिल किया जा सकता है।

शोधकर्ताओं के बारे में:
शोध दल कंप्यूटर और सूचना विज्ञान विभाग के भीतर नॉर्थम्ब्रिया विश्वविद्यालय में स्थित है।

खोज करने वाली टीम:
सिमरन चोपड़ा (डॉक्टरेट छात्र, नॉर्थम्ब्रिया विश्वविद्यालय)
डॉ. एड्रियन क्लीयर (सीनियर रिसर्च फेलो, नॉर्थम्ब्रिया विश्वविद्यालय)

समझने की प्रतिभागी पुष्टि

परियोजना का नाम: ऑरोविले में टिकाऊ भोजन और खाद्य प्रथाओं के भविष्य को भी समझना, भूमिका प्रौद्योगिकी इस समर्थन में खेल सकती है।

प्रतिभागी का नाम:

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इस फॉर्म का उद्देश्य यह जांचना है कि आप समझते हैं कि यदि आप अनुसंधान में भाग लेने के लिए सहमत हैं और आपके द्वारा साझा की जाने वाली किसी भी जानकारी का उपयोग शोध के दौरान और उसके बाद किया जाएगा।

☐ मैं पुष्टि करता हूं कि मैंने उपर्युक्त परियोजना के लिए प्रतिभागी सूचना पत्रक को पढ़ और समझ लिया है।

☐ मुझे जानकारी पर विचार करने, अनुसंधान के बारे में प्रश्न पूछने का अवसर मिला है, और इन्हें संतोषजनक उत्तर दिया है। मैं समझता हूं कि अगर मुझे कुछ भी पता नहीं है तो मुझे संलग्न सूचना पत्र पर संपर्कों के माध्यम से प्रश्न पूछने का और अवसर है।

☐ मैं इस परियोजना में भाग लेने के लिए सहमत हूं और समझता हूं कि मेरी भागीदारी स्वैच्छिक है

☐ मैं समझता हूं कि साक्षात्कार ऑडियो रिकॉर्ड किया जाएगा और इन शोधों के लिए इस शोध से संबंधित सभी सामग्रियों में उपयोग किया जाएगा

☐ मैं मानता हूं कि अध्ययन के दौरान मुझे दिए गए किसी भी उत्तर का प्रकाशन प्रकाशनों में किया जा सकता है। मैं समझता हूं कि इन्हें गुमनाम रूप से इस्तेमाल किया जाएगा

☐ मैं समझता हूं कि अध्ययन के दौरान किसी भी समय, इसके लिए कारण बताए बिना मुझे वापस लेने का अधिकार है। यदि मुझे बाद में अपने डेटा को वापस लेने की आवश्यकता महसूस होती है, तो मैं शोधकर्ताओं से संपर्क करूंगा, उनकी जानकारी मुझे प्रदान की गई प्रतिभागी सूचना पत्र में सूचीबद्ध है

प्रतिभागी हस्ताक्षर:

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शोधकर्ता हस्ताक्षर:

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दिनांक:

समझने की प्रतिभागी पुष्टि

परियोजना का नाम: ऑरोविले में टिकाऊ भोजन और खाद्य प्रथाओं के भविष्य को भी समझना, भूमिका प्रौद्योगिकी इस समर्थन में खेल सकती है।

प्रतिभागी का नाम:

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इस फॉर्म का उद्देश्य यह जांचना है कि आप समझते हैं कि यदि आप अनुसंधान में भाग लेने के लिए सहमत हैं और आपके द्वारा साझा की जाने वाली किसी भी जानकारी का उपयोग शोध के दौरान और उसके बाद किया जाएगा।

☐ मैं पुष्टि करता हूं कि मैंने उपर्युक्त परियोजना के लिए प्रतिभागी सूचना पत्रक को पढ़ और समझ लिया है।

☐ मुझे जानकारी पर विचार करने, अनुसंधान के बारे में प्रश्न पूछने का अवसर मिला है, और इन्हें संतोषजनक उत्तर दिया है। मैं समझता हूं कि अगर मुझे कुछ भी पता नहीं है तो मुझे संलग्न सूचना पत्र पर संपर्कों के माध्यम से प्रश्न पूछने का और अवसर है।

☐ मैं इस परियोजना में भाग लेने के लिए सहमत हूं और समझता हूं कि मेरी भागीदारी स्वैच्छिक है

☐ मैं इस शोध से संबंधित सभी तस्वीरों में फोटो खिंचवाने और उपयोग करने के लिए सहमत हूं

☐ मैं समझता हूं कि तस्वीरों का उद्देश्य खाद्य प्रथाओं को पकड़ना है मैं इसमें शामिल हूं, यह दस्तावेजी साक्ष्य के लिए है और प्रकाशित होने पर तस्वीरों में अज्ञात रूप से तस्वीरों का उपयोग किया जाएगा

☐ मैं समझता हूं कि अध्ययन के दौरान किसी भी समय, इसके लिए कारण बताए बिना मुझे वापस लेने का अधिकार है। यदि मुझे बाद में अपने डेटा को वापस लेने की आवश्यकता महसूस होती है, तो मैं शोधकर्ताओं से संपर्क करूंगा, उनकी जानकारी मुझे प्रदान की गई प्रतिभागी सूचना पत्र में सूचीबद्ध है

प्रतिभागी हस्ताक्षर:

शोधकर्ता हस्ताक्षर:

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दिनांक:

Information Sheet for Participants

Project name: Understanding the future of sustainable food and food practices in Auroville also, the role technology can play in supporting this.

As a participant in this research project we are asking you to take part in a voluntary interview. The project is about food growing in your community and its future. This sheet provides information about the research, the interview and the field observations also, the type of data that will be captured.

We hope it answers any questions that you may have but if you do have any further queries please feel free to contact:

Simran Chopra	**Adrian Clear**
Doctoral Student	Senior Research Fellow
Department of Computer & Information Sciences	Department of Computer & Information Sciences
Room 310, CIS Building,	Room 310, CIS Building,
Northumbria University,	Northumbria University,
Newcastle upon Tyne.	Newcastle upon Tyne.
T: +44 7588753921	T: 0191 227 4253
simran.chopra@northumbria.ac.uk	adrian.clear@northumbria.ac.uk

What is the research about? What will my participation involve?
We are running a series of interviews in the city of Auroville around the subject of food system in the city, and how, from your perspective, future visions of food growing can support self-sufficiency and sustainability in Auroville. The interviews are a part of a general project aim to develop ways for engaging citizens and grassroots food growing communities in the discussion and design of sustainable urban futures, through creative exploration and collaboration of visioning and digital technologies. We ask that if possible you take part in the 60minute interview with a series of open ended questions which you can answer according to your comfort. The questions will be around food practices, production and distribution of food, future planning and visions, policy creation and participation in the city of Auroville (details to be confirmed):

You might be invited to take part in an observational study where the researcher would observe the food related practices that you are involved in and take pictures for documentary evidence of the research.

You might also be invited to be part of a small visioning exercise where you would be drawings, writing, building, recording videos or audios in between the interview, of your visions about the future of food growing in Auroville.

Why are we doing it:

Current food consumption patterns are unsustainable. The food system is globalized and dominated by a few large organisations, which disempowers people to make changes to it. However, grassroots communities are important in engendering positive change from the bottom up. Long-term thinking is a key to empowering these communities in transitioning towards self-sufficiency and ecological practices that meets the needs of the present without compromising the ability of future generations to meet their own needs. Also, understand the role of technology in supporting the long-term thinking and planning for sustainable food practices.

The current research project will be looking at citizen participation and long-term thinking processes around the food system within the city of Auroville, India. With concentration on the politics of participation concerning different socio economic contexts, the established vision within the city, its negotiation with everyday food practices and the future sustainability agenda.

Confidentiality and anonymity:
The interviews will be audio recorded and you can withdraw from the interview at any point. If you feel the need to withdraw at a later stage after the interview please contact the researchers, their information is listed above. Any information collected from you will be treated with confidentiality. This means that only the primary researcher will have access to any raw information that can be specifically associated with you. Any information that is shared beyond her will be made anonymous. This means that unless otherwise specified by you, personal details such as your name will be removed, and a pseudonym will be used instead. This will apply to any publications or presentations or any discussion with other colleagues in the Universities.

How will the data be used and protected:
We will treat data that you provide in accordance with the *General Data Protection Regulations 2018*, and any subsequent data protection legislation. This means that any personal information stored in physical format (e.g., on paper) will be stored in a locked filing cabinet in a locked office on Northumbria University or Newcastle University premises. Any personal information stored electronically will be stored on a secure, password-protected computer. Any personal information that is transported electronically on a mobile device (a laptop or memory stick) will be encrypted and/or password-protected.

The information collected during the interview as audio files will be deleted on transcription and the transcriptions will be anonymised. Field notes and observational data will be recorded anonymously. Only anonymised information will be retained for a period of 5 years for research purposes. Images captured during the course of the research are for documentary evidence, the purpose being to capture food practices and will be used anonymously when published.

Participant confirmation of understanding

Project name: Understanding the future of sustainable food and food practices in Auroville also the role technology can play in supporting this.

Participant name:

The purpose of this form is to check that you understand what will be required of you if you agree to take part in the research and how any information that you share will be used during and after the research.

☐   I confirm that I have read and understood the Participant Information Sheet for the above project.

☐   I have had the opportunity to consider the information, ask questions about the research, and have had these answered satisfactorily. I understand that I have further opportunity to ask questions via contacts on the attached information sheet if there is anything, I am unsure about.

☐   I agree to participate in this project and understand that my participation is voluntary

☐   I understand that the interview will be audio recorded and for these recordings to be used in all materials related to this research.

☐   I agree that any answers I give to questions during the study can be used in publications. I understand that these will be used anonymously

☐   I understand that I have the right to withdraw, without giving reasons for this, at any point during the study. If I feel the need to withdraw at a later stage I will contact the researchers, their information is listed in the Participant Information Sheet provided to me

Participant signature:

Researcher signature:

Date:

Participant confirmation of understanding

Project name: Understanding the future of sustainable food and food practices in Auroville also the role technology can play in supporting this.

Participant name:

The purpose of this form is to check that you understand what will be required of you if you agree to take part in the research and how any information that you share will be used during and after the research.

☐   I confirm that I have read and understood the Participant Information Sheet for the above project.

☐   I have had the opportunity to consider the information, ask questions about the research, and have had these answered satisfactorily. I understand that I have further opportunity to ask questions via contacts on the attached information sheet if there is anything, I am unsure about.

☐   I agree to participate in this project and understand that my participation is voluntary

☐   I agree to being photographed and for these photographs to be used in all materials related to this research

☐   I understand that the purpose of the photographs is to capture food practices I am involved in, it is for documentary evidence and the photographs will be used anonymously in the research when published

☐   I understand that I have the right to withdraw, without giving reasons for this, at any point during the study. If I feel the need to withdraw at a later stage I will contact the researchers, their information is listed in the Participant Information Sheet provided to me

Participant signature:

Researcher signature:

Date:

The information collected will be used to inform the development of further research and may be included in anonymised form in publications, presentations and PhD theses.

About the researchers:
The research team are based at Northumbria University within Computer and Information Sciences Department.

Research Team:
> Simran Chopra (Doctoral student, Northumbria University)
> Dr Adrian Clear (Senior Research Fellow, Northumbria University)

Research questions

"How can interactive systems be designed to support participatory visioning processes in grassroots communities to promote transitions for sustainable outcomes?"

   a) *How does the use of existing digital technology limit or support sharing in participatory visioning processes?*

   b) *What are the considerations for developing vernacular digital tools for local grassroots communities engaging in participatory visioning?*

45-min Interview (face to face or zoom) {when people are available within the week}

The discussion will be audio and video recorded if you are not okay with it please say so. We are going to discuss your experience of the two walks of the neighbourhood, the ways in which different technologies can be used for creating future visions and plans for your community.

3 items for discussion: **Open ended questions and discussion about what people get out of visioning and how tech supported the activity/visioning**

   1) *Walking activity experience - "How was your experience of the walking activity? What did you like, or not like? Was it useful? Did it lead to anything you hadn't thought about before? Was there anything that you found surprising?"*

   1. How did you feel when taking the walk? Who did you go along with? And did you like that you could go at a time convenient to you rather than walking with the group? Was there something you found useful in the whole exercise? Did it help in thinking about the neighbourhood differently? Did the walk help you look at the neighbourhood and the locations on the walk through a new light or more in depth with regards to including nature in concrete environments? Were there any surprises for you in doing the activity or did it provoke any questions or things you got curious about? What were your frustrations or struggles during the walking activity?

   2. The walk enabled a relationship between physical and digital (you walked the neighbourhood and interacted with the future content through your smartphone), did you experience any difficulty in interacting with the physical and digital together? How did you manage the transition? What did you think about the locations on the walk, the choice of locations, the responses to the locations that were shared through the time windows? Do you think digital tech can be useful in thinking about the neighbourhood? Did it introduce any participation barriers or helped in reducing it?

2) Whatsapp group discussions and navigating conversations together

1. What did you think about the ideas other participants came up with and how people contributed content? Did the conversation/discussion on whatsapp at any point change your perception or bring in new perspectives about the neighbourhood? Or think about things differently? What mediums did you prefer to share your ideas in the whatsapp group? What was it that you shared which you liked the most or was important and what did you learn?
2. How was the experience of the week-long nature of the discussion on whatsapp? How did you fit in the conversations on the whatsapp group in your day, when did you use it? Did you like the asynchronous nature of it that you could use it at a time convenient to you or did you like responding in real time when someone messaged? What were your interactions with the whatsapp group, how did you go around using it and interacting with other members? Did you take out time for it specially or did you fit it in with other activities in the day? What did you do along with looking at the message on whatsapp? Did you speak to anyone outside of the WhatsApp group about it? Was the activity on your mind much throughout the week? Was the week-long nature of it helpful in thinking about things on and off rather than sitting in a workshop around a table for 2 hours? Did it prompt ongoing reflection for you rather than real time conversation? Did it change your thinking or perception at anypoint towards the neighbourhood or food growing? Did your engagement with the group and the topic change at all throughout the week?

3) Visioning through technology approach and community coordination

1. Was there any aspect of the visions/ideas of the future that you thought of which you were not able to share or capture? Like smell, taste, etc. Or you could not communicate with the rest of the group as you were not confident about it, you thought others would laugh at it or you were self conscious? How do you think technology can help you with sharing and capturing these? And do you think there can be other ways to reimagine the neighbourhood? Can technology be part of it? Do you think technology can be part of the built infrastructure in the neighbourhood? How can you think technology and nature can work symbiotically? Suggest 3 words for such technology.
2. How do you think you can interact and work with other community members better to imagine the neighbourhood's future? Did you have conversations with other people outside of the activity about the activity/research like with friends or family? Did you learn something new during the activity or meet new people you had not met before? Did it create space to share knowledge and experiences about the neighbourhood with other people? How would you think the created visions/futures can be implemented and monitored over a period of time? How can technology be used in this long term scenario?

Do you have anything else to add? Thank you for your time.

WHATSAPP SCRIPT

6th Friday:

- Hello, welcome to the Growing green futures team whatsapp group. This is a safe space for people to express themselves freely. Please respect everyone's point of view as there is no right or wrong suggestion, only points to be discussed.

- To get to know each other well. Please introduce yourself to the group by telling us your name, something about yourself and what is your favourite vegetable. Share a photo of what you have grown recently.

Eg. "Hello I am Simran. I am from India, I like growing food and am still learning about how to grow in the British weather. My favourite vegetable is aubergines. I like to cook and eat them but they are difficult to grow in Newcastle. (photo of my garden)"

- Your group has two mentors to support you in the activity do feel free to message and ask any questions

- Please look at the activity booklet and try to take the 10 minute guided audio walk. This will be really helpful for you to prepare for the activity tomorrow and day after.

7th Saturday:

- Hello today is day 1 of the activity. Hopefully you have looked at the training video and are prepared for your 30 min walk today. Please take your walk between 10 AM to 6 PM today. If you need assistance from the community coordinators Naseem and Mark or would like to walk with them, they would be available from 11am to 1pm. Please request their company in advance for them to manage their time.

- Remember there is no right or wrong for doing the activity
- Do share your plans with the group when you decide to go for your walk.
- Send us a picture when you arrive at a time window.
- Share your thoughts and ideas on the WhatsApp group e.g. through messages, making a video, recording a voice note, clicking a picture and drawing on it.

- Do go through other people's thoughts and ideas and feel free to message each other discussing the same.

- Ask questions, community mentors are here to help with their experience of growing and being in the community.

8th Sunday

- Hello today is day 2 of the activity. Hopefully you had an engaging and thought provoking experience on your 30 min walk yesterday. Please take your walk between 10 AM to 6 PM today. If you need assistance from the community coordinators Naseem and Mark or would like to walk with them, they would be available from 11am to 1pm. Please request their company in advance for them to manage their time.

- Remember there is no right or wrong for doing the activity
- Do share your plans with the group when you decide to go for your walk.
- Send us a picture when you arrive at a time window.
- Share your thoughts and ideas on the WhatsApp group e.g. through messages, making a video, recording a voice note, clicking a picture and drawing on it.

- Do go through other people's thoughts and ideas and feel free to message each other discussing the same.

- Ask questions, community mentors are here to help with their experience of growing and being in the community.

ONE WEEK OF WHATSAPP CONVERSATION

9th Monday

- Good evening! Hope you had a good start to the week. We are opening up the group to suggestions and discussions around growing in public spaces such as the community planters and the backlanes. Remember there is no right or wrong suggestion.
- We will be discussing about
    - How might we grow food in the neighbourhood in future? What could we grow, and where? How might we bring nature back into our neighbourhood? What would it look like if we did?

    - How could we achieve these things together as a community?

    - What technologies, tools, skills, and knowledge would we need?

- No future is too distant or absurd, just share what you think would be good to discuss with the group. e.g. through messages, making a video, recording a voice note, clicking a picture and sending us a drawing.
(Use 2 suggestions by participants from the activity to start discussion)

- Who do you think would be required to create this reality? Is it the councils, other communities, successful project leaders, professional growers, researchers, corporations or the next generation of growers?

- Can we say "..........." is a take away from the discussion? (Summarize - use what people have said and combine discussion)

10th Tuesday

- Good evening! Today we are opening up the group to suggestions and discussions around reinviting nature and wildlife into our urban concrete spaces in the neighbourhood. Remember there is no right or wrong suggestion. No future is too distant or laughable, just share what you think would be good to discuss with the group.
(Use 2 suggestions by participants from the activity to start discussion)

- How will our neighbourhood look? Do you see technology being a part of nature or helping nature thrive?

- Can we say "..........." is a take away from the discussion? (Summarize - use what people have said and combine discussion)

11th Wednesday

- Good evening! Now that we are proficient in imagining green futures. We will think of how we can achieve this as a community. Remember there is no right or wrong suggestion. No suggestion too silly, just share what you think would be good to discuss with the group.
(Use 2 suggestions by participants from the activity to start discussion)

- How does the community work and coordinate to grow food or rewild the neighbourhood?

- What can the community do to achieve this? Do you see technology helping you achieve this?

- Are festivals and celebrations part of community building?

- Can we say "..........." is a take away from the discussion? (Summarize - use what people have said and combine discussion)

12th Thursday

- Good evening! Now we have had a few discussions around greening the neighbourhood and building community. We will think of the skills and mentoring required to achieve these.

Remember there is no right or wrong suggestion. No suggestion too ridiculous, just share what you think would be good to discuss with the group.

● Would you need dedicated spaces for such activities of skill development and mentoring? How can we create these resources?

● Do you think monetary support is necessary and how can we create alternate systems of monetary support like community enterprises? How do you think technology can support this?

● Can we say ".........." is a take away from the discussion? (Summarize - use what people have said and combine discussion)

13th Friday

● Good evening! Now we have had great discussions around greening the neighbourhood, building community and working together. We will now think of how these are part of the city and the proposed smart cities of the future. What can we do to create opportunities for citizens to have a say and create the right to the city's public spaces. Remember there is no right or wrong suggestion. No suggestion too ridiculous, just share what you think would be good to discuss with the group.

● Do you feel the government controls the public spaces? How can we reclaim the public spaces?

● How do you think future technologies like internet enabled and connected devices in the city impact this? Do you feel they invade your privacy?

● What can we do to make technology - nature, wildlife and food growing friendly?

● Can we say ".........." is a take away from the discussion? (Summarize - use what people have said and combine discussion)