

## Bearing an open “Pandora’s Box”: HCI for reconciling everyday food and sustainability

ANONYMISED FOR REVIEW, Anonymised for review

Food sustainability is a significant global concern with drastic change required to mitigate complex social, environmental and economic issues like climate change and food security for an ever increasing population. In this paper, we investigate the roles that digital interactions might play in bringing about more sustainable food consumption practices. To inform this exercise, we set out to understand the place of food in people’s lives, their food practices, and the processes of transition, past and ongoing, that shape these. In particular, we contrast the journeys of ‘pioneers’ of sustainable food practice with more ‘mainstream’ consumers. We use our findings to highlight HCI design opportunities to support sustainable transitions in food practices, and promote wider participation in niche sustainable practices. We highlight the importance of designing to heighten, redirect, and sometimes rekindle the ‘meaningfulness’ of food and meals in people’s lives.

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### 1. INTRODUCTION

It is widely recognised that dominant patterns of consumption in industrialised nations are “unsustainable” [Crocker and Lehmann 2013; Jackson 2009]. In Europe, food consumption has a strongly negative impact in relation to a range of environmental indicators [Tuckker et al. 2006]. Hinrichs [2014, p. 114] suggests that a confluence of intensifying circumstances in the early twenty first century, including climate change and energy security, gives rise to new urgency and challenges for food systems, leading her to argue that we ‘should be concerned about what present trends mean for the future’. While technological ‘solutions’ are suggested to help mitigate some of these challenges, social and cultural

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elements of practice that shape what and how we eat represent a significant opportunity to effect greater change [Crocker and Lehmann 2013].

Historically, food was largely produced and consumed locally, and within a specific set of biophysical and cultural constraints [Atkins and Bowler 2001]. In developed countries after World War II, a more integrated system evolved, where food production and consumption became increasingly spatially and culturally independent. This ‘mainstream’ food system sees food products that are more highly processed, and food which is accessed predominantly through vertically-integrated, global supply chains via supermarkets. In contrast, a growing number of people are looking beyond the supermarket for more sustainable and ethical food sources. As part of shifting practices in relation to food consumption, there has been a growth in interest relating to alternative and local food systems [O’Neill 2014], such as farmers’ markets, farm shops, producer cooperatives, community supported agriculture (CSA) [Holloway et al. 2007], vegetable box schemes (where fresh fruit and vegetables are delivered direct by the producer to the consumer), and digitally mediated variations of these, such as the Local Food Assembly.<sup>1</sup>

In this paper, we investigate the food practices of two groups of participants as a precursor to sustainable HCI design: one group drawn from a panel of supermarket shoppers with what might be viewed as ‘mainstream’ food practices; the other, pioneering practitioners of sustainable food.<sup>2</sup> Drawing on understandings from both of these groups, we ask, what roles might HCI play in transitioning everyday food practices to be more sustainable? In investigating ‘sustainable food’, our focus is on a small part of the food system, namely consumption and domestic practices. Within this, our analytic focus is on the full range of food practices—we consider all of these relevant in designing for sustainable transitions—and so includes those carried out in accordance with various food values (e.g. related to economy, health, ethics), some of which are agnostic of any sustainability values. Hence, while our primary objective is to consider designing for sustainability, our findings will be relevant to those interested in people, food, and HCI, more generally. For our sustainability ‘pioneers’, we deliberately incorporate the range of ‘sustainability’ definitions that they describe and live by. One of our purposes in this paper is to understand how participants think about ‘sustainability’ and operationalise it in practice. The complexity of the term ‘sustainable’ was recognised and deeply considered by the ‘pioneers’ group. As Håkansson and Sengers [2013] wrote about families who strove to live simply and ethically, “*we believe that this [sustainable pioneers] group, who has thought consciously and at length about what it means to live*

<sup>1</sup> The Local Food Assembly, <https://thefoodassembly.com/en>, accessed 6 February 2015.

<sup>2</sup> We recognise that the terms ‘mainstreamers’ and ‘pioneers’ is an oversimplification that does not capture the diversity of people and practices within each group we studied. However, these terms remain a useful shorthand for our presentation; but our findings should be understood in this light.

*sustainably holistically, provides a valuable lens to illuminate issues in HCI research and design.”*

To this end, we analyse current practices, how they came to be and are already changing. We unpack the real work and deep meaning involved in food practices, the contrasts between mainstream and pioneer practices, and the processes by which ‘pioneers’ have integrated sustainability into their everyday food. We derive insights into opportunities and approaches to design for sustainable food transitions from a) learning from ‘pioneers’ about the lived experience of sustainable food and their appreciations of alternative consumption practices, and b) questioning how sustainable practices, and the process of routinising them, might be made more widely accessible and valuable, for more mainstream consumers.

Our novel contribution to this important but underexplored area of HCI,<sup>3</sup> is better understandings of the process of transition towards sustainability in food practice, providing important context for HCI designers and researchers developing specific tools intended to support changes in consumption (e.g. [Choi et al. 2014, Ch.1,5,10]). Through interviews and focus groups, we elicited accounts of a breadth of everyday practices surrounding food, including shopping, cooking, sharing, foraging, and growing. We contribute a unique contrast of the place of food in the lives of both conventional and self-professed sustainable food practitioners, highlighting socio-cultural challenges and everyday practicalities that interaction design might help to bridge. From these understandings, we consider implications for ethical design of food interactions (digital and otherwise), focusing specifically on the important concepts of ‘meaningfulness’ and ‘transition’ that emerged.

## 2. RELATED WORK

Other research has usefully investigated ‘greener’ lifestyles as a means of informing sustainable HCI design. Woodruff, Hasbrouck and Augustin [2008] explored the practices of people who made significant alterations to their homes in the interests of the environment. In contrasting these practices to the wider population, they point to the need for HCI not just to focus on changes within individuals, but also that surround individuals e.g., policy and public infrastructure. They conclude by calling for research to study populations with more varying degrees of commitment. Håkansson and Sengers [2013] studied “simple living” families in order to explore how HCI could support such lifestyles. They consider sustainability holistically rather than in purely environmental terms. Here, we take a similar analytical view; focusing on food, we extend our understandings of sustainability to account for its wider place in everyday life. Everyday social practices have also been studied in HCI in relation

<sup>3</sup> <http://www.sigchi.org/communities/foodchi>

to food. Clear et al. [2013] examined the cooking practices of university students in shared accommodation, and quantified the GhG impacts of direct energy and embodied emissions. Ganglbauer, Fitzpatrick and Comber [2013] specifically examined household food waste, and developed some design strategies for addressing this issue. In this paper, we put aside the quantitative impacts and examine broadly the range of food practices of two contrasting participant groups to explore how we might design for sustainable food as a transition to different ways of doing.

Despite this work, food has received relatively little attention in HCI compared to other areas of everyday life, like work or entertainment. This is perhaps related to the still relatively sparse (or less prominent) integration of digital technology into the practice, and the relatively mundane nature of food itself in everyday lives.<sup>4</sup> The few exceptions in HCI literature include instances of technology design for the kitchen [Olivier et al. 2009] and augmentation of specific appliances such as the fridge [Bucci et al. 2010]. And, a large proportion of this research is concerned with energy, health or sustainability. Blevis and Morse [2009] pioneered the domain by suggesting a number of promising directions for sustainable design research. Since then, research has explored how practices like healthy eating [Comber et al. 2013]; local food shopping [Li et al. 2009; Light et al. 2010]; and urban food production [Odom 2010] might be augmented with digital technology. Kalnikaite, Rogers and Bird [2011] investigated how ‘nudge’ theory might be applied to supermarket shopping by augmenting the shopping trolley with a display indicating the food miles associated with items that were put into it.

Our interest here relates to how *transitions* towards more sustainable practices can be achieved in relation to food. Transition implies a gradual, pervasive shift from one state or condition to something different [Hinrichs 2014]; transformation may be a more radical way of shifting behaviours and practices [Brown et al. 2012]. The end point of transitions (e.g. upholding a vegan diet) might well be considered radical in the context of norms and practices of starting points. However, relative to ‘transformations’, the processes of change involved in ‘transitions’ are gradual and might not be experienced as radical by practitioners.

Relating the need for transitions in practice and consumption to climate change can be “*especially difficult because global climate change is perceived as spatially and temporally distant*” [Slocum 2004, p. 413]. As a result, engaging people in climate change mitigation and adaptation is problematic – as Giddens [2009, p. 2] argues, no matter how much people are told about the threats

<sup>4</sup> Although we should recognise that in the future smart cookers and fridges, recipe and food websites, electronic loyalty card systems and online shopping may well come to market and become significantly more widely adopted, we found little integration of digital technologies in the food practices of our participants.

of a changing climate, it is “*hard to face up to them, because they feel somehow unreal and, in the meantime, there is life to be lived, with all its pleasures and pressures.*” In a sense, therefore, the future is an active presence for some people, but for many others such a future may be a presence that they prefer to keep absent from their everyday consciousness [Philips and Dickie 2014, p. 80]. In this paper, we explore food consumption practices with those that keep sustainability ‘present’ in their food consumption consciousness, as well as with those for whom it is less significant or even absent.

### 3. METHODS AND PARTICIPANTS

This research involved two distinct participant groups: shoppers selected using a survey in several branches of a regional supermarket chain in the UK, and ‘pioneers’ of food sustainability recruited from a UK University city via local food sustainability and sustainable transitions groups like Transition Towns (see Table 1). These groups were intentionally selected to allow a comparison between more mainstream consumers and those who appear to have embraced (varying definitions of) sustainability in their food shopping, preparation and eating. Our design focus is on engaging with and supporting the work involved in transitioning towards sustainability within today’s complex food landscape. For this exercise, we broadly investigate food practices and values linked to these. We acknowledge that ‘sustainability’ may or may not be a component of these and, where it is, may mean different things to different participants. Our examination of design for sustainable transitioning is based on understanding the experience and work involved in foregrounding ‘sustainability’, whatever it may mean, in everyday food practice, and situating these experiences in relation to mainstream practices where ‘sustainability’ is usually not consciously considered, but is shaped by a range other elements. In this way, we develop a picture of the elements at play in shaping different trajectories of food practices, and assess these as opportunities and challenges for sustainability.

The first group of 24 participants were recruited using an in-store supermarket survey carried out in person, and involving six short questions on food shopping. Recruitment took place in three stores of a regional supermarket chain (which was a project partner) within 20 miles of the university where the researchers were based. Respondents were asked if they would be willing to be involved in an interview. Given the large geographical area served by these three supermarkets, interviews were conducted by telephone. We filtered participants to ensure a balanced mixture of age, gender, use of digital technologies, and living circumstances; and removed participants who did not buy most of their food from the supermarket. We conducted 24 telephone interviews ranging from 20 to 60 minutes in length. During the interviews we deeply explored issues relating to shopping practices, information sought when food shopping (country of origin, production practices, nutrition, and so on) as well as cooking practices and rhythms of food (meals, snacks) in the home. Our aim was to elicit

comprehensive accounts of food values and practices without passing any judgement about the ethics of these. We did not assume that ‘sustainability’ was a concern for these participants and so we did not ask about it unless the participants themselves noted it as a factor that influenced their practices. Our mainstream consumers typically purchased their food via supermarkets, and many used more than one supermarket with specific criteria for what was purchased from where.

The second group (the ‘pioneers’) was recruited specifically for their interest in and adoption of sustainable food practices. They were self-selecting and unfiltered in this regard; they were contacted via existing initiatives such as Transition Towns, Incredible Edible, a local organic vegetable box scheme, and through flyers distributed to various city centre shops, asking, for example, “Are you conscious of the environmental impact of what you eat? Does it affect your shopping? What challenges and limitations do you face?” None of the participants had been previously recruited for research studies by the authors, nor, to our knowledge, for any other University research projects.

We purposely employed differing, but compatible methods of enquiry for the two groups. We could have interviewed the pioneer participants, but we chose to conduct focus groups instead because we felt we could elicit richer accounts of values, practices and experiences through group discussion of topics that they were passionate about with like-minded individuals. Common interest meant that we could let participants direct discussions according to their own interpretations of ‘sustainability’. In contrast, the ‘mainstream’ group often saw food as mundane, and not an area for in-depth discussion. One-to-one interviews allowed more probing from the researchers, adapting questions to participants’ situations.

The pioneer participants took part in one of a series of two-hour focus groups; we held three of these with 27 participants in total, one at the University and two at a city-centre location. Each focus group was arranged into three activities: i) to elicit information relating to how they currently incorporate issues of food sustainability; ii) what motivates them to do so; and finally iii) how things could be improved in the future. Participants reported thoroughly enjoying reflecting upon sustainability and their food practices, and sharing opinions and experiences with others on subjects that were of common interest. Some participants already knew each other through their involvement in various food and/or sustainability communities and groups in the City. For those involved in the focus groups, many talked about getting food from independent stores specialising in ethical and organic food, and vegetable box schemes. Many also supplemented foods purchased via stores, with food that was foraged, bartered, or self-grown. In general, and in contrast to much of the UK population, a number of these participants purposely do not own a car, and do not work full time so as to have

time to participate in activities that they enjoy, like growing food and caring for family members.

<b>Focus groups with early adopters of food sustainability – May 2014 (each lasting 2 hours)</b>	
Focus group 1: University, lunch time	Age: 20s to 60s; Mix of people from urban and rural areas; Students, academics, and support staff that responded to call for participation through university mailing lists. Participants: William (O), Shane (O), Joyce (O), Margaret, Philip (Vgt), Liz (Vgt), Chloe (O), Isabella (V)
Focus group 2: City centre, evening	Age: 30s to 70s; Mostly live in city centre; People involved in voluntary sector initiatives on local food; 2 university students and an academic; 2 live in local sustainable co-housing development. Participants: Michelle (Vgt), Jane (Vgt), Gerard (O), Sally, Cynthia (V), Luke (V), Katie (Vgt), Gillian (O), April (V), George (Vgt), Faye (O)
Focus group 3: City centre, evening	Age: 20s to 50s; Mix of people from urban and rural areas. Two university students (not from UK) and one researcher; others recruited through veg. box scheme, flyers in an ethical convenience store; and community food groups. Participants: Maria, Lucy (O), Dave (O), Theo (Vgt), Jacinta, Melissa (Vgt), Melanie (Vgt), Kelly (O)
Values noted in relation to food practices included seasonality (17), local sourcing (15), organicity (14), cost (14), animal welfare (12), food miles (11), social injustice (11), economic security (9) environmental stewardship (5), and climate change (3).	
<b>Telephone Interviews with mainstream supermarket shoppers</b>	
24 telephone interviews (20 - 60 minutes)	Geographically varied, covering most of a UK region, urban and rural. Mix of retired and working, male and female. Age: 30s to 70s; Four participants were vegetarian.
Values noted in relation to food practices included cost (10), local economy (7), health (6), local sourcing (5), organicity (2), social justice (2), and animal welfare (1).	

**Table 1: Description of research participants. Vegetarian (Vgt), Vegan (V), and Omnivore’s (O) are listed if known.**

Informed consent was secured during every stage of the research process. Both the telephone interviews and the focus groups were recorded using a digital recorder and then transcribed, each participant being assigned a pseudonym. Two researchers coded and analysed the transcripts using Nvivo for food practices i.e., enactments of shopping, cooking, planning, and so on. Each author reviewed a selection of transcripts to ensure consistency in the interpretation of the data and a coding framework was developed which reflected an interactive engagement between the research questions and the data, as well as the literature. All participants received a £10 voucher for taking part.

**4. FINDINGS**

In this section, we present our findings from our groups of participants, interleaved to contrast the two groups’ practices along several themes arising from our coding of the study data. Specifically, we first discuss food procurement and knowledge and competencies around this; then the significance of food to our participants; and finally, transitions in practice, and how practices are disrupted and reformed in more or less sustainable directions.

In looking at shopping and the meal, we develop understandings of the (in)significance, and meanings held around everyday food and how it, and sustainability, are enacted in busy lives. We deliberately maintain a separation between the groups in our findings presentation to expose a dissonance between their food practices that sustainable HCI could contribute towards bridging. We

consider these on a practical level in terms of knowledge, skills and infrastructures, but, as well as this, we consider how stances on sustainability result in variations in how food is practiced so we can elucidate socio-cultural opportunities for sustainability interventions. In presenting our findings, we detail the number of participant accounts that support the points made where it makes sense to do so. However, given the semi-structured, informal nature of our interviews and focus groups, these may be supported but unreported by other participants, so these figures should be treated as a minimum.

#### **4.1 Food procurement: new skills, complex practices**

Within the broad foodscape of the UK, the majority of UK people access their food by (mostly) driving to out of town supermarkets with easy parking, and buying their weekly requirements in one ‘big shop’, with some ‘top up’ shopping at typically more expensive, local, small and convenient outlets (e.g., corner shops) [Blake et al. 2010].

This foodscape is currently driven by market competitiveness. With the rise of discount supermarkets like ALDI and LIDL, the UK supermarket context is changing, and the most common ways that businesses distinguish themselves is through ‘value for money’. As a result, the main context in which food is presented to consumers relates to price and value to the pocket: marketing campaigns focus specifically on price comparisons, buy-one-get-one-free’s (BOGOF) promotional offers, and various special offers and incentives encouraging bulk purchases.

We now discuss and contrast the procurement practices of our two participant groups, acting within this UK context.

##### **4.1.1 Beacons for sustainable practice**

A notable feature of the ‘pioneers’ participants’ food practices was that almost all of them (24) regularly shopped or acquired food from places *other than supermarkets*. On the whole, ‘sustainability’ in their everyday shopping practices did not relate to whether they should buy specific food items; for them, the sustainability of their food practices was better reflected in where they shopped or acquired food from. In fact, even when supermarkets were used, for reasons of convenience, cost, or poor availability of alternatives, care was taken in deciding which shop was most suitable, for example based on its environmental policy.

Some (7) pioneer participants reported boycotting certain producers or countries of origin that were associated with unethical practices, ranging from unfair conditions for small farmers and producers, to the export of food from countries that suffer chronic food poverty. Other dominating influences were locally sourced food (15) and economic security (9). A few participants (5) were strongly

guided by notions of environmental stewardship connected to religious or farming backgrounds. This resulted in strong appreciations of nature and ‘natural’ foods, and also sometimes in a responsibility not to interfere with natural processes, such as seasonal growing cycles or fish stocks. Related to this, a smaller proportion (3) of participants were highly motivated by climate change issues and minimising the greenhouse gas externalities of their food practices.

Buying seasonal and local food was an area that some ‘mainstream’ participants (4) were concerned about, with certain supermarkets ascribed as performing better in this regard. Tomatoes and meat were mentioned frequently as having to be as local as possible: one participant, Bonnie (M) notes, *“they do promote and advertise that they’re selling local stuff that’s in season. So I think it’s at that particular shop I would be more aware of it. I think at other supermarkets there’s...there’s less advertising of the fact that these apples are British or this is produced in [UK county].”* Some other participants (4) were aware of the need to analyse what food labels were and were not saying. For example, Catherine (M) felt that she had to *“be careful when you look at it because...some of it is packaged in England but...the actual meat isn’t English. The stuff that’s ready made [...] you’ve got to be careful there that you’ve got the English meat because the dish being made in England and the meat being produced in England is two different things. Sneaky!”*

This contrast shows the effects of supermarket and packaging design on the practicalities of sustainability. On the one hand, a responsible brand or supermarket can serve as a proxy to take much of the burden out of decision making – we see how shopping decisions related to sustainability issues had already become established and habitual in participants’ daily lives. Their choice of where to shop negated the need for fine-grained decisions about products due to their trust in the responsible sourcing/growing practices of the retailer. Whereas, on the other hand, the opacity of supermarket and packaging design can make basic (in terms of sustainability) valuations of a given food item onerous and difficult. For HCI, and sustainable design in general, there are important roles here related to managing and abstracting sustainability (e.g. related to supermarkets, brands, countries of origin, or food groups like ‘red meat’), and accruing and disseminating the knowledge required to do so; and for promoting greater transparency for individual products. However, we propose that, first, there are broader roles for HCI here in engaging people in cultural changes around food consumption to realign food with its environmental consequences. To help us think about what this might entail, in the following section we the motivations behind mainstream food consumption with accounts from participants who already engaged in alternative food cultures.

#### 4.1.2 Engagement in alternative food cultures

In the case of our ‘mainstream’ participant group, the ‘big shop’ is often carried out across more than one supermarket. Some supermarkets were deemed preferable for certain foods, and this can be related to factors like perceived quality (e.g. especially in relation to meat), but is quite often related to cost (i.e. a particular supermarket supplying a product at lower cost, or running a special offer).

Given the dominant framing of food and value in UK supermarkets, it is not surprising then that this participant group described their motivations in terms of economy or getting value for money: such consumption practices exist in the wake of a major economic downturn, but are perhaps exaggerated through supermarket marketing campaigns. They also exist within cultural norms and expectations around lifestyle; that basic costs of living, including food, might be minimised to allow for more luxurious materials and activities, like owning a car, or holidaying abroad. A consequence of this for sustainability is that choices are negotiated relative to the monetary cost of products in other supermarkets, and in such negotiations, food is generally detached from the way it has been produced and supplied, and the effect of this on the natural environment.

Four of the ‘mainstream’ group were vegetarian, but for the majority, meat was a feature of most meals. Meat was frequently bought in supermarkets as part of buy-one-get-one-free (BOGOF) deal or ‘three for two’ offers. In comparison, some respondents such as Carol (M) were more critical and reflected on the quality of meat bought for, say, “£1.50 from Tesco” – she preferred to “*eat meat less often and buy good quality meat rather than buying cheap meat and eating it every day.*”

Most of the ‘pioneer’ participants sourced their food in a range of creative ways, beyond simply shopping for it. Many (13) grew some fruit and vegetables at home or on an allotment, some (2) kept hens for eggs, and some (5) frequently went foraging locally for wild food, like elderberries, wild garlic, or blackberries. Their interactions with local, seasonal food both stemmed from a desire for meaningful connections with what they consumed, as well as reinforcing these. In particular, it connected them to the natural cycles of seasonal growing and provided them with confidence that the agricultural practices involved were healthy and sustainable. As well as this, their participation in their own food production drew awareness to the amount of time, effort, and resources required – like space, seeds, water, compost, and money – and the fragility of the system; sometimes crops fail, and not everything can be grown naturally, everywhere, all of the time. But, being in tune with this process led to strong appreciations of these foods, not only in terms of their consumption, but also of food more generally.

*“we’ve planted fruit trees, I’ve got potatoes now, I’ve got courgettes ...it’s really important to me and I think some of that is the fact that I’m vegetarian and actually when you’ve grown it and there’s that whole time thing and it costs a lot more to have one of my courgettes but at least I know I’ve grown it and I know what’s gone onto it and actually when you come to eat it not only does it taste really good but...it’s just kind of a nice cycle I think” (Liz, P)*

For some participants, like Kelly (P) and Theo (P), sustainable food practice was a more integral process, underpinned by long-held values, or a ‘moral compass’. In their case, ethical values stemmed from a religious background, and they responded to food information that resonated with these. Other participants more actively informed themselves about food sustainability through their own research.

*“we found it was a bit of a Pandora’s box ... as soon as you start asking questions you...there’s no stopping point, you have to keep asking more questions! So you either just deny it altogether and shut the box and ignore it, or you have to keep unpacking it, and I suppose that’s where the gradual process comes out, you have to just keep asking questions!” (Jackie, P)*

Here, we see very different values and meanings associated with food and how these are intertwined with food practices: values and meanings inspire practices, and participation in practices, like growing your own food, can reinforce these. In transitioning to sustainable food practice, we might consider interventions that address both of these angles i.e., promoting and making accessible practices like growing. But also, how might we encourage greater engagement with climate change and sustainability? What was clear from the pioneer participants is that the source of food, and its richer provenance, was extremely important in adhering to the set of values, including sustainability, that they ascribed to. This connection to the food at source, and greater awareness of its seasonality and availability, is also something typical abstracted away from in more mainstream supermarket food provision. We consider roles for HCI in both of these in the Discussion.

#### **4.1.3 An ongoing and gradual labour**

The shopping practices that have emerged to negotiate the complex and dynamic landscape of food supply are, unsurprisingly, complex and often onerous themselves. While some might argue there is a deskilling in cooking [Giard (1998: 212), in Meah and Watson 2011], the opposite is often the case for food procurement. Shopping and planning have become increasingly skilled, as George’s (M) detailed account of financial decisions and food preferences illustrates well:

*“I think people are more discerning now... like there’s only [regional supermarket] do certain things. I could go in there for [brand] ice cream, for*

*example, which I like. Now, that's quite expensive: in a big litre thing they're £6.77...I know it's good and I can't buy it anywhere else. But if Lidl did it for £4.30, I'd go to Lidl."*

Erica (M) also talked in detail about the skills she and her mother used in buying their food – she had observed *"baby sweet corn and mange tout ...are miles cheaper in Sainsburys than they are in [regional supermarket]. I sound like a shopping geek, don't I?"*

Thus, there is significant skill, knowledge and effort required to manage the cost of household food consumption across a number of different supermarket suppliers, within a dynamic special offer scene, while also taking into account a range of other, often lower priority factors such as household tastes, schedules, local economy, and so on. It requires substantial knowledge of the costs of products across various stores, and considerable planning according to changing household needs. Nevertheless, shopping for our 'mainstream' participants is a practice that only a small amount of time is allowed for each week. This is so that other, higher priority practices can be made to fit into busy lives. As such, the knowledge and skill drawn on to enact shopping practices is the product of incremental experiences and interactions with food and supermarkets, built up over potentially many years of shopping trips and meals.

Digital technologies did often play a role in research and planning. One of our participants devotes time to navigating the less predictable special offer scene each week to achieve good savings:

*"It can be a chore because prices, the way that they are at the moment, you have to look around a lot of different shops seeing who's got the best prices and quality ... I write a list through the week of what I need and we usually go online or look at the magazines that they produce and see who's got the best offers on."* (Rita, M)

This investment in knowledge and skills distributed over long periods calls attention to the challenge of changing practices. Liminal shopping practices require significant effort to evaluate new items for the many factors that we have described, and the more items up for renegotiation, the more burdensome this becomes. Cyril (M) recounts the information challenge of switching to a cheaper supermarket:

*"It's a very, very reasonable price [in Aldi]. And the quality is comparable ...I'm a label reader and ...they have the same standard and they contain what they should do and a percentage of this, that and the other is right ...it's ok saying your pot of jam might be 50p cheaper but if it's all full of sugar it's not what you want."*

As we have seen, ethical food choices were not necessarily a daily concern for the pioneer participants, but they were an ongoing one. Many participants (14) saw the sustainability of their diet and food practice as a gradual process. This related to the multiple complexities associated with ‘sustainable food’ that are difficult to comprehend and negotiate; and the challenge of integrating alternative food choices into new meals (i.e. what to cook and how to cook it). This gradual process was usually initiated and then shaped by distinct points of transition where an event, experience, or exposure to pertinent information (for example through media stories, reading books, watching documentaries, or talking to others) would serve to bring aspects of existing food practice up for reflection. Despite this challenge, changes were made over time, in response to critical points of transition; and these changes might become habitual.

*“and I suppose all of us are describing, do a little change and embedding it, do a little change and embedding it, and it’s growing and growing...” (Kelly, P)*

Reflection on food ethics required interactions beyond the supermarket as the information available on food items in store (product labels and supermarket literature) was limited (e.g. organicity or country of origin) relative to participants’ interpretations of sustainability; and foods with packaging were perceived to be intrinsically less natural and sustainable.

In general, accounts of the use of digital technologies in food practices were rare (8). Where they did arise, it was in relation to finding recipes, searching for special offers, online shopping, sharing photographs of food with others, or researching the ethical aspects of particular foods (particularly our ‘pioneers’). Given the sensitivity to price, any technical intervention around sustainability must act within the framework of offers and perception of ‘value’. But, there are clearly other values at work, including ‘quality’ and what’s ‘local/UK’ produce, and an information deficit felt by some consumers (particularly the label checkers), which suggests there are opportunities for HCI design.

But, we also acknowledged the need for engagement and culture change, and our understandings of how food practices evolve give us some insight into where engagement interventions might fit within a larger process of transition. From our pioneers, we see that there is work involved in changing food practices, but that our mainstream participants already put a lot of work into food consumption. In thinking about bringing change about, we suggest that there is value for design in reflecting on how the work of existing food practices is distributed; it consists of a gradual reskilling that over time shapes weekly shopping practices. And so interventions might target both discrete points of engagement and critical reflection, and but also ongoing incremental processes of integrating change to support these.

## 4.2 The various significances of food

Murcott [Murcott 1995, p228-229] describes how a ‘proper’ meal for British people is epitomised by the Sunday roast. She details how people know and understand the tacit ‘rules’ for its composition and preparation. This ‘properness’ is part of the cultural significance of certain meals in British society, linked to family life, the role of women in the home, caring responsibilities, healthy and nutritious food. ‘Proper’ meals also help to structure the day and reinforce routine [Meah and Watson 2011].

### 4.2.1 Proper, normal and convenient

With our mainstream participants, ‘proper’ food was sometimes linked to tradition and what families had ‘always done’, but some foods like soup, although recognised as being ‘good for you’ were not seen as ‘proper’ food. Joan (M) associates ‘proper’ with traditional, homemade, and fresh food:

*‘Proper food, what it used to be like. None of this, how can I put it, these ready meals. I have bought an odd ready meal at [regional supermarket]...usually I make all the meals fresh. It’s how you’ve been brought up, I’ve been brought up on meat and potato pies, and shepherds pie.’*

Like Joan (M), some other participants described ‘proper’ food as antithetical to ready meals. We have seen that many participants would consider doing away with the ‘proper’ as a food dystopia. Practices of shopping, cooking, and eating often have significance beyond conveniently satisfying hunger pangs and bodily energy requirements. This significance of food is to a large extent brought out in the social interactions involved in food practices. Delivering a ‘proper’ meal for household members can be a cornerstone of family life.

In contrast, ready meals were perceived as overly processed and something to be cautious of. This relates to perceptions of ‘junk’ food [Meah and Watson 2011], associated with a mistrust of modern methods of food production. Despite these views on ‘proper’ food, many participants deviate from such ‘properness’ on a regular basis.

Whilst many (10) of our telephone interviewees occasionally bought a ready meal for convenience, there were some respondents who described a rather different picture: for them, ready meals were a source of emancipation for the person who does the cooking (frequently female), and offered what they saw as the same type of food they would cook themselves. This was something that had changed within people’s lives over time as more variety became available, in particular relating to ready meals that are vegetarian or gluten free.

*“There are that many things available these days that we don’t see the point of my wife being in the kitchen an hour and half tied to the stove and preparing things... food products and the way they’re presented... has changed so much over the last two decades that it’s almost unrecognisable to what was available at one time... there’s so much available these days that we’ve changed our mode of doing things.” (Steven, M)*

George (M) reflected that, *“things have moved on a long way since my mother was alive and she made all things fresh”*. In contrast, he and his wife *“buy a couple of chickens for £5-6, chickens with cheese on...and you can buy other ready stuff like sautéed potatoes to put in the oven as well. So it’s not a big deal.”* George normalised the extent of this practice by saying *“we do tend to eat convenience food, which I think a lot of people do nowadays.”*

Bonnie (M), in contrast to Steven (M), felt that vegetarians were not well catered for, especially with regard to convenience foods. She described how she does not *“buy many ready meals because the quality and the standard and the portion size, there’s very little available I would say for vegetarians that is really worth buying.”*

We see that mainstream food practices are to a large extent shaped by availability, as evidenced by the significant role of ‘ready meals’ and convenience foods. Along with this, some of our participants’ notions of ‘proper’ food are changing, or the requirements of meals in this respect are loosening in light of convenient or cheap alternatives. Although the ingredients used in ready meals often have high embodied emissions, there might be a sustainability argument to be made for shifting consumption patterns towards ‘convenience’: bulk preparation reduces direct energy costs, and the responsibility of sourcing ingredients is centralised and, as a result, easier to control [Clear, 2013]. Living alone or without the need to provide food for a family seemed to place renewed emphasis on the role of convenience foods. Given the impacts of these kinds of meals, this is concerning from a sustainability, if not a health, point of view – and this trend is set to increase (the number of people now living on their own is predicted to be 41% of all households in England by 2033<sup>5</sup>). Social-technical interventions toward sustainability might be designed respecting the freedom and virtues afforded by these convenient alternatives. And, more critical approaches might seek to reduce the importance of these by engaging people in sustainability issues. We draw on our pioneer accounts in the next section to outline what some of these might be.

#### **4.2.2 A different normal**

In contrast to our ‘mainstream’ participants, food held quite a lot of significance for our ‘pioneer’ group beyond family, sharing and nourishment. The pioneers’

<sup>5</sup> Household Projections, 2008 to 2013, England

food practices were all ethically guided in some way, but their interpretations of and commitment to sustainability varied. Factors related to sustainability that they reported taking into account included animal welfare (12), organicity (14), local sourcing (15), food miles (11), seasonality (17), social injustice (11), and affordability (14). Although many participants reported the influence of more than one of these on their food practices, usually one or two factors featured more prominently than the others. The significance of these dominant factors was linked to strong feelings about the morality of a particular issue.

For many participants, sustainability had evolved beyond making a simple ethical choice between more or less equivalent items or diets. Ethical foods were perceived as superior and desirable, or even essential; and dishes and diets were slowly shaped to incorporate items that could be ethically sourced. As well as quality and taste, these foods were appreciated for their authenticity above, say, non-organic or non-local alternatives. For this reason, they were worth paying higher prices for and/or spending the time personally to produce them.

#### 4.2.3 The sociality of food

What was bought, and the work involved in its consideration varied considerably between participants. There was a marked contrast between family life, and those living on their own, for example. Some families took a collective responsibility for what was bought, cooked and eaten, but this was more unusual among our participants. For example, Louise's (M) children particularly like accompanying her to do the shopping. She thought that they *"like seeing all the options and they like talking through how we make decisions about what we're having during the week. They love picking the fruit and veg ...and...comparing prices and all that kind of stuff, they really enjoy doing that side of the shopping."*

However, for some respondents food was more a necessity than something to be enjoyed or lingered over. Mary (M) responded *"Well you have to eat food haven't you?"* while another participant suggested that for them *"food isn't a big thing...We're not gourmet eaters or anything like that. We like our food, but it's not a big priority for us"* (Steven, M). Sometimes this occurred because living alone meant that food was less of an occasion. For Nancy (M), *"when the family were all at home you [did] a big shop. But when you're on your own you don't need things hanging around or storing them too long."* And for Dorothy (M) living alone meant that having *"a takeaway would be once in a blue moon. There's no fun in a takeaway on your own."* For those whose children had left home, cooking for two was seen as *"just a meal"* and, for Rita (M), there was *"no point getting too excited over it."* In response to being asked about whether she tries new recipes, Dorothy (M) says that she *"might but when there's one of you, you can't scale some things down necessarily [and] I can't always be bothered."* Once the social aspect of food becomes absent for these participants, the

significance that food holds at a personal level is greatly reduced, meaning that less consideration is given to its content or structure.

For some pioneer participants (6), there was a social value to producing or foraging for their own food, too. It enabled them to sustain a way of life outside of institutional food supply. Instead, ‘raw’ foods that were self-grown or foraged were swapped with other members of the community. For Sally (P), this practice provided the scale required to sustain a varied diet that was rich in non-commercial (“jam cupboard”) foods: *“I just live off all kinds of bits and bats that people leave in my house, ‘would you like a slice of something or other?’ ‘would you like eggs?’ I love all that ‘cos I just swap stuff all the time, ‘would you like a jar of jam instead?’ ...but that’s why I forage and grow stuff on an allotment so I can live in a jam cupboard economy...”*

Like the ‘mainstream’ group, the significance of food also included ideas connected to sharing. Some people (7) reported enjoying cooking if it was for other people, and being able to create meals that they liked. Michelle (P), who cooked as part of her care job responsibilities, spoke about how she used to envy people that ‘understood’ ingredients; she subsequently taught herself to cook creatively and produce vegan and gluten-free dishes that had *“amazing flavours.”* She was proud of what she accomplished. Some of our focus group participants saw an important role for themselves in sharing food practices with others. Shane (P) related the pleasure he got from sharing meals with his flatmates, introducing vegetables to them, and teaching them how to make these meals for themselves. Sally (P) had committed herself to *“moving the philosophy forward”* by passing on her knowledge and skills to others:

*“I want people to be able to do things, I want them to try growing three lettuces in a window box, in their backyard or just come out with me on a forage walk and I’ll show you one fabulous thing that you can do when you go home.”*

In this case, social interactions are key to dispersing new skills and competences for food practices. But, close social relations were sometimes very powerful in engaging participants in different (often ethical) perspectives on food consumption, for example becoming vegetarian or vegan.

*“one of my kids became a vegetarian before I did, he ...erm..., he was only 3, when he found out what lamb was he suddenly made this connection between nice little animals and then something on the plate and getting killed, so that was it, he kind of set an example to me and then I set an example to my mum so it went up the generations! And anyway he’s 19 and he’s still a vegetarian.” (Melanie, P)*

The role of social influence, and the level of competence, particularly around creating fresh and tasty food from available ingredients, was a recurring theme in

our focus groups. Some participants already used social media to scaffold their experiences by sharing recipes and their experiences with new ingredients. Digital technologies are already having a role in developing competence, and this may highlight opportunities in more mainstream practice, providing designers are mindful of constraints such as convenience.

### 4.3 Food in the broader context of everyday life

We found that food often had to fit within the constraints of time pressures or dietary constraints arising from activities or lifestyle choices outside the home. Food choice was often compromised due to perceived lack of time.

#### 4.3.1 Time and commitments

Participants talked about feeling constrained in what they bought and ate due to lack of time. In busy lives, where a range of other everyday practices were prioritised, little time was left for food. Practices like leisure activities, work, coordinating family activities, and so on, all compete for precious time. And, time saved on planning, cooking and eating is gratefully repurposed in other areas of everyday life. This was sometimes in spite of aspirations for the contrary, when food itself was valued as a leisure activity. For Bonnie (M), while she described the food they ate as *“nutritious, all vegetarian, using lots of fresh vegetables,”* she also reported that there was *“not a huge variety because we never seem to have the time to actually focus on looking at different recipes...it’s an aspiration to spend a bit more time on food. But yes, life tends to be pretty full with various things...it does tend to be fairly similar.”*

As a result, participants found it convenient to routinely prepare the same dishes each week: *“We do say to each other sometimes we ought to be more adventurous with our cooking. We have a whole selection of books but tend to cook the same type of things fairly regularly ...it’s straightforward to do.”* (Cyril, M)

For some (7), food labelling and local food were issues that also required time and dedication: Bonnie (M) argued that *“if you’re busy you don’t, I wouldn’t spend an awful lot of time studying labels and reading things...you’d have to be a bit dedicated to do that.”*

Even routine meal planning and eating together was difficult for some families as work commitments, study and revision and visiting friends get in the way, as Erica (M) describes:

*“I wouldn’t say I would follow necessarily what’s happening on what night. So we don’t have fish every Friday and things like that. Sometimes...it’s a bit chaotic about what we have. My daughter, she’s out at a friends revising, the little one’s off to Cubs, my partner’s off to do his night shift and it’s very hard getting everything ready. A lot of it is quite ad hoc.”*

Planning and helping food ‘fit’ within such constraints, is an area where ICT can have a role, particularly in a food environment increasingly enabled by online shopping and delivery services. It is worth reflecting however, whether it should be the food that always has to ‘give’ in busy lives, or whether, quality time with food and taking the time to appreciate this together, also needs to be valued and prioritised.

#### 4.3.2 Making peace with food

All our pioneer group participants spoke of the tensions between aspects of sustainability and the need to fit within the practical constraints of everyday life. For many participants there was a pragmatic need to really focus on the one or two factors that were more significant to them, e.g. animal welfare, the environment. It was perfectly possible to keep digging and learn more about their foods and their origins, but there was soon a limit to how many criteria and how much time they could spend taking all these factors into account in deciding what to buy (or not) – and in what was available to choose from in any case. Hence, compromises were often made, which were occasionally uncomfortable, but a degree of resignation was also involved in ‘making peace’:

*“I think it’s an evolving system and I have a whole list of things, and if I tick at least one of them then I’m happy with that, I do look at fruit and veg like if it comes from Spain or France or Holland...that’s close enough for me, and I make peace with that.” (Melissa, P)*

It is not only the characteristics of particular products and their provenance that restricted participants’ ability to integrate sustainability in their food practices. Some (13) spoke about being constrained geographically in terms of what they could access. This related to what was available in their locality, but also, for some (4), what was accessible without the need of a car for transport.

Many (14) participants also spoke about the challenges of eating sustainably in a way that was affordable. For example, some of the more sustainable foods are often considered ‘premium products’ by supermarkets, or small ethical suppliers were not considered affordable for a weekly shop. Participants also spoke about the challenge of integrating sustainability into everyday meals, noting the challenge of learning new recipes and ways to cook things that were alien to them. Doing so was only manageable as part of a gradual process; over-commitment could be too disruptive to them and their households.

One participant mentioned the challenge of maintaining a sustainable household diet while raising children. Children’s exposure to food practices outside the home (i.e., at schools and friends’ homes) and via television marketing campaigns made it difficult to retain sustainable practices at home:

*“I don’t know what he’s eating [at school], probably a lot of chips, and fish-fingers and baked beans and things ...I think when he goes to his friends he gets cheap meat, that is probably easier to eat, whereas I make a point of buying either organic or from local butchers which are in fact coarser and he takes like half an hour on one little thing! But, he identifies, ‘oh I think that’s the one I want’ and I’m like I’m not getting that!” (Isabella, P)*

Like the ‘mainstream’ group, busy lives and unplanned activities sometimes got in the way of sustainability, too:

*“I’m always really conscious of things like, you know, who grew it and I hate buying stuff like pineapples when I see them for a quid. I think I love them but who’s grown that and for how much, ...and I hate loads of packaging; that’s just a big turn off. But having said that I live on my own and I’m not at home all the time and I buy stuff and it goes off, and then I’ll go, like last night I was out with [a friend] and I ended up getting a pizza in town, and the night before. ...I thought ‘great, I don’t know what’s gone in it.’” (Gerard, P)*

While again, provenance and trust in the sources of food, is an area where ICT can help to lend reassurance, or provide more information to more mainstream consumers; it is worth reflecting on the wider ‘normative’ food that are getting reinforced as often default choices by powerful actors such as schools and institutions, and ‘fast’ convenient food in our high streets and shopping centres. Only by making the sustainable easier, more acceptable, more normal can we achieve a large scale transition towards sustainable diet. Can HCI design perhaps hold up a lens to help hasten systematic reflection and change?

#### **4.4 Transitions: Practices in motion**

What we have seen so far is a snapshot in time of food practices of our participants, but in thinking about change toward sustainability, it is interesting to consider how these particular ‘ways of doing’ came to be. Meah and Watson [2011] explore the role of lifecourse transitions: they highlight the absence of linearity in their participants’ engagement with cooking as they move between different transitional points in their lifecourse. So too, it is for our participants, as we now explore.

##### **4.4.1 Critical transitions**

As might be anticipated, many respondents described how their shopping and cooking practices have changed over their lifecourse, and in response to specific transitional events. For example, having a family (5), children leaving home (6), moving house (16), retirement (10) and death (2), were all described as affecting food practices. For some, retirement offered the time to take up growing food in the garden or on the allotment, whereas the loss of a partner can mean the loss of

the skills for growing food and keeping an allotment (Mary, M). For Rita (M), whose husband tends an allotment, this affects what they eat seasonally, and what they buy from the shops varies by what is available in the allotment:

*"It gets to be the same items each week in the summer and then change over in winter. Because my husband grows a lot of veg...in the winter months we have to buy from the shops, so it just changes."*

Growing food seemed to be a predominantly male practice in contrast to cooking, which was principally described as a female practice among our respondents. Retirement can also free up time to take part in other leisure activities: food shopping and cooking were seen as leisure activities in and of themselves. One of our retired participants, George (M), sees shopping as a 'trip out':

*"I'm retired now and my wife is mostly retired, so it's a trip out. I know it sounds a bit, we sound like old people! But you think yeah we'll have a run to Lidl, you do that and do a couple of other things, go and visit friends as well."*

Carol (M) had recently lost her husband, which, not surprisingly, had had a dramatic impact on her life, but also on her eating habits in particular. Immediately following his death she turned to ready meals as she could no longer face cooking just for herself. She described a significant shift in what she bought, cooked and ate:

*"I don't cook as often as I did. And we eat a lot more salads and a lot of fresh vegetables. Well we ate fresh vegetables before but they had to be cooked because it wasn't a real meal if it hadn't been cooked!"*

Those with younger families and caring responsibilities described how having children influenced what they bought, cooked and ate, as well as when. Louise (M) had started buying more local and seasonal produce in response to her children when they had been learning about local food and "have started taking a real big interest." Her children were comparing "strawberries from Spain and strawberries in England. They will look at those type of things and make decisions based on where it was grown... [they] like the idea that they're buying locally and supporting local farmers and local producers."

We saw that major life transition points had very significant effects in terms of reshaping food practice. These transition points often involved significant relationships with others, and the capability and infrastructure associated with them, but also the motivation they provided. It is worth thinking how new information and coordination, brought about via powerful actors and personal relationships, might lead to more, rather than less sustainable food.

#### 4.4.2 Culture and competence

Sahakian and Wilhite [2014] argue that a view of agency distributed across people, things and social contexts is fruitful for research, and that learning can be achieved through membership in communities of practice, where people are involved in experiments with or exposure to new practices. For them, transferring knowledge through demonstrations of new practices is a powerful way to stimulate change.

Five of the pioneer participants reported how a change of cultural context had sensitised them to new issues, for example living in a third world country, or moving to a place where institutions (e.g. supermarkets) better incorporated food sustainability issues. One such issue, animal cruelty, was particularly powerful as a motivating factor for changing their diets, often influenced by an experience or media awareness of a particular issue, like conditions for battery-caged hens. There were also more mundane accounts of transitions, where participants adjusted their food practices as a result of TV documentaries (2) or reading certain books (2) alerting them to particular sustainability issues.

The importance of social interaction in establishing and changing practices was clearly evident from our focus group participants' accounts. For some, domestic influences through formative years provided crucial skills, and alternative perceptions of and ways of doing food. Shane (P) associates his cooking competence with the way he was raised by his mother, and Sally (P) spoke about '*channelling her mother*' in the kitchen. It is worth noting that most of the focus group participants regularly cooked for themselves and some enjoyed experimenting with new foods and combinations of ingredients. Experiences of growing food provided a reference point for notions of, for example, naturalness, freshness, seasonality, and taste, from which they could critically evaluate supermarket produce.

*“the expiry date of fruits and vegetables in the supermarket I find very surprising ...with the carrots, the expiry date is within two weeks ...my family always had a farm you can store them all Winter... what sort of carrots am I buying if it goes off within two weeks?!” (Joyce, P)*

As per Sahakian and Wilhite [2014], in Philip's (P) case, living in a vegan cohousing environment was important in developing the skills that he now uses to exercise this diet: *“they showed you...what are the key tools. So a blender is a really important...if you're going to be vegan, because you can do so much more with raw – you can make your own cashew milk, you can make hummus...and I wouldn't have thought to do that...”*

Not all pioneer participants had integrated sustainability into their food practices to the same extent. This was related to their reliance on mainstream supermarkets

for food compared to other sources. Such participants were more likely to consider sustainability in relation to issues for which information was available in-store, i.e. locality, organic, or food miles. And, cost or convenience frequently took precedence in decisions about what to buy compared to the other participants, and thus illustrates characteristics more in line with our ‘mainstream’ participant group, and which exemplifies the lack of neat distinctions between our two groups. These participants were aware of a broad perspective of food sustainability but acknowledged only taking some factors into account. Compared to some of the other participants, it seemed that they had come to consider sustainability much more recently, and were in the process of developing knowledge, skills, confidence or the motivation to change their practices in more radical ways than making like-for-like choices. Sustainability had not yet become integrated in a new way of life or ‘way of thinking’, unlike Melanie (P) “*it’s actually a whole way of thinking...but I’m old and I’ve had time to learn!*”

#### 4.5 Discussion

At its most basic level, food is fuel for life: a resource necessary to sustain participation in everyday life’s interconnected practices. In this way, food can be mundane: a daily concern to support perhaps more noteworthy matters like work, entertaining ourselves, and raising children; food is an often secondary concern in busy lives. But, as our findings have highlighted, for many others, food *is* more significant. It is variously ‘situated’, and hence, enacted [Comber et al. 2013].

At the other extreme, food constitutes everyday life in profound ways: food is a way of life, a central concern that other practices are configured to fit around. One of the more surprising and significant findings that emerged from our study is the large difference in the importance that food holds in people’s lives.

This is not to say that, for some participants, food held no meaning at all. On the contrary, food *was* meaningful but it was more defined by factors like cost and convenience that can be at odds with sustainability. So, for example, in some cases we see a reliance on ready-made supermarket meals to sustain lifestyles of leisure. But, importantly, the appreciations associated with food at this stage, like getting a bargain or reducing the time or effort of shopping and cooking, were not necessarily reflected at the consumption stage, i.e., food was less meaningful during the act of consumption.

In contrast, those participants who expressed concerns for sustainability described how they gained satisfaction and enjoyment from eating. Aside from the fact that they often perceived sustainable foods to be tastier, this arose because these foods also reflected values that aligned with appreciations at the consumption stage—living in harmony with natural food cycles, and/or maintaining ethical diets, and the care, time and effort required for this—reinforcing positive feelings like pride and virtuousness, as a result.

Another defining element in the meaningfulness of food is the social context in which practices are enacted. Living with family members and partners and other social interactions around food gave cause for upholding and sharing notions of ‘properness’, and for enacting ceremonies around food. Whereas in other situations such as living and dining alone, the value of expending effort on food (or indeed in sharing a takeaway) is often lost. We saw with the pioneer group how food meaningfulness and appreciations can co-develop alongside knowledge and skills through sharing meals, cooking together, passing on recipes, or even simply observing the practices of others and discussing elements of them (e.g. the challenges associated with sustainable consumption). In the next section, we will explore how HCI can leverage, support and promote these intertwined concepts for sustainability.

## 5. TOWARD SUSTAINABLE FOOD INTERACTION DESIGN

As we have seen in related literature and our participant accounts, the sustainable food consumption space extends far beyond the traditional remit of digital technology and HCI, but some useful concepts have emerged that represent promising directions for sustainable interaction design. We intend the sensitivities we have developed from our two participant groups to have standalone value for ‘FoodHCI’ researchers and practitioners, but in this section we describe some of our own interpretations of our findings’ ‘implications for design’.

### 5.1 Designing for a process of transition

There is considerable variation in how food is done, both across our participant set but also within each individual’s life. As Meah and Watson [2011, p. 20] suggest, this points to the complex ways that individuals’ practices are socially and culturally embedded, and emergent from a range of factors, including exposure to external influences, time and space, and a range of life-course transitions which might rupture existing patterns and behaviours. For our sustainability pioneers, what we see is a continual *process of becoming* whereby practices are altered in response to recurring interrogations and reflections on what is ethical, affordable, and healthy. To design for sustainable food is to design for a course of change.

#### *Significant life events*

Aside from the obvious design contexts of sustainability ‘novices’ and ‘pioneers’, we saw significant events or stages in people’s lives where food practices are broken down and then slowly rebuilt, e.g. family members leaving home, retirement, or loss of a life partner. Support processes already exist for the newly retired and bereaved, which might represent levers for sustainable food interventions, a domain that HCI has not previously explored in this respect. The role of design would be to explore how these life transitions could be

meaningfully supported—developing new leisure activities or replacing lost cooking skills—in a way that is also positive for food sustainability. As food is highly situated, a promising role for digital technology might be in supporting how such transitions are enacted in the home, and in helping broker access to knowledge, skills and support in the local area.

### *Doing your best at doing good*

But a more important implication that is connected to the concept of ‘transition’, and echoed by the Sustainable HCI community’s call for more consideration of longer-term processes in design [Silberman et al. 2014], is that design should be contextualised within and as part of the whole process of sustainable food. This represents a significant challenge for HCI in that it requires a shift from designing for particularly contexts like shopping or enhancing technologies in the kitchen, toward thinking about how interactions with food and technology must evolve in a way that is compatible with transitions in practice. It requires that design support users in undertaking and embedding meaningful changes in preparing or acquiring food over time, like we saw with our sustainable food pioneers. But, importantly, and related to designing for the concept of ‘enough’ introduced by Håkansson and Sengers [2013], design must equally consider how to avoid feelings of powerlessness and despair, and support people in being happy with ‘being good enough’ even while maintaining a trajectory of continual improvement. As Håkansson and Sengers suggest, this requires recognising that digital technology opens up a world with few barriers, which is perhaps adverse to *gradual* change in the physical world.

### *Learning from and sharing with others*

We have seen that the importance of social interactions in motivating and facilitating changes in food practice should not be underestimated. We, like Comber et al. [2013], saw that for many people, eating with others was more enjoyable than eating alone, and provoked greater reflection on what was or what could be consumed. We saw through these social encounters how people discovered new dishes, foods and ways of cooking that were more sustainable, but also developed confidence that they could sustain an alternative way of doing food, despite the challenges. We also saw the role that children (and second-level learning) can play in integrating sustainable practices at home and creating more meaningful interactions around food. For our sustainability pioneers, opportunities were highlighted for sharing homemade and homegrown foods, as well as costly ‘materials’ required for processing (e.g. a blender for vegan food). To enhance collectivism and community [Comber et al. 2013], HCI might explore technologies for the sharing of materials, foods, and, importantly, individual experiences with food (e.g. pictures of a self-created recipe or dish). Some of our participants already used a private Facebook group for sharing images of vegan dishes. But sharing food experiences is worthy of further attention: even when

practices are carried out alone, sharing an account of them (e.g. a picture) makes the process so much more meaningful.

### *Designing for more meaningful food*

Food represents an opportunity for sustainable HCI because it is an area of everyday life where sustainability can be transformed from an abstract, obscure concept to a more tangible, embodied one. The challenge for design is to move beyond food as just a commercial product or a recipe with ingredients, to a process with meaningful and sustainable outcomes.

We saw how the concept of ‘proper’ food had taken on new meanings for the sustainability pioneers, from what is traditionally considered a proper British meal to appreciations of nature, personal accomplishments, and ethics. Practicing proper food had become associated with special occasions, rather than the everyday, for the mainstream participants. Significantly, where food was more meaningful for this group, it was linked to wider food processes and practices, like growing on allotments and shopping for leisure, or information brought in by children from their education, enhancing the enjoyment of making decisions in the supermarket. So whilst our emphasis was clearly on food sustainability (incorporating growing, shopping, cooking and eating) this palpably linked to other practices such as those related to children, socialising, and leisure. Sahakian and Wilhite [2014] caution against excluding these wider aspects of practice from food sustainability. We have already highlighted the importance of designing for sharing and social interactions around food, but some other design spaces that warrant attention are: 1) exploring how children might be better included in family food. As Grimes and Harper note, ‘it is in part through these patterns and eating norms that families define their identity’ [2008]. And, perhaps as an extension of this, 2) growing and processing as a leisure activity might enhance connections to, and appreciations of, wider food processes, like seasonality, and food provenance.

### *Celebratory food*

Related to these considerations is the concept of ‘celebratory food’ that we described in the previous section, which highlighted the value for our participants in things like creativity, motivating challenges, fun and enjoyment in food. These findings have ‘implications for design’ in the sense that we might be interested in developing designs that augment these creative and celebratory aspects – especially as they are connected to another central finding of our work, the importance of the process of ‘transition’ in the movement towards sustainable consumption.

Many of our participants were not ‘creative’ cooks, generally not having the confidence to veer beyond tested recipes. But, in some cases creativity was valued—the challenge associated with putting ingredients together according to

taste, intuition, and what is available, to create a satisfying meal. This was an enjoyable practice, but it had the added value of increased appreciations of particular foods, low food waste because uses for leftovers came easily, flexible dishes whereby ingredients that were unavailable (or unsustainable) could simply be replaced with something else, and confidence to find a use for new foods, for example, that were grown themselves or acquired from a sustainable vegetable box scheme. HCI should explore new technologies to support cooking in a way that brings these important concepts of celebration, transition, skill and improvisation together, focusing on the development of cooking competencies rather than facilitating the execution of well-defined recipes. The basis for such cooking activities might be the set of ingredients that a user already has to hand, or ingredients that already are or could be responsibly grown and produced in their locality.

#### *Offering alternative perspectives on food*

A key difference between our participant groups was the perspectives on food that were held in each, which were shaped by different experiences and trajectories of food practice: mainstream participants’ perspectives were shaped more by special offers (e.g. BOGOF) and identification of which supermarkets tended to sell specific items for a lower price, whereas green values, social networks and significant events or pieces of media shaped pioneer participants’ perspectives. In a market defined primarily by economic goals and competition, the mainstream foodscape offers little room for alternative food perspectives, e.g. of farmers or ecologists.

HCI offers a promising opportunity to engage people in alternative perspectives on food. For individuals, Mobile HCI can bring alternative perspectives on food into the supermarket, beyond any single retailer. Independent ‘apps’ can infiltrate the supermarket via handheld devices, and so designers might usefully provide layered perspectives on what appears on the supermarket shelves by, for example, augmenting the shopping list with information about greenhouse gas emissions, supply chain ethics, and perhaps alternative products, or more sustainable foods that are commonly substituted in recipes. The application of these layered perspectives might range from the practical (as in food substitutions or personal carbon footprinting), to apps meant to provoke critical reflection (e.g. portraying cost in terms of the equivalent number of vegetarian meals that could be produced, or relative climate change effects). The latter may not have direct practical effects but might perhaps stimulate discussion in social networks or change attitudes towards food (as in the case for some of our pioneers), potentially gradually shifting food cultures over the longer term. Extending this further, HCI design might look to stimulate and disseminate sustainable social practices through design in public spaces or digital civics platforms [Olivier and Wright 2015], for example that exhibit and promote critical reflection on local food consumption (e.g. grown, imported, supermarket provision) and provide a

platform for collective action (e.g. participating in alternative local food economies).

## 6. CONCLUSION

In our research, we set out to understand food practices from the perspective of both ‘mainstream’ and ‘sustainable’ consumption. This was an exercise in both exposing what sustainable consumption is for our participants and how it is enacted, but also in exposing the gaps between sustainable and mainstream consumption. We sought sensitivities of what everyday food entails to think about how design might narrow this gap by transitioning practice in new ways at one end, and supporting existing transitions at the other. A more significant defining characteristic that emerged is the meaning associated with food, with interesting chasms both within, and between, our two participant groups, for example around the perception of ready meals (Section 4.2.1), or the practices involved in procurement (Section 4.1.2). There are some clear opportunities for HCI to help bridge the food sustainability gap by designing for life transitions and related practices, and by leveraging important notions of ‘celebration’, ‘properness’, and sharing of practices and experiences with others.

## REFERENCES

- Atkins, P.J. and Bowler, I., 2001. *Food in society: economy, culture, geography*. London: Hodder Arnold.
- Blake, M.K., Mellor, J., and Crane, L., 2010. Buying Local Food: Shopping Practices, Place, and Consumption Networks in Defining Food as “Local”, *Annals of the Assoc. of Amer.Geog.*, 100(2), pp. 409-426.
- Blevis, E. and Morse, S.C. SUSTAINABLY OURS: Food, Dude. *Interactions* 16, 2 (2009), 58–62.
- Brown, G., P. Kraftl, J. Pickerill, and C. Upton. 2012. Holding the future together: Towards a theorization of the spaces and times of transition. *Env. and Plan. A* 44: 1607–1623.
- Bucci, M., Calefato, C., Colombetti, S., Milani, M., and Montanari, R. Fridge Fridge on the Wall: What Can I Cook for Us All?: An HMI Study for an Intelligent Fridge. *Proc. of the International Conference on Advanced Visual Interfaces*, ACM (2010), 415–415.
- Choi, J.H., Foth, M., and Hearn, G (eds.). *Eat, Cook, Grow: Mixing Human-Computer Interactions with Human-Food Interactions*. The MIT Press, 2014.
- Clear, A.K., Hazas, M., Morley, J., Friday, A., and Bates, O. Domestic Food and Sustainable Design: A Study of University Student Cooking and Its Impacts. *Proc. of CHI*, ACM (2013), 2447–2456.
- Comber, R., Hoonhout, J., van Halteren, A., Moynihan, P., and Olivier, P. Food Practices As Situated Action: Exploring and Designing for Everyday Food Practices with Households. *Proc. of CHI*, ACM (2013), 2457–2466.
- Crocker, R., and Lehmann, S., (eds) (2013) *Motivating Change: Sustainable Design and Behaviour in the Built Environment*, Earthscan Routledge, Abingdon.
- Ganglbauer, E., Fitzpatrick, G., and Comber, R. Negotiating Food Waste: Using a Practice Lens to Inform Design. *ACM Trans. Comput.-Hum. Interact.* 20, 2 (2013), 11:1–11:25.
- Giddens, A., 2009. *The Politics of Climate Change*. Polity, Cambridge.
- Grimes, A., & Harper, R. (2008, April). Celebratory technology: new directions for food research in HCI. In *Proc. of CHI Conference on Human Factors in Computing Systems* (pp. 467-476). ACM.
- Håkansson, M. and Sengers, P. Beyond Being Green: Simple Living Families and ICT. *Proc. of CHI Conference on Human Factors in Computing Systems*, ACM (2013), 2725–2734.
- Hinrichs, C.C. (2014) Transitions to sustainability: a change in thinking about food systems change, *Agriculture and Human Values*, 31, pp. 143-155.
- Holloway, L., Kneafsey, M., Venn, L., Cox, R., Dowler, E. and Tuomainen, H., 2007. *Possible Food Economies: a Methodological Framework for Exploring Food Production-Consumption Relationships*. *Soc. Rur.* 47(1), pp. 1-19.
- Jackson, T (2009) *Prosperity without Growth: Economics for a Finite Planet*, London: Sustainable Development Commission.
- Kalnikaite, V., Rogers, Y., Bird, J., et al. How to Nudge in Situ: Designing Lambent Devices to Deliver Salient Information in Supermarkets. *Proc. of Ubicomp*, ACM (2011), 11–20.

- Li, L., Chen, N., Wang, W., and Baty, J. LocalBuy: A System for Serving Communities with Local Food. *CHI '09 Extended Abstracts on Human Factors in Computing Systems*, ACM (2009), 2823–2828.
- Light, A., Wakeman, I., Robinson, J., Basu, A., and Chalmers, D. Chutney and Relish: Designing to Augment the Experience of Shopping at a Farmers’ Market. *Proceedings of the 22Nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction*, ACM (2010), 208–215.
- McKie, L. (1999) Older people and food: independence, locality and diet, *Brit. Food Journal* 101(7), pp. 528-536.
- Meah, A., Watson, M. (2011) *Saints and slackers: challenging discourses about the decline of domestic cooking*, *Sociological Research Online*, 16 (2), 6.
- Murcott, A. (1995) Raw, cooked and proper meals at home, in Marshall, D. (ed) *Food choice and the consumer*, CAB Direct, Oxfordshire, pp. 219-235
- Odom, W. “Mate, We Don’T Need a Chip to Tell Us the Soil’s Dry”: Opportunities for Designing Interactive Systems to Support Urban Food Production. *Proc. of DIS*, ACM (2010), 232–235.
- Olivier, P., Xu, G., Monk, A., and Hoey, J. Ambient Kitchen: Designing Situated Services Using a High Fidelity Prototyping Environment. *Proc. of Pervasive Technologies Related to Assistive Environments*, ACM (2009), 47:1–47:7.
- Olivier, P., & Wright, P. (2015). Digital civics: taking a local turn. *interactions*, 22(4), 61-63.
- O’Neill, K. 2014. Situating the ‘alternative’ within the conventional’ – local food experiences from the East Riding of Yorkshire, *J. of Rur. Stud.* 35, pp.112-122.
- Phillips, M. and Dickie, J. (2014) Narratives of transition/non-transition towards low carbon futures within English rural communities, *Journal of Rural Studies* 34, 79–95
- Sahakian, M., and Wilhite, H., (2014) Making practice theory practicable: Towards more sustainable forms of consumption, *J. of Consumer Culture*, 14(1), 25-44.
- Silberman, M.S., Nathan, L., et al. Next Steps for Sustainable HCI. *Interactions* 21, 5 (2014), 66–69.
- Slocum R. 2004, Polar bears and energy-efficient lightbulbs: strategies to bring climate change home *Env. and Plan. D*, 22(3) 413 – 438
- Tukker, A, Huppes, G, Guinée, J, et al. (2006) Environmental Impact of Products (EIPRO): Analysis of the life cycle environmental impacts related to the final consumption of the EU-25. Main report. European Commission, Joint Research Centre (DG JRC), Institute for Prospective Technological Studies.
- Woodruff, A., Hasbrouck, J., and Augustin, S. A Bright Green Perspective on Sustainable Choices. *Proc. of CHI*, ACM (2008), 313–32