Co-creating sustainable eating futures: Technology, ICT and citizen–consumer ambivalence

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A B S T R A C T
The early 21st century has seen a plethora of future-oriented roadmaps and foresight exercises focused on increasing food supply, often with the aid of advances in technology, in order to feed a growing global population under conditions of uncertain climate change. As such, they provide important, but only partial, pictures of how we might eat more sustainably. The complex politics underlying food production and distribution as well as factors that shape the highly uneven practices of food consumption are often obscured. Equally, and in the face of ongoing conflicts that suggest otherwise, supply-side analyses frequently assume that technological advances will play a relatively uncontested role in food futures. Drawing on insights from a participatory backcasting process that adopted a practice orientation within an overarching transitions framework, this paper adds two related dimensions to the productivist paradigm in urban food futures research. First, it places eating practices at the heart of food futures debates and second, it provides a critical reflection on consumer–citizen perceptions of the role for technology, and in particular ICT, in shaping those eating practices. Ultimately, it is argued that technological advances in production alone are unlikely to generate the significant transformations required to construct more sustainable urban future food landscapes.

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1. Introduction

In 2010 the World Economic Forum (WEF) announced its new vision for agriculture on the basis that agriculture contributes 30% of global greenhouse gas emissions, provides 40% of employment worldwide (and 70% for the bottom billion) and accounts for 70% of all water withdrawals (World Economic Forum, 2010). Derived from stakeholder consultation involving 350 leaders of business, government, civil society, international organisations and academia, the WEF initiative approached the major challenges presented by feeding the world from the position that agriculture is a positive contributor to food security, environmental sustainability and economic opportunity. The roadmap produced by this consultation ultimately concludes by outlining the need to ‘produce more with less’, thus evoking an ecologically modern interpretation of sustainability through its vision of a technologically driven agri-business future (Horlings and Marsden, 2011). The WEF are not alone in considering food futures from a productivist perspective (OECD, 2012a; GOS, 2011; European Commission, 2010a, 2011; Teagasc, 2012; CleverConsult, 2010) and focusing on supply-side issues of agricultural production, and the role that technology might play within that, is undoubtedly important (Borch, 2007). However, such
perspectives rarely deal with the complexities that lie behind the abhorrent geographies of world hunger and obesity; these complexities being intimately related to geopolitical histories, economic development trajectories, socio-cultural norms and the global flows of food exports and imports that all contribute unsustainable eating practices (McLean and Hopkins, 1974; Freibauer et al., 2011).

This paper argues that adopting a productivist or ‘predict and provide’ approach will not address the highly unequal and unsustainable practices of eating and related food wasting around the globe in the future. More holistic approaches that link agricultural production with consumption and which go beyond a purely technological fix, will need to be developed in planning more sustainable eating futures. One such approach, practice-oriented participatory (POP) backcasting (where backcasting essentially refers to a process of imagining desirable possible futures and then working back to the present to consider interventions that might build towards its achievement), which considered how food acquisition, storage, preparation and disposal related to household eating practices could become more sustainable by 2050, is outlined and critiqued in this paper (Pape et al., 2011; Davies et al., 2012; Doyle and Davies, 2013). Before outlining and reflecting on the conceptual foundations underpinning the development and implementation of the approach adopted, a further clarification of the limitations of a solely supply-side approach is demarcated. Following this, a consideration of how the resultant scenarios for sustainable eating in 2050, and in particular their technological components, were delineated, shaped and received by the participants and in particular citizen-consumers is presented. In conclusion, the potential for POP backcasting to offer novel spaces for deeper and wider deliberation regarding alternative, more sustainable eating practices and desirable urban food futures is considered.

2. Problems with ‘predict and provide’ and the technological fix for sustainable eating

A key problem with current productivist paradigms, and in accordance with critiques of such ‘predict and provide’ approaches in other sectors such as transport or housing (Owens, 1995; Owens and Cowell, 2011), is that they do not address the question of ‘need’ in relation to food, nor differentiate between basic survival needs and unsustainable desires, either now or in the future. While all incidences of hunger and food insecurity are unacceptable, continued food shortages are made all the more distressing by the massive overconsumption of food (and therefore also overconsumption of related resources) elsewhere. While establishing exact patterns of food consumption globally and even within regions is challenging, it has been estimated that nearly twice as much food (in terms of the nutritional needs of their populations) as is required is consumed across the United States and Europe. Despite data constraints, the OECD has predicted that more than two out of three people will be overweight or obese in some OECD countries by 2020 (OECD, 2012b). Often couched in terms of the negative health impacts that such obesity levels will engender, and the costs of treating associated diseases and illness caused by obesity, the overconsumption of food also indicates profligate use of natural resources in terms of the associated water, energy, fertiliser and pesticide use required to produce, store and transport it. Equally, the issue of food waste and its geography is rarely incorporated into productivist prescriptions for food futures. This is despite the fact that the United Nations Food and Agriculture Organisation estimated in 2011 that roughly a third of the food produced in the world for human consumption (approximately 1.3 billion tonnes) gets lost or is wasted during the production, harvest, post-harvest and processing phases (UNFAO, 2011). While food loss during these phases is the major concern in developing countries, it is food waste, primarily caused by retailers and consumers throwing away edible foodstuffs, which is of major concern in industrialised countries. As with overconsumption, such food waste not only misses an opportunity to feed those who are hungry, it also represents a significant mismanagement of resources (EEA, 2012). In this vein, food waste features prominently in the European Commission’s Roadmap to a resource efficient Europe, which suggests that 90 million tonnes of food (180 kg per person) are wasted every year in the European Union, much of it still suitable for human consumption (European Commission, 2010b). Building on these statistics, the European target for reduction of food waste stands at 50% by 2020, with some MEPs calling for 2014 to be designated the ‘European year against food waste’.

In contrast to the WEF report, the EU Roadmap calls for farmers, the food industry, retailers and consumers to work together to develop and implement resource-efficient production techniques and sustainable food practices. Indeed, according to the Food and Agriculture Organisation of the United Nations’ 2011 Global Food Losses and Food Waste report (UNFAQ, 2011), consumers should be made aware that it is more effective to reduce food losses than increase food production in order to feed a growing global population, given the finite nature and limited availability of natural resources. Certainly, national consumption surveys indicate that significant work needs to be done in terms of both raising awareness and changing actions in relation to sustainable food practices. For example, the lifestyle survey conducted as part of the CONSENSUS (Consumption, Environment and Sustainability) project in Ireland found that price rather than environmental concern remains the main driver behind food purchases, followed by health concerns and taste. In terms of food waste, 48% of people regularly bought food only for it to expire before it was used and 54% do not compost their food waste. Such figures are not unique to Ireland, research conducted by Waste and Resource Action Programme in the UK found that a third of all food purchased in UK households regularly goes to waste (Pape et al., 2011; Carroll et al., 2012a,b). So, even in countries where hunger is not a key policy driver, widespread concerns about food sustainability remain and these concerns stretch far beyond questions of increasing production. In these countries, arguments about sustainability (for there is no one agreed definition) are beginning to focus more carefully on the demand-side of the food equation; essentially on people and the practices of eating which in turn have complex relationships with agricultural production, food processing, transport, storage, retail, cooking and disposal.
Envisioning future eating practices from a consumer perspective is not a new phenomenon. In the late 1930s, for example, the Popular Mechanics Magazine reflected on improvements to make the kitchen a more efficient site of cooking and eating. Similarly, during the 1950s the Swedish Home Research Institute sought to produce an ultra-efficient ‘standard kitchen’ while Frigidaire’s ‘Dream Kitchen’ included an IBM punchcard recipe file, automatic dispensing, on-line television ordering and pre-microwave technologies that cooked ham with radio waves. A driving motivation behind these visions was to reduce the time and effort taken for those preparing food to provide meals for families and in most cases the challenge of increasing efficiency was seen to be located in technological advancement. In many cases the technical fixes envisaged in the early twentieth century have become mainstreamed in modern households, for example, through ICT developments such as on-line food ordering and extensive open access to on-line recipe websites and blogs. However, while visionary research and development has also led to more efficient devices to assist with the food storage and preparation such as fridges and cookers, the proliferation of electronic appliances in the home (including those that play a role in eating practices) and the energy they consume, have offset the efficiency savings made (Maxwell et al., 2011). For example, the average energy consumption of a 1401 refrigerator dropped 29% between 1990 and 2001, but the incidence of households with more than one refrigerating product has also increased.

Technology-focused visions of future eating continue to be undertaken, with companies including Hyundai, Philips, Electrolux and Ikea all constructing provocative designs seeking to shape how we eat in years to come. While efficiency is still a core feature of these modern visions, the drivers behind them are more complex, placing a greater emphasis on personal and planetary well-being through precision nutrition analysis, smart systems and food security. The visions however still tend to be driven from a relatively uncritical technological product-oriented perspective focused on the development of new machines or gadgets rather than an in-depth analysis of how such technologies might be appropriated, utilised or governed (Murphy, 2007). Certainly questions remain about whose dreams are being manifest in these industry-led visions and whether they would actually contribute to more sustainable eating practices in the future. It was such questions that stimulated the development of the CONSENSUS POP backcasting approach.

3. Motivations and methods: situating the CONSENSUS practice-oriented participatory backcasting approach

3.1. Constructing eating futures

As recently as 2008 in this journal, Karen Hurley argued that there had been little discussion in futures studies about food (Hurley, 2008). While there are many suggested explanatory reasons for this relative oversight, Hurley argues that it is the complexities of food and its role supporting life, shaping cultural heritage and linking humans to ecosystems as well as functioning as a key commodity for trading, that makes its study so daunting. However, beyond this journal there are numerous analyses of visions for future food provision and consumption food futures, as exemplified in Warren Belusco’s recent work (Belasco, 2012). What both Hurley and Belusco ascribe to is a need to ensure that any food futures experimentation not only addresses the big picture abstractions (the major dynamics and drivers such as population growth and climate change), but also the inherently placed experience of eating, those ‘intensely localised food events that require personal choices by real people’ (Belasco, 2012). It is from a similar point of reflection on localised food events, or more specifically the practice of eating in the home, that the CONSENSUS approach began to take formation. While it is widely accepted that the household is an important site of consumption, and the OECD estimate that one-third of a household’s consumption impact comes from food consumption alone, it is also a black box when it comes to a clear conception of user practices. It is very hard to know exactly how and why people behave the way they do. This is particularly the case given the habitual nature of daily eating practices and the diverse personal, social and psychological drivers including, for example, comfort, community and convenience, that shape those practices beyond survival requirements. Central to the CONSENSUS project was a desire to return to the essential mundanity of eating in order to explore how such quotidian processes are embedded in webs of wider influences that often have global reach. In order to do this, citizen–consumers from a range backgrounds, life-stages and geographical locations across Ireland, along with stakeholders from various vested interests from public, private and civil society organisations, were invited to co-create visions of how eating practices might be performed more sustainably in 2050. The 2050 timeframe was selected to be far enough in the future to liberate participants from the constraints of current practices, yet close enough to the present to conceivably become ‘lived’ futures, either for the participants themselves, or their direct descendants.

3.2. Social practices and sustainable consumption

The practice focus of CONSENSUS backcasting draws inspiration from a plethora of studies which have identified limitations with the individualist, neoliberal approaches to changing consumption behaviour that currently dominate policy (Shove, 2010; Hargreaves, 2011; Halkier and Jensen, 2011). Without rehearsing arguments which have been made extensively elsewhere (Owens, 2000; Blake, 1999; Hinchliffe, 1996), such approaches tend to focus on isolated interventions targeted at educating or informing individual choices and behaviour such as eco-labels on appliances or awareness campaigns about sustainable resource use. In isolation, such interventions fail to account for the milieu of social relations, contextual factors and material infrastructures of production and provision that continuously shape and reshape the way people live and hence the consumption practices they perform. Social practice approaches, in contrast, reorient attention
away from the individual to ‘the routine accomplishment of what people take to be “normal” ways of life’ (Shove, 2004). Social practices are then, ‘forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know how, states of emotion and motivational knowledge’ (Reckwitz, 2002). Eating as a practice is seen as the nexus of activity co-ordinated by items of consumption (the materiality of food itself) alongside a suite of understandings, procedures and engagements with and about food that are constantly negotiated (and thus can and do change over time) (Halkier and Jensen, 2011; Warde, 2005). In this context, understandings are the practical and broad interpretations of what and how to do things (e.g. knowing that food is essential fuel for the body to function). Procedures are instructions, or principles and rules (e.g. purchasing food from a convenience store) and engagements are emotional and normative orientations (e.g. seeing moments of eating as social spaces for interaction with friends or family).

Following Reckwitz, the co-ordinating elements of understandings, procedures and engagements include processes that can be tacit and discursive, bodily and mental, material and immaterial (Reckwitz, 2002). As a result, and as argued by Warde (2005), it is when practices are performed that consumption occurs rather than as a result of individual choices. Essentially, a practice-oriented approach to sustainable consumption focuses on transforming practices themselves rather than seeking to educate or inform an individual in order to change behaviour (Hargreaves, 2011), and requires detailed reflection on why eating occurs, when, how and for what purposes. This practice orientation formed the foundations of the research reported in this paper.

3.3. Backcasting

Backcasting has been employed as a tool for sustainable system innovations when current trends, if extrapolated into the future, mean that goals (in this case more sustainable eating) are unlikely to be attained. It is therefore increasingly being used when structural changes to modes of living, working and producing are required (Højør et al., 2011; Dreborg, 1996; Svenfelt, 2010). Backcasting itself, however, is an evolving methodology that has been adopted and adapted in various settings. As a result, attempts to create typologies of their formation and application have been developed (Quist and Vergragt, 2011; Quist, 2007). Despite this diversity, all approaches adopt a future point of reference for visioning in order to free participants from the constraints of contemporary trends and to encourage longer term planning amongst key decision makers. The particular variant adopted in CONSENSUS is that of participatory backcasting, which places greater emphasis on involving a range of stakeholders in the development, modification and discussion of future scenarios. Such participatory approaches have been used previously in other experiments, when formulating ‘images of the future’ for household consumption in sustainable cities (Carlsson-Kanyama et al., 2008) or involving stakeholders with issues of reducing energy use in buildings (Svenfelt et al., 2011). As with other interventions which actively involve users or practitioners in the design process, including participatory and co-operative design (or co-design), the advantages of participatory backcasting include extending the scope of expertise informing scenarios and increasing the level of interaction and learning among participants (Davies et al., 2012). Most importantly for the CONSENSUS project, were the possibilities that the participatory approach provided for getting closer to the actual practices of eating by permitting attention to be placed more centrally on holistic practices rather than individual purchasing choices and by engaging with people beyond those directly involved in the earlier phases of the food production chain. Also, the focus was not initially on designing for the present, but rather taking a future-oriented perspective and thinking about alternative ways of doing things and then working backwards from those desired futures to identify means to encourage significant transformations in consumption practices.

3.4. Practice-oriented participatory (POP) backcasting

Few backcasting experiments have taken specific practices as the units of analysis and social practice arenas have not tended to be future oriented, predominantly reflecting on evolution of practices in the past and how this influences present configurations. The POP backcasting approach attempted to overcome the limitations of these two approaches in order to identify the ‘conceptual resources with which to enter ordinary arenas of everyday life’ (Shove and Walker, 2007) and to identify concrete interventions to assist with the significant transformations required of household practices such as eating (see Fig. 1 for an overview of the entire process).

3.4.1. Problem orientation and visioning workshops

The first step of the process, problem orientation, was conducted by the CONSENSUS research team through an analysis of existing governing approaches that affect eating, a review of academic publications and the results of a lifestyle survey conducted across both Northern Ireland and the Republic (Doyle and Davies, 2013). This formed the backdrop for the second stage of research, an initial visioning workshop where 18 diverse stakeholders who serve to create and maintain elements of the food supply chain were brought together for a period of 3 h on one day. These stakeholders were identified through the analysis of policy documents during the problem definition phase along with engagement of associated trade, community and environmental networks. This combined with a process of snowballing led to the identification of a cross-section of practitioners from public, private and civil society arenas. While only a limited number of participants could be accommodated within the workshop setting, the spread was nevertheless illustrative of the diverse actors with an interest in, and association with, practices of eating. They included four representatives of food-related government departments and organisations, seven representatives of private sector companies (including farmers, product designers and food processors)
and seven non-governmental actors (including researchers, journalists, food writers, environmental organisations and not-for-profit enterprises).

Following an introductory presentation outlining how eating practices in Ireland have changed over the last 100 years and indicating the current unsustainabilities of contemporary eating practices, stakeholders were asked to think about how the needs of eating (including food acquisition, storage, preparation and disposal) within households might be fulfilled more sustainably in 2050. The ongoing contestation about what sustainable eating might comprise, particularly in terms of tensions between those proposing organic or genetically modified food production or between those arguing for locally sourced food and those concerned about resource intensity of producing a variety of foods in particular localities was discussed. Rather than prescribe a fixed definition of sustainability prior to brainstorming the aim was to highlight the current unsustainabilities (for example in terms of resource inefficiencies of current food production and supply chains) and permit the stakeholders to debate and work through their notions of more sustainable eating through the active process of visioning.

Following a discussion of the understandings, procedures and engagements that participants felt shape their eating practices currently, participants were asked to brainstorm about how those eating practices might be transformed in 2050. Suggested points of transformation included the possibility of novel devices and technological advancements (coded as technology), altered norms, skills and cultural practices (coded as people) and divergent rules of governance and systems of provision (coded as organisation) within the 40 year timeframe provided. In order to encourage, but not direct, participants in the challenging process of envisioning future practices, examples from other future brainstorming activities focused on household practices of personal washing and home heating as part of the wider CONSENSUS project, were provided. While previous studies have indicated that some people can find it difficult to free themselves from the present (and as detailed in Figs. 2–4 many of the ideas have their roots in existing practices), the range and extent of ideas produced in the visioning exercise did indicate a productive mix of creative thinking, technical expertise and professional insights (Davies et al., 2012).

The brainstorm, which occurred in smaller sub-groups of six participants, led to the articulation of 100 individual concepts in total. The largest body of concepts were predominantly organisational interventions (43 ideas), followed by concepts that were categorised as primarily people-oriented in their expression (30), with the fewest number of concepts relating to essentially technological developments (22). Collectively, the entire group then embarked on a process of clustering similar concepts, discussing their relative contributions towards future eating practices from a sustainability perspective (i.e. according to social, economic and environmental criteria) and ultimately rating the clusters in terms of desirability for meeting the needs of eating more sustainably in 2050.

3.4.2. Scenario development and assessment

Clustered concepts from the visioning workshop formed the basis of three visual and textual scenarios constructed by the research team in collaboration with a graphic designer. Each scenario image details how eating practices are performed in that scenario supported by devices, lifestyles, social norms and regulations and each displays varying degrees of change across the dimensions of organisation, technology and people. Written descriptions were also developed to provide a high-level overview of each scenario’s essential characteristics and a more nuanced picture of what it would be like to live in that scenario. Shortened ‘day in the life’ narratives were then produced to supplement the images for those involved in the remaining backcasting phases. These scenarios were deliberately focused not just on policy interventions but also on
business design and social innovation. Feedback on the initial scenarios was elicited from the workshop participants through an on-line survey leading to their subsequent refinement.

Figs. 2–4 illustrate the three scenarios: Smart Eating – exhibiting high levels of technological change; Community Eating – with high levels of lifestyle change; and Educated Eating – that incorporates high levels of organisational change. However, all scenarios illustrate combined and reinforcing changes to organisational structures, societal behaviour and technological enhancement in accordance with the practice orientation. For example, improved ways of sharing information about food, from how it is produced and exchanged to how it is consumed and disposed of, are present across all scenarios. Even in the highly technological scenario there is a re-evaluation of food and greater attempts to reconnect people with its production, underpinned by new systems of provision from living walls in kitchens to edible parks.

Whilst a high quantity of creative solutions were proposed through the visioning exercise, as Jungk and Mullert state, “the success of a [visioning] workshop is not...to be measured solely in terms of the schemes or catalogues of proposals it generates, but also by how it subsequently affects the participant’s minds and behaviour” (Jungk and Mullert, 1987). In order to explore the learning engendered by the visioning workshop, participants were invited to reflect on the impact of the workshop on their thinking and activities. The results are explored in detail elsewhere, but essentially they record positive readings of the innovation stimulated by the collaborative process, a high level of interest and enjoyment in the visioning process and a considerable degree of personal learning (Davies et al., 2012).

Once the scenarios were revised, a phase of sustainability assessment was undertaken. Given the paucity of data, the absence of an agreed definition of sustainability for household eating and the conceptual nature of many of the scenario innovations, it was difficult to undertake an accurate quantitative, technical calculation of sustainability. Nonetheless it was felt important to consider the potential and relative impact of the three scenarios according to indicators that integrate social, economic and environmental considerations (Seyfang, 2008). The indicators were: localisation, the extent to which solutions strengthen local economies and emphasise self-sufficiency; community-building and collective action, the potential to promote collective ownership, social inclusion, community empowerment and collective decision-making around sustainable consumption; new systems of provision, the extent to which low impact living and local provision might be attained; reducing ecological footprints, the potential to decrease environmental and social impacts of consumption; macro-economic sustainability, considers the potential implications for employment structure, job creation, economic stability, and competitiveness; and individual well-being, the potential impact on well-being (mental or physical), comfort and safety. Every core element of the scenarios was considered in relation to each of the indicators and given a rating of between −2 and +2 according to their perceived impact (see Fig. 5). While recognising that the selection of a particular indicator set for assessing broad sustainability impacts will inevitably skew outcomes according to the indicators present, the process did provide some benchmarks for qualitatively comparing the scenarios.
3.4.3. Citizen–consumer workshops

The assessment process was followed by a suite of three citizen–consumer workshops held in Dublin, Galway and Belfast. The groups were not intended to be representative of the cities’ populations, but there was an attempt to configure the constituencies of the groups to reflect broad levels of engagement with environmental issues. These categories were delineated as mainstream, dynamic and green. Mainstream participants (the Belfast group – eight people) were identified as having no expressed connection with environmental or food issues either through employment, leisure activities or social group membership. This group was developed through contacts with community agencies in Belfast City. The green group (Dublin – seven people) included participants who had some personal or professional interest in and commitment to environmental protection. This group was convened via invitations to environmental organisations in Dublin. Dynamic participants (the Galway group – 10 people) were not directly involved in environmental issues, but did indicate that they would like to know more about environmental issues and sustainable consumption. Participants for this group were identified through advertisement within Galway university. During the citizen–consumer workshops (each of 2 h duration), the scenarios were used to stimulate discussion about current practices of eating and alternative possibilities. Participants were invited to evaluate the scenarios and comment on the potential for adoption of the embodied practices the scenarios encapsulated, as well as recommending modifications to the scenarios and their elements. These processes were primarily discursive with the discussions taped and later transcribed for analysis, and they also included a voting procedure where participants indicated the extent of their support for both entire scenarios and elements within scenarios. The citizen–consumer phase of the POP backcasting approach is particularly significant given that these participants would be the ultimate adopters or ‘practitioners’ in any future eating scenarios and the results are drawn out for further analysis in Section 3.

3.4.4. Transition workshop and framework production

The aim of the final two phases of the process was to take the most promising concepts from the future scenarios (identified through the visioning and citizen–consumer workshops, and sustainability assessment) and co-design short-, medium- and long-term interventions (across policy, business and research, education and community categories) that would collectively work towards their achievement. While the earlier phases were specifically organised to free-up creative thinking by exploring a wide range of future possibilities, the transition phases involve processes of refocusing and
4. Technical fixes for sustainable household eating: a landscape of ambivalence

4.1. CONSENSUS visions of technological supports for sustainable eating futures

There is no doubt that technological innovation continues to hold great potential for further efficiency gains and for supporting behavioural transitions. The multistakeholder visioning workshops are a testament to this and the perceived role for technology, and ICT in particular, is clear across the scenarios that those workshops generated (see Figs. 2–4). These include novel elements such as the intelligent fridge that records and displays the food it contains, as well as providing guidance on how the food can be combined into healthy meals with minimum food wastage. Similarly, already existing technologies such as smart phones are envisaged as playing an enhanced role in sustainable eating futures as food scanners providing full and verifiable food chain analysis of products and linking food growing and sharing communities. Smart kitchens incorporate closed loop systems for energy recovery, water recycling and the production of biofuels, while an integrated ICT tool in the living wall optimises small-scale crop production and rotation using fertiliser derived from food wastes. Refined technologies are imagined that permit food safety testing to be conducted in the home alongside safe and sustainable GM food technologies that can be grown locally, even in intensive vertical urban farms, without the need for resource intensive supports. In addition, new governing mechanisms facilitated by technological advancements in data analytics allow for accurate calculation and monitoring of food carbon budgets and ultimately the development of personal carbon credits.
While visioning workshop stakeholders envisaged technologies, and specifically ICT, playing a central role in sustainable eating practices in 2050, discussions also indicated that sustainable eating entailed much more than functional bits of kit which assist in the storage, preparation, eating and disposal of food. Alongside, and interacting with, the technological interventions were ideas relating to more collaborative and joined-up systems of food production, retail and exchange as well as more intense and experiential lifelong learning about food and nutrition. Indeed, while technological advances were perceived to be present and potentially supportive of any transition towards more sustainable eating practices, there was also a sense of their inevitability rather than a necessary desirability in their extended role in shaping the way society might eat in the future. While many of the elements suggested as core components for sustainable eating practices were contested, there was a clear degree of ambivalence towards the technological elements in particular and the highly technological elements proposed during the visioning stages were the most unfavourably received within all citizen–consumer workshops. As a result, it is on these issues that the remainder of this section will focus, with more extensive discussions of the overall research detailed in other publications (TFDP).

4.2. Citizen–consumer perspectives on technology and ICT in sustainable eating futures

Overall, the Smart Eating scenario in toto was the least popular scenario amongst the participants in the public workshops when they were asked to vote on their preferred vision of the future, although it also generated the most discussion about its component parts. Only one participant felt that they would like to inhabit the highly technological kitchen of the future, while a third of participants in the public workshops favoured the more collective vision captured in the Community Eating scenario. More than a half of participants preferred the Educated Eating scenario with its increased regulation, mix of technology and enhanced food awareness dimensions. Across all citizen–consumers groups there was a widely articulated ambivalence towards the technological devices and procedures encapsulated in the Smart Eating scenario and also with respect to the technologically driven components of the other scenarios. For example, some participants felt that the ICT components of the Smart Eating scenario could work well in terms of automating behaviours in the home that are currently
problematic, such as over-purchasing and subsequent food wastage. Others, however, were troubled by a feeling that the technological interventions might lead to de-skilling. As Carol (green group) said, she ‘...didn’t like techno orientation...if there’s a flaw in the technology we wouldn’t know what to do...’ [the] emphasis on the technology aspect, makes us lazy or headless’. In contrast, in other groups there was concern that the technological fixes and the ICT components in particular, such as the smart phone providing detail on food traceability, still require an interest in such information and do not necessarily close down (or choice-edit) unsustainable consumption patterns. In this vein, John (a member of the dynamic group) argued that the Smart Eating scenario ‘...doesn’t ask fundamental questions about lifestyles. Really it’s just continuing on the way we are, not asking anything more profound than that. Maybe it’s more realistic though’. What these illustrative quotes highlight is the rather obvious point that it is not technology alone that will lead to a change in practices, but how that technology is appropriated, utilised and governed.

In terms of voting on individual aspects of the scenarios, it was the widespread adoption of GM technologies in order to grow most foodstuffs locally without heavy resource inputs, which was the most unpopular element across the scenarios. Yet, even here there were differences of opinion about the technology, and in particular how it might evolve from its current position up to 2050 to overcome some of the present-day concerns. Within the green group Karen and Peter’s positions illustrate this divergence, with Karen being adamant that ‘(I have an) issue with GM, personally [I’m] not in favour of them, I have issues with them. [They are a] particular element I dislike’, while Peter was more open to considering the technologies contribution to future eating practices suggesting that ‘there are definitely disadvantages of GM technologies and these would have to be ironed out in the future, going forward’. Such considerations of how trust is engendered and how governing practices need to respond to conditions of evolving and uncertain scientific knowledge in new and emerging food technologies is not a finding unique to this research (Blue, 2010; Eiser et al., 2002; Borch, 2007). However, the persistence of aversion amongst citizen–consumers, despite the suggestion that such technologies in 2050 would be subjected to enhance regulatory control by agencies, ensuring food and environmental safety, indicates enduring levels of mistrust of food production and authorities tasked with ensuring its safety. Ultimately, the participants were not willing to suspend their current concerns with the technology. Equally, while trust was an issue for many of the citizen–consumers, there were other concerns that also affected their positions. Ethical concerns about interfering with ‘natural’ processes were voiced as well as uncertainty with regards to the ultimate use of genetic technologies and the possibilities of creating new problems for society were also prevalent (Blue, 2010; Eiser et al., 2002). In this sense the unchartered territories of future GM food technology were seen simultaneously as both an opportunity and a threat to sustainable consumption eating practices with ultimate outcomes being shaped by those who have the most to gain commercially from the application of technologies rather than those with a commitment to more sustainable outcomes (Table 1).

Ironically, given the rejection of enhanced GM technologies to ensure a wider range of food could be grown locally and with low resource inputs, the second most unpopular element across the scenarios was the notion that diets would be restricted to low carbon intensity, locally grown produce. Although some concerns were raised about the loss of livelihoods to producers of such products in developing countries, the arguments against this move centred around the perceived loss of choice such an enforced move would generate, particularly in terms of non-essential food products such as coffee or chocolate. The tension between the desire for a varied diet and an ambivalent response to technologies and their governance (which might deliver such diversity in a potentially more sustainable fashion) highlights an important issue when designing and implementing more sustainable urban food futures. Fundamentally, it indicates the limitations of assuming a purely technical fix will resolve the complicated practices of unsustainable eating and elevates the importance of public perceptions and governing frailties.

Modern information technologies, such as the smart phone and intelligent fridge as conceptualised in the scenarios, for example, could generate extensive information sharing capabilities bringing producers, manufacturers, retailers and consumers together in novel ways. This was specifically discussed across the mainstream and green groups where participants sought to emphasise the new social networking possibilities that such smart technology could provide, building communities beyond the household. However, and as perceived by the participants of the citizen–consumer workshops, the use of information communication technologies (ICT) and the information they generate are unlikely to remain neutral tools nor necessarily lead to the kinds of transformation in social norms and responsibility required for more sustainable eating. As Colm (mainstream group) suggested, ‘I also don’t really agree with the intelligent fridge and the intelligent food phones. I

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think if people took more individual responsibility or would be more aware of their diet and food consumption really we wouldn’t need such technology or investment in technology’. Certainly, while one challenge of emerging ICT is to ensure that any information provided is precise, simple, and usable (Borch, 2007), there are other challenges related to the ethics of generating and utilisation personal information that ubiquitous computing approaches envisage (Loorbach and Rotmans, 2010).

A recurring theme in citizen–consumer discussions was a concern about the collection of data in the highly technological scenario and elements, specifically regarding individual liberty and security in relation to who would collect, access and act on such detailed and widespread data on personal eating practices. Brenda, from the green group, suggests this is not a new concern, ‘they [already] have data on your usage. You’d be shocked at how willing people are to give out information’. However, the future scenarios envisage a considerable extension of ubiquitous computing technology and mobile sensors relaying information to public and private actors, which led others in the green group to agree that ‘people are going to be increasingly concerned about what are you going to do about that information’ (Tara). This is not to imply there were entirely consensual perspectives either within or across the discussions, as the following dialogue between participants in the mainstream group indicates:

Catherine: I don’t like the intelligent phone idea at all, but I love the intelligent fridge idea. I love it that it would give you menu suggestions because that’s something that I am always trying to do. Like when I have something in my fridge I type the ingredients into google and hope that I can get a recipe—that’s brilliant. I just think that’s such a good idea. I mean I don’t know the cost implications might be really high, but I think it is such a good idea

Anne: No I wouldn’t be into that intelligent fridge whatsoever. No I just think that whatever is in your fridge, get a recipe book, get a cook book, I mean.

Catherine: …but I do, I have lots of cookbooks, and I cook, and I bake, but sometimes with a few things you’re like…I just have no imagination right now I can’t think of…and then they end up in the bin, which is really annoying.

Despite the predominance of negative reactions to the technological aspects of the scenarios, citizen–consumers felt that the embryonic technological components were already visible in current activities, through smart phone apps for example, and as such their realisation in 2050 was quite feasible and perhaps inevitable. As Elaine (green group) commented, some of the scenario suggestions were seen to be predictable, ‘[t]he tech aspect is very realistic, everyone has smart phone and it’s only going to continue that way; very realistic of 2050’. Yet the negative connotations of extending such assistive technologies were also proposed, with Tom (mainstream group) arguing that fundamental biological processes, such as eating, were become increasingly divorced from sentient practices, ‘[i]t’s too isolating and mechanical…retreating into decisions made by your fridge…’. Others wanted to modify or clarify how the intelligent systems might work more positively. As Elaine (green group) argued technology does not necessarily have to lead to increased individualisation or dependency on technology, ‘the intelligent fridge is a good idea … if there was a community sharing system’.

5. Conclusion

The key difference between discussions in the stakeholder visioning and citizen–consumer workshops was that technology innovations were primarily discussed positively by stakeholders in terms of their potential as information and convenience devices, to connect people (e.g. online communities and retailers) and to enhance efficiency (e.g. closed loop kitchens). The Smart Eating scenario embodies these positive visions most coherently, but other scenarios also see a food future enhanced by technology with on-line food sharing communities and heighten’s technologies for calculating food carbon budgets and personal food credits. Citizen–consumers meanwhile expressed reservations about the desirability of such processes and how they might shape social interactions and lifestyles in 2050, particularly where such processes devolved elements of control over data and decision making to others. In this sense the citizen–consumers remained much more attuned to the practices of their current behaviour. However, while struggling to liberate themselves from the present-day and imagining how things might be different in 2050, they did provide a critical brake to the optimistic presumption that technology alone will provide the required shift in eating practices. Certainly, given the current preoccupation with ‘predict and provide’ models of agricultural production and the lack of attention to eating practices (beyond emergent taxation of sugary or fatty foods), it is not unreasonable or irrational for citizen–consumers to imagine that future pathways for food production and consumption might perpetuate current trajectories. Citizen–consumers are yet to be convinced of key stakeholder commitment to sustainable eating practices more broadly, commitment that would need to be evidenced by coherent strategies that would include mutually reinforcing policy, educational and community, research and business developments. Specifically, this research experiment has shown that including diverse communities in thinking about more sustainable eating innovations – that is doing things differently with an explicit goal of reducing current unsustainable in eating practices – reveals nuances within and tensions between desired visions. That conflict rather than consensus is exposed in backcasting does not invalidate the process, far from it. Ignoring such diversity of opinion simply obscures its existence. Certainly it highlights that further work is required with respect to human–technology interfaces for sustainable eating.

At the heart of the research lacunae is the need to establish how increasingly ubiquitous technologies, such as smart phones, can be developed and governed to empower communities to adopt more sustainable eating practices. How, for
example, would such already existing technologies for smart eating (such as the smart phones), and those yet to be mainstreamed (such as the intelligent fridge), fit with wider systems of business models, social norms and research and development; essentially how will such innovations occur and be taken up within the wider context in which eating practices take place? Who will be the key shiftshapers to spark a systematic reorientation in eating consumption practices and what will it take to translate niche practices into broader changes in the landscape of eating? Such questions are posed not to dampen enthusiasm or creativity within design or activist communities seeking to exploit the obvious potential of technologies and in particular ICT. Rather they should be embraced to ensure that technological developments purporting to be sustainable are actually fit for purpose and can support people to practice eating sustainably. After all, it is people ultimately who create, adopt, adapt and govern technology as well as grow, process and consume food.

Methodologically, the process of POP backcasting described in this paper is not envisaged as a silver bullet for generating more sustainable food futures. In common with other participatory techniques, the collaboratively designed scenarios may well be innovative, but without institutional and political buy-in supporting their further refinement and implementation they will remain exercises of the imagination only. Nonetheless, research has indicated that collaborative co-creation of ideas regarding sustainable eating practices can lead to heightened learning and interaction between stakeholders who would rarely engage otherwise (Davies et al., 2012). Considering innovations in the round is a key feature of backcasting and permits the exchange of knowledge in settings which are explicitly non-confrontational. This facilitates ownership and interaction helping to avoid silo thinking which can be present in highly departmentalised approaches to policy arenas. In the food-related experiment this meant bringing together food producers, retailers, consumer advocates, environmental non-governmental organisations and researchers, as well as policy makers from the food and agricultural policy sectors. It is these actors who are in a key position (albeit with variable levels of access to and influence on national policy) to shape policy and the way in which future food governance is formulated and implemented.

Ultimately, and more broadly, the CONSENSUS research has found that POP backcasting does provide alternative spaces for innovative sustainable food practices to be co-designed by focusing on collaborative action and awareness raising across related sectors and publics about alternative ways of doing things. However, and in contrast to other policy areas (Loorbach and Rotmans, 2010), such collaborative attempts to manage sustainability transitions have yet to be substantively trialled, never mind institutionalised, in food governance sectors. Nonetheless, it is quite clear that simply ‘producing more with less’ (World Economic Forum, 2010) is an insufficient governing mantra. Systems of organisation and consumption will also need to be confronted. Equally, technological development and deployment does not operate in a socio-economic vacuum and citizen–consumers are far from passive agents in the adoption and adaption of technology in the food arena as elsewhere. As Andrew Feenberg pointed out more than 20 years ago, ‘technology is an ambivalent dimension of the social process and like education, law, the military . . . it is involved in social struggles which determine what it is and what it will become . . . [it will be] necessary to develop a democratic technical politics’ (Feenberg, 1990). Technological advances related to either food production or consumption, developed in isolation from the everyday, lived realities of users (stakeholders or citizen–consumers), are likely to fuel already existing ambivalence, even resistance. This could negatively affect possibilities for significant structural transitions that could occur through careful development and implementation of sustainable ICT.

Following the work of Shelley-Egan (2010), it would be dangerous to slip into a ‘division of moral labour’ in which industrial actors and scientists can focus on the progress of science and technology in food production, while other actors, such as NGOs and citizens groups, are expected to take care of broader considerations including the ethical and social issues of food production and consumption. While there is a need for more research and development in science and technology of food production, it is clear that values play a significant role in shaping views of and interactions with food systems (Garnett and Godfray, 2012). More nuanced approaches to understanding and engaging with the practices of eating, including the technologies supporting eating practices, that are sensitive to people, power and politics, will be required to gain both a better understanding of what the challenges of attaining sustainable eating are and also what successful solutions might be.

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The Transition Framework documents produced by CONSENSUS comprise a description of the practice oriented participatory backcasting process, a description of the most promising practices derived from the previous backcasting phases and the identification of policy, education and engagement, and research, technology and business interventions that could be developed. All Transition Frameworks, along with details of all outputs relating to the project, are available from: http://www.conensus.ie/publications.html. The interventions identified within the Frameworks are those that were seen by the research team and participants in the workshops (stakeholder and citizen-consumer) to be most promising for achieving more sustainable eating in 2050.

