
Designing Sustainable Food Systems

#foodCHI

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Abstract

There is significant interest in designing technologies for the food system, from agricultural modeling tools to apps enabling humans to assess nutritional value of various food choices to drones for pest detection. However, a good food system must be a sustainable one. There is an urgent need for deliberation and thoughtfulness in designing for both technologies that support existing food systems and new modalities that work towards more sustainable food systems. This workshop will bring together HCI researchers, designers, and practitioners with an interest in exploring what constitutes a sustainable food system, as well as defining the role of HCI in this domain. Our key objectives for this workshop will be to identify what opportunities for design and collaboration exist and to lay the foundation for an active foodCHI community.

Author Keywords

Sustainable HCI; Food; Agriculture; Design

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

Workshop Motivation

Global food systems are complicated and varied as they encompass all processes and infrastructures involved in: growing crops; raising animals; harvesting, processing, cooking, and packaging foods; food distribution; the act of consumption itself; and the disposal and reuse of associated wastes [14]. There is

an intricate chain of actors, transformations, and interactions, from earth to mouth and back to the earth again. There is an increasing demand for sustainable food that has put pressure at all points in the food system. *How can we, as HCI researchers, designers and practitioners, relieve some of this pressure?*

From spear to drone, humans have had a long history designing technologies to address complexities inherent in the food system, and to improve our ability to produce and consume effectively and efficiently. Like any system humans depend on for survival, the food system should inherently be sustainable. However, given the inevitable changes in climate, food security and socioeconomic issues, and a tenuous geopolitical context, it is imperative that we are deliberate in our design of food system components and supportive technologies so that they contribute to the sustainability of the food system as a whole. There is an increasing interest in “disrupting” food through technology ranging from food delivery mobile applications, to component-based cooking, to sustainability ratings driven by big data. Such technologies are envisioned to improve aspects of the food system for some people, but are these technologies creating sustainable food systems for everyone? If not, what should we be creating?

A good food system is sustainable. This means that it is: environmentally friendly, beneficial to the individual, socially responsible, economically viable, and technically feasible. A sustainable food system is adaptive, should support human needs, and it should be culturally and contextually appropriate. This workshop is a venue for HCI researchers, designers and practitioners to engage with the various challenges

faced in designing sustainable food systems. A systems approach requires holistic analyses that take into account interconnected impacts and interdependencies.

There is an increase in the data both available to and required of human actors, whether farmer, chef, inspector, or parent, at all points in the food system. How can we address the information challenges these actors face? Some exemplary information challenges include:

1. When deciding to purchase an organic tomato at a local farmer's market, how does the consumer know if the fruit has been grown sustainably? For each individual, what are the different factors that constitute the *right* choice?
2. When a farmer conducts a long-term experiment with dry farming, how can they track the effects on their system and the environment over decades? How can they manage the necessary information appropriately?
3. When creating online-delivery services to address accessibility in food deserts, how can designers ensure that people who need access to food are getting it and that they are actually bringing the cost of food down? How do food sovereignty and food security issues affect such designs?
4. How are technologies implicated in the activities of people who choose to go off the “food-grid”? For example, how can we scaffold the activities of those growing their own food in non-farm contexts or adopt foraging as part of their lifestyles?

Workshop Goals

As HCI researchers, designers, and practitioners, it is our responsibility to critically engage with the role that

technology may play in designing a sustainable food system. In recent years, there have efforts to frame HCI research at the food system level [3,5,11]. Examples of HCI research in the food system include: supply chain transparency tools for small [4], designing urban food gardens [15], building communication tools for fish farmers in India [10], studying coordination on family farms [12], studying the use of location-based information systems for non-profit food assistance organizations [6], designing better cooking technologies [2], and persuading people to stop putting food waste in landfills [20].

In this workshop, we intend to build on this momentum, bringing together HCI researchers, designers, and practitioners (henceforth referred to as the FoodCHI community) to discuss the interplay between various components of the food system, and how the role of design and maintenance of ICTs in working towards more sustainable food systems. There are three goals for this workshop:

1. *Exploring* the roles and implications of information technologies on and in a sustainable food system.
2. *Designing* techniques and adapting design paradigms to specific components of a sustainable food system.

3. *Reflecting* on the landscape of design work and core opportunities for design within a sustainable food system.

Topic Matrix

Table 1, below, is a topic matrix that has been seeded with previously published HCI research with respect to environmental, personal, social, economic, and technical challenges in the food system. Some papers cover multiple sustainability dimensions or components of the food system. This matrix is not meant to be complete, but is instead demonstrative of the topics we're interested in addressing.

The topic matrix is derived from established frameworks for the food system and sustainability. The Food System components in Table 1 have been adapted from the breakdown presented in "A Framework for Assessing the Effects of the Food System" [14]. Goodland [8] originally proposed three dimensions of sustainability: *Environmental*, *Social* and *Economic*. However, when considering the role of technology in sustainability issues, it is useful to add dimensions to address *Human* sustainability, whereby the focus is on individuals, and *Technical* sustainability, with a focus on the sustainability of the technical system itself [16].

Food System	Sustainability Dimensions				
	Environmental	Human	Social	Economic	Technical
Agriculture	[15]	[12]			
Food Processing		[18]			[18]
Distribution and Logistics				[13]	
Consumption		[19]	[6]		[9]
Waste Management		[20]			

Table 1: Topic Matrix

Participation Criteria

Papers and Pictorials: We will solicit Extended Abstracts (2 pages, not including references) from invited authors and the general HCI community that must address one or more sustainability challenges in one or more components of the food system. Papers must present a problem or question about some portion of the sustainable food system that is represented in the topics table. Pictorials will also be submitted in the CHI Extended Abstract format (5 pages not including references). The organizing committee will review all submissions.

Talks: We will invite 10 authors, a subset of the accepted papers and pictorials, representing a diverse range of topics, to give 7-15 minute talks about their papers.

Posters: These can be submitted as discussion pieces during the breaks and to be displayed at the informal dinner social.

Discussant: We welcome discussants to attend without contributing a paper, if there are available spots. Activities include: session moderation, reviewing submissions, and other selected program activities.

Workshop Structure

This one-day workshop is split into three thematic halves. The theme of the first part of the day, will involve *exploring design in a sustainable food system*. A food scholar will give the morning keynote: that is, someone who has deep domain knowledge of the intricacies of the global food system and who is willing to set the tone for the day.

This will be followed by alternating talks and discussion sessions on topics that lie at interesting intersections of the *topic matrix* in Table 1. Participants will be placed in groups before the workshop begins to facilitate the discussion sessions after each talk. During the talks, each group will be provided with discussion prompts to allow us to conduct a jigsaw activity [17] at the end of the morning whereby we collaboratively fill out the topic matrix to map out the landscape of design work.

In the afternoon we switch into a more practical gear, with a thematic focus on how we can engage in *HCI for a sustainable food system*. The afternoon keynote will be an invited HCI scholar specializing in design techniques that are pertinent to a diverse range of components within the food system. This will be followed by two group-based design sessions that allow for creation and ideation among attendees. One of the outcomes of this session will be to produce informal posters or demos for the final part of the workshop.

The day will be capped off by an informal “poster” session, conducted off-site, in which we *reflect on the role of HCI in a sustainable food system*. We will identify a suitable venue for a dinner social to allow for more fluid discussions. Posters and pictorials submitted by workshop participants, and artifacts created during the afternoon session, will be displayed for discussion.

The three session themes (see Table 2) are geared to reflect toward the workshop goals described earlier. Some organizational points of interest throughout the workshop are:

- A participant will be invited to moderate each session. Our goal is to encourage participation and

for all community members to take ownership of the workshop.

- Each paper, poster, and talk will be converted into an “index card” style poster. The topic matrix will be printed as a large format poster. During activities, we will place and replace these index cards on the poster to facilitate discussion.
- During the evening session, the topic matrix poster and index cards will be placed in the room. Participants will be encouraged to move and annotate the poste. A camera will capture a time lapse of how the matrix changes.

Time	Activity	Resources
9:00	Welcome	Moveable Seating
Morning Theme:		
Exploring design in a sustainable food system		
9:15	Keynote One	Moderator 1
10:00	Papers Session 1	Moderator 2
11:00	Break	Coffee/Tea service
11:10	Papers Session 2	Moderator 3
12:15	Lunch	Sustainably produced lunch
Afternoon Theme:		
HCI for a sustainable food system		
1:15	Keynote Two	Moderator 5
2:00	Design Session	Moderator 6 & 7
2:50	Break	Coffee/Tea service
3:00	Design Session	Moderator 6 & 7
5:00	Break	Transition to location
Evening Theme:		
Reflecting on a more sustainable food system		
6:00	Poster Session	Space for poster gallery

Table 2: Workshop Schedule

Design Session

A jigsaw activity is a cooperative learning technique whereby people are divided into groups of five to six. Each group has a specific goal, where the outcomes of all the groups are components to understanding some bigger picture. In this workshop, we adapt the jigsaw activity for a group design setting.

Prior to the workshop, but after registration, we will send out a one-question online survey will ask that participants prioritize your topic interests by marking their top five areas of interest on the topic matrix. This information will be made available to participants to facilitate group formation based.

The semi-structured design session will ask that each group focus on a particular cell, or set of cells within the topic matrix. Participants may use whatever design techniques they see fit, set up their own session outcomes, and subsequently work toward realizing their concepts, prototypes, papers, and/or sketches. Some motivating questions for the design session are:

- What is the role of technology in food and what are opportunities for design?
- What are the sustainability challenges with respect to a particular component of the food system (or as a whole)?
- What do effective HCI and design interventions look like with respect to sustainability challenges in the current food system?
- How can we better evaluate the role of HCI and design in creating a more sustainable food system?
- How, through HCI and design, can we address one or more sustainability challenges?

Pre-Workshop Plans

Call For Participation: We will solicit position papers, posters, talks, and participation as discussants and/or moderators via CHI, sustainability, and food systems related mailing lists, departmental lists, social media, and the workshop website: <http://www.foodchi.org>.

Invitations: We will invite a food system expert for the morning keynote, and a HCI expert for the afternoon keynote.

Pre-workshop survey: Sent post-registration.

Post-Workshop Plans

During the workshop, we will collaboratively select and plan to achieve at least one of these four outcomes:

1. Publish an interactive online poster based on the topic matrix. Invite public to submit matrix entries.
2. Publish a systematic mapping study of HCI and Food literature.
3. Form groups to pursue specific ideas or publish a design ideations paper based on design sessions.
4. Pursue a TOCHI paper on *Designing Sustainable Food Systems*.

Organizers

Ankita Raturi is a PhD student in Software Engineering at the University of California, Irvine. Her research is in environmental sustainability and software design, looking at modeling challenges faced by small-scale sustainable farmers during environmental assessment.

Juliet Norton is also a PhD student in Information and Computer Sciences at the University of California, Irvine. She is actively researching and developing

information systems for newcomers to non-professional agroecology design.

Bill Tomlinson is a professor in the Informatics Department at the University of California, Irvine. His research explores the juncture of sustainability and computing, with a particular focus on local food production.

Eli Blevins is professor of Informatics in the Human-Computer Interaction Design (HCI/d) program of the School of Informatics and Computing at Indiana University, Bloomington, and a visiting professor at the Hong Kong Polytechnic School of Design. His primary area of research, and the one for which he is best known, is sustainable interaction design.

Lynn Dombrowski is an assistant professor in the Human-Centered Computing Department at Indiana University – Purdue University – Indianapolis. Her research focuses on exploring the limitations and strengths of design in addressing contemporary social issues.

Call for Participation

The FoodCHI workshop will bring together HCI researchers, designers, and practitioners to discuss the interplay between the various components of the food system, how we can create sustainable food systems, and how we may design technologies for a sustainable food system. There are three goals for this workshop:

- Exploring the roles and implications of information technologies on and in a sustainable food system.

- Designing techniques and adapting design paradigms to specific components of a sustainable food system.
- Reflecting on the landscape of design work and core opportunities for design within a sustainable food system.

We invite papers, pictorials, and posters that present research on sustainability challenges in the food system. Selected authors of papers and pictorials will be invited to present a 7-15 minute talk on their work. There are three criteria for submission:

- Explore the food system: gardening and agriculture; cooking and food processing; food access, distribution, and logistics; eating and consumption; and waste management.
- Consider any associated sustainability challenges: environmental issues; human health; social repercussions; economic effects; or technical feasibility.
- Have a core contribution to the HCI community.

We also invite attendees to participate as discussants, who will moderate sessions, respond to particular papers, and make connections across shared topics. For details about the submission process and signing up to be a discussant, please see <http://www.foodchi.org/>.

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