Smart Excess

TEAM MONTLAKE

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SETTING THE CHALLENGE

How might we create a redistribution network to link food excess with food shortage within Smart City communities?

1 Our research began by considering inequality in the city of Seattle. Our core idea was that the living standards of the most marginalized populations in a city are an important factor of ‘smartness’. In other words, a truly smart city cannot be unequal, but income inequality is certainly on the rise in major technology centers.[1]

2 With recent estimates of up to 12,000 homeless[2], Seattle (King County) ranks third in the country by homeless population[1]. Research into homelessness, a visible and complex issue, led us to consider the core needs of humans, including Maslow's hierarchy of needs.[3]

3 We investigated other physiological needs around shelter and safety, the concept of belonging (community, networks), and food security leading us to general research into food waste. We found an unbalance between food excess (security), and food that is needed (food insecurity).This is backed up by the World Bank, reflected in the UN Sustainable Development goal 12.3[4]

4 At the same time, the goals of, and technologies that make up Smart Cities were investigated. What makes a city smart? What does a smart city actually look like? Who or what is actually smart? Research into current initiatives in cities like Barcelona demonstrate a vision of Smart Cities with ‘Smart Citizens’ who are empowered to contribute to their Smart City.[5]

5 Putting together the technologies available within smart cities, empowering smart citizens, behavioural models and novel case studies around food waste and distribution led us to consider ‘smart excess’. This is a concept of Smart Communities in which excess food is distributed to those in need, whether marginalised or simply willing to consume food that would otherwise be wasted

WHAT IS A SMART CITY?

A smart city is one that '...pursues sustainability, livability and social equity through technological and design innovations'. Within Smart Cities, digital nervous systems, intelligent responsiveness and optimization can occur at every level' - MIT Smart Cities Group

GOALS

1 To be highly inter-connected, data driven, thus optimized for efficiency across all interactions, including space, fuel, energy, transport/mobility, food, water, waste, entertainment, health, education, infrastructure.[6]

To have citizens, government, businesses and their environments operating in symbiosis;

To share the benefits of improved technology, providing an improved quality of life for all.

TECH

2 Traditional conceptions of Smart Cities applied to food distribution include Big data (food consumption, waste, need and distribution data), the Internet of Things (IoT), Cloud Computing, hyperconnectivity (Smartphones, Wifi, Bluetooth mesh networks[7]), machine learning, robots, drones, autonomous green vehicles, 3D/4D printing, renewable energy and video capture and processing.[8]

Open source APIs should also work together as part of the overall distribution chain to allow community involvement.

OUR VISION

3 Smart Cities only exist with Smart Citizens, so a 'bottom up' approach is needed to empower citizens as makers, data producers and ultimately contributors.[5]

Giving up too much control to the environment itself and abandoning individual decision making in favour of collective computational governance results in loss of awareness of environmental and social processes.[9]

Inequality has no place in a smart city, and solutions must be designed to ensure resources are shared with marginalized populations.

Safety and privacy must reach a balance, whereby data can be collected and used transparently, without invasive mass surveillance.

BEHAVIOR

Our research and solutions must account for behaviors, with regard to technology and food

SHARING

1 Current trend of sharing economy is creating a culture of sharing, and building up trust amongst citizens.[10]

Public sharing has been used as a means of raising awareness about various issues including sustainability and overconsumption.[11]

FOOD DIGNITY

2 Marginalized populations are interested in eating well and prefer food dignity.[12]

Nutrition and choice are important components of food dignity.[13]

EXCESS FOOD

3 ”Determinants of consumer food waste behavior: Two routes to food waste”. Results of the study strongly support the approach of targeting household routines (e.g. planning, shopping or reuse of leftovers) to reduce waste. Based on the findings, efforts to change leftovers reuse routines may contribute to the largest effects on food waste. More traditional models of decision making were also discussed (Theory of Planned Behavior).[14]

Individuals and restaurants in the US are not willing to donate or share food (especially fresh food) because of liability issues. Existing Good Samaritan laws only limit legal liability for donation of food to a recipient charitable organization. That means all the donated food has to go to a third party first.[15]

Currently, restaurants usually donate raw ingredients that are safe for consumption, with cooked food and leftover food on a customer’s plate usually thrown away.[16]

PARTICIPATION

4 To allow for participation, liabilities for sharing food should be waived by legislation.[15]

Sustained engagement with an activity is more likely when intrinsic motivation exists, (such as gamification). Offering an extrinsic reward can powerfully drive a one-time behavior change.[17]

FOOD EXCESS

FOOD WASTE

1 40% of food in the United States goes uneaten. If all the wasted food in the world was grown on one farm, it would be larger than Canada.[18]

Food waste is a “farm-to-fork” dilemma, whereby produce is unnecessarily lost throughout all phases - in fields, warehouses, packaging, distribution, supermarkets, restaurants and fridges.[19]

Food waste is a result of a ‘culture of perfection’.[19]

FOOD IN A SMART CITY

2 55% of Americans throw away food when it doesn’t smell, look, or taste right. As a result, the EPA has created a food-waste toolkit.[20]

A lot of waste happens in our own homes, impacting our environment and community.[18]

Every year, the USDA conducts surveys of households struggling to put enough food on the table. In 2016, 12.3 percent of U.S households were food insecure.[21]

PROBLEM WITH CURRENT METHOD

3 Traditional food charity organizations, such as food banks, have a number of issues. Most foods from banks are preserved or near expiration and rarely provide healthy diets. A survey in Canada finds that 62% of the food provided in food banks are non-perishable/ preserved.[22]

Food charities are expensive to run and make great demands on volunteers and environmental resources. As such, a growing body of research suggests that they simply do not work.[22]

CASE STUDIES

FARMBOT

1 FarmBot is humanity's first open-source CNC farming machine, with game-like software and a farming data repository, that aims to "create an open and accessible technology aiding everyone to grow food and to grow for everyone." It lies at the intersection of automation, open source DIY maker movement and small scale poly crop farming and responds to our broken food production system. Farmbot is optimized for automated care and includes a universal tool mount with options for a weed suppressor, a watering tool, a soil sensor and a seed injector. It's drag and drop game-like interface makes farming accessible and fun.[23]

DABAWALLAHS

2 Even with no technology and an uneducated workforce, this lunch distribution system in India has 99% accuracy. The collection and distribution system uses a simple color coding system, whereby a green code on top tells where to pick up and a red code directs where to deliver.[24]

Dabbawala translates to "one who carries boxes," and is considered one of the best logistics organization in India, whilst using minimal technology. Each day, the lunch boxes, 'dabbas', are collected, loaded onto bikes, and brought to a meeting place with other dabbawalas. The boxes are then sorted by destination and loaded onto trains where a new group of dabbawalas take over by loading the dabbas onto trolleys for the last mile of transport. After lunch, the journey continues in reverse.[25]

MIT FOOD CAMERA

3 Foodcam is a simple technology made up of a camera, a button, and some wires that alert people when there are leftovers in the building. The idea was originally born in the late 1990s when a new webcam launched. From there, it evolved into many different forms. It added on a button feature that could email a picture of food contents to a list of people, then a robotic bell and a soundboard, and eventually its own slack account. People continue to hack the system to put themselves ahead of their competitors, this includes being notified of food before others. Not only does it feed hungry students, but it creates a platform for informal social interactions to take place.[26]

SYNTHESIS

ASSUMPTIONS

1 The majority of citizens will have some level of access to the Smart City infrastructure, regardless of socio-economic background.

Homelessness and inequality are key characteristics of technologically advanced cities and will continue to rise.

A Smart City requires Smart Citizens who participate.

Food waste/excess and distribution will continue to be a major problem.

The sharing economy could explore sectors beyond transport, housing and employment if enough trust is established.

TAKE AWAYS

2 There is unbalance in the US and the world between food security and food insecurity.

Food is the center of a smart city and we need to better utilize technology to establish a balance between food that is wasted and food that is needed.

The current food system is flawed. Existing projects that explore solutions leave us room for improvements.

A better organized redistribution system could be helpful, and we prioritize the bottom-up, ‘Smart Citizen’ approach demonstrated in our case studies

Many people make poor decisions during food planning, shopping and reuse of leftover routines, leading to waste. Technology will not prevent poor decisions from being made, but can help relieve the repercussions.

NEXT STEPS

3 Learn more about the benefits of open source farming.

Observe large scale distribution at supermarkets.

Conduct research in sharing culture and incentives needed to sustain it.

Hone in on a specific community to understand behaviors around food - such as waste, sharing and values.

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