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Using communicative ecology theory to scope the emerging role of social media in the evolution of urban food systems

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Abstract

Urban agriculture plays an increasingly vital role in supplying food to urban populations. Changes in Information and Communications Technology (ICT) are already driving widespread change in diverse food-related industries such as retail, hospitality and marketing. It is reasonable to suspect that the fields of ubiquitous technology, urban informatics and social media equally have a lot to offer the evolution of core urban food systems. We use communicative ecology theory to describe emerging innovations in urban food systems according to their technical, discursive and social components. We conclude that social media in particular accentuate fundamental social interconnections normally effaced by conventional industrialised approaches to food production and consumption.

Keywords: food, cities, communicative ecology, urban informatics, social media

1. Introduction

Urban agriculture describes the production of food or fuel (e.g., livestock, fruit and vegetables, forestry) within, or on the fringe of, urban spaces [1, p. 1]. This practice can take many forms (e.g., horticulture and aquaculture) and each form may consist of a wide variety of implementations – for example, from low- or middle-income earners producing vegetables in their backyard or rooftop garden, to international organisations producing mushrooms in major cities such as Jakarta [1, pp. 2-4].

Urban agriculture plays an increasingly vital role in supplying food to urban populations. It contributes to food security in cities, which are currently home to half of the global population [2, p. 232], up from 15% last century [3]. The current rate of urbanisation in Australia is estimated at over 89% [4]. Alternative means of ensuring adequate food supply for these urban centres (if food is not produced locally) require the importation of large quantities of food; this food travels on average between 1500 and 2500 miles before consumption, creating pollution that contributes to climate change [5]. Additionally, local forms of agriculture provide a wide range of social, economic, educational, physical and mental health benefits to communities [6,7]; the potential role of local agriculture in alleviating poverty and improving food security and nutrition in developing countries and poor urban communities is of particular significance [see, for example, 8,1].

The production of food is of course only one part of a much more complex system. The urban food system can be conceptualised more broadly as involving the following components [9]:

1. *Production*: This includes industrial-scale farms, fisheries, community gardens and individual household gardens.
2. *Distribution*: These systems operate at international, national, regional and local levels.
3. *Acquisition*: This includes restaurants, farmers' markets, retail outlets, soup-kitchens and foraging practices.

4. *Consumption*: How, when, why (and with whom) we consume particular foods is dependent on a range of factors including education, culture, finances, advertising and geography.
5. *Waste*: This includes food scraps, packaging, non-sellable parts of plants, manure from livestock, exhaust from trucks during transport, and solid household waste.

The role of each of these components in the design of sustainable and resilient urban food systems is being increasingly recognised. However, the potential role of social media in supporting sustainability and resilience initiatives is only starting to be fully grasped.

Changes in Information and Communications Technology (ICT) are already driving widespread change in diverse food-related industries such as retail, hospitality and marketing. It is reasonable to suspect that the fields of ubiquitous technology, urban informatics and social media equally have a lot to offer the evolution of core urban food systems, for example, they can enable communication and sharing of information among food growers. Further, the use of social media in combination with existing public relations and communication strategies can greatly enhance the ability of non-profit organisations to compete in the market and achieve their organisational goals [10]. Other studies relating to agriculture and media found that while the benefits of social media are recognised, content producers often failed to investigate and ensure that they understood their customers' needs with regard to the medium [11]. Many urban agriculture and sustainable food projects have limited resources and a high dependency on volunteer labour; these factors diminish their ability to invest time and effort in public relations and social media in order to increase the likelihood of organisational goals being met.

Nevertheless, many of those involved in these activities clearly recognise the potential of social media to facilitate change. For example, the *Eat Well Guide* published the handbook *Cultivating the web: High tech tools for the sustainable food movement* over four years ago [12]. Social media as applied in food-related research – albeit with a focus on the community aspects of eating rather than growing – can be seen in an increasing number of applications. For example, *Foodmunity* found that social media that is centred on food is an effective topic and incentive for people to interact [13] and *Kalas* enabled exploration of food recipes using social navigation [14]. Similarly, our own program of research in this area has informed the design of

I8DAT (see Fig. 1), a photo-sharing application that allows users to publish pictures of their meals before and after the preparation process [15,16]. These examples focus on the eating and cooking of food, but the same techniques, if applied to the practice of growing food, for example, represent an area of great opportunity [17].

[INSERT FIGURE 1 HERE]

Fig. 1 *I8DAT* allows users to share their meals and interact with one another.

Researchers in the field of sustainable agriculture (e.g., 18,19,20,21) argue for a renewed understanding of agri*culture* as inherently socio-cultural: as a "linked, dynamic social-ecological system" [21, p. 54]. However, as Pearson, Pearson and Pearson [22] highlight, there is room for more research on the central role of social factors including community building and social connectivity in the development of more sustainable ways of producing food. Studies that explore a link between urban agriculture and technology do indicate opportunities for innovation to create greater community engagement [2,17]. Biggs, Ryan and Wiseman [23] suggest further that ICTs have a central role in the move from a dangerous over-dependence on centralised models of food, energy, water and transport systems to a more 'distributive' model of critical infrastructure provision: adaptive, localised, open and network based. Distributive systems, they argue, are more resilient to change and more sustainable ecologically, economically and socially. They note, in particular, the capacity of ICTs to connect people, in real time, with the impact of their consumption practices [23, p. 24].

In responding to these gaps and opportunities, we argue for the utility of media and communication studies to help us better understand and theorise the interaction and communication patterns in urban food system initiatives. For the purpose of our research we have developed and refined an ecological framework that we call 'Communicative Ecology' – appropriated and tailored to the needs and requirements of scholarship in applied media and communication studies. We apply this framework to a sampling of the emerging range of human-computer interaction (HCI) innovations that deploy social media in the work of forging new, more sustainable modes of urban food culture. The rest of this article is organised into the following sections: a discussion of the theory of communicative ecologies; an overview of the

role of ICTs in the evolution of social systems; our analysis of the emerging ecology of urban food systems; and our conclusions.

2. Communicative ecologies

Communicative Ecology Theory is an approach to understanding communication among and between people and groups, from a holistic perspective [24]. The holistic perspective of communicative ecologies provides a framework for researchers to understand the communication that occurs within the group and between groups, without focusing solely on an individual or on a single communication channel. As such, the use of the term 'ecology' is used to signify the imperative of understanding the broader field of communication of groups of people who are connected.

Although a recent innovation, communicative ecologies, when used as a conceptual framework, have been employed to study the communication of other phenomena in a number of settings, including urban environments [see 24,25], HCI [26] and ICT for Development (ICT4D) [27].

To effectively apply the conceptual lens of communicative ecologies, Foth and Hearn [24] suggest the division of research foci into three layers: the technology and media layer, the discursive layer and the people layer [24,25,28]:

> **The technology and media layer** describes the means used to communicate between the different people and groups and includes all communication devices, distribution systems (either digital or analogue) and the technical systems that enable them (either software or mechanical).
> **The discursive layer** is ideational and has a focus on the actual content of communication, in particular the stories, understandings, beliefs and symbols that define – in this case – urban food culture and food practices.
> **The people layer** describes the different people and groups who are involved, their social relationships and the social institutions and structures that connect them.

Hearn and Wright [29] apply the idea of communicative ecologies to the future of food production systems. They imply that mutually influential evolutionary processes are at work in each of the three layers of the communicative ecology, which can lead

to possible alternative futures for food. Hearn and Wright also suggest that consumers and debates about consumption will have an enormous influence on the future of food. Change at the consumer level, they argue, has the potential to "retrofit change back up the supply chain of food and bring about large-scale change in food production systems with ramifications throughout food cultures in general" [29].

In this paper, we report on our research into emergent elements in the communicative ecology of urban food systems, with a focus on those elements that work to connect urban 'end-users' or consumers to the rest of the system. These connections are especially crucial in imagining and developing alternatives to conventional industrialised forms of food production, marketing, distribution, acquisition, consumption and disposal that separate the source and the end product: farmers and city-dwellers, animals and meat, nature and culture, soil and plate.

What role does technology, and social and mobile forms of media more specifically, have to play in reconfiguring the different components of urban food systems and reconnecting different actors to form a more sustainable network for the future? Before outlining the results of our sampling of emerging trends in this area, we touch on research about the role of communication technologies in social systems more generally.

3. The role of ICTs in social systems through the lens of Communicative Ecology Theory

Communicative ecologies can be thought of as complex systems that evolve through time. The operation of complex systems in physical, biological, social and economic domains is now well accepted. The recent failures of economic science in forecasting economic trends and providing solutions to socio-economic problems (such as unemployment in consumer-oriented economies) have highlighted the shortcomings of the mechanistic, neoclassical paradigm in dealing with the inter-related complexities of turbulent real-world situations [30,31].

Similarly, the evolution of urban food systems can be understood in complex systems terms; as communicative ecologies, they contain interacting technical, social and discursive systems. Hearn and colleagues [e.g., 30,31] have articulated four distinguishable possibilities for social systems as they evolve through time. First, they can remain essentially the *same*. Second, they can *change* through adaptation (for

example, through growth and decline or modification of core processes). Third, they can *transform* themselves (for example, by radically innovating new processes). Finally, as Marion and Bacon [32] remind us, they may cease to exist altogether.

The technical layer of a communicative ecology affects the evolution of the social layer [33]. This is because ICTs not only change in their own right, thus affecting the technology layer of a communicative ecology, but they also mediate both the discursive and social layers of communicative ecologies. They can in fact act in contradictory ways, sometimes accelerating change and at other times inhibiting change.

From an information science perspective, at least two factors explain how ICTs accelerate change. ICT platforms that provide affordances to social networks are robust and efficient mechanisms for the production and flow of information. Networks facilitate and also accelerate information transfer by bypassing institutional structures via horizontal links, which cut across institutional boundaries to put people in direct contact with each other (for example, via Linkedin or via "hyper-hybrid" cloud-based information repositories). Networks also help to create ideas as well as spread them. As well, as each person in the network receives information, it is synthesised and new ideas may spring forth – information easily builds on information. Networks thus share new ideas and help to create them. Networks undergird learning processes. Acceleration effects can also be achieved by the addition of new forms of value to existing products, services and artefacts through the manipulation of information, for example, by attaching nutritional information to the barcodes of food or changing delivery logistics.

We suggest that these effects are evident in the operation of the communicative ecologies that support urban food systems evolving globally. It is to the emerging evidence of this evolution – across the domains of the technological, discursive and social – that we now turn. The examples we discuss below are a systematic but not exhaustive review of this rapidly changing field. The review was guided by a holistic understanding of the urban agricultural system across multiple dimensions: production; distribution; acquisition; consumption; and waste [9].[1]

[1] Because of the under-developed nature of knowledge about this emerging field, our selection of innovations is necessarily opportunistic. We used the community knowledge of those members of our research team involved in urban agricultural activities and secondary sources such as industry blogs to complement the nascent academic literature.

4. Urban food systems: the communicative ecology

4.1. The technical layer

With rapid advancement and growing affordability of digital technology, future horizons of food-related technology include digital fabrication in a form of food printing [34,35] and DIY food science [36,37].

Our focus here, however, is primarily on forms of communication technology that are currently being used in urban food systems. We focus in particular on the use of a range of social and mobile media forms – Facebook, Twitter, SMS, blogs and smartphone apps, for example – in the support of material systems of distribution and acquisition. In particular, we examine how social media helps growers and buyers of sustainable food products to find each other in the city and do business.

4.1.1. Distributing and acquiring food

How do local small-scale farms find and build markets for their products? How do consumers find sustainably produced or socially ethical products and make informed purchasing decisions? The time and financial burden of marketing, distributing and selling food is significant for small-scale producers. The inconvenience, lack of reliable information and cost are also issues for consumers. Strategies for addressing these distribution and acquisition issues – community shared agriculture (CSA), food co-ops and farmers' markets, for example – are integrating social media and HCI elements. . These elements enable direct peer to peer (P2P) communication between different actors in the food system, thus bypassing mainstream distribution, marketing and retail structures.

Farmers' markets, for example, are experimenting with different forms of social media. These strategies include [38]:

- making use of Facebook and other forms of social media to connect with consumers
- using QR codes to support mobile marketing strategies and direct traffic to producers' websites
- using smartphone apps that make information about the location and time of markets easier for consumers to find

- fully converting to online versions that support the buying, selling and direct delivery of produce.

Direct communication using SMS marketing is another emerging way that organisations are maintaining relationships with clients. Further examples of applications designed to address acquisition issues include the following:

- *Seasons*[2] is a smartphone application (or app) for consumers with geographically specific information on what fruits, vegetables, herbs, fungi and nuts are in season. It also provides information about a user's local farmers' markets based on their phone's GPS.
- *Locavore*[3] is another app (US and Canada specific) that helps users to access local, seasonal produce. It locates farms and farmers' markets near the user based on the phone's GPS and provides information about in-season and soon to be in-season products and recipe suggestions. The app also uses Facebook to help people to connect with each other on this topic. *Locavore* is powered by www.localdirt.com, a US-based website that helps individual buyers to order local food online, helps local farmers and other food producers to feature and sell products, and helps groups of local buyers and sellers (farmers markets, co-ops and buying clubs) to find each other to conduct business.
- *Foodhub.org* is a social networking tool designed to revitalise regional agriculture by connecting local farmers and potential buyers interested in local produce. Its scope is currently limited to the US states of Oregon, Washington, Alaska, Montana, Idaho and California. It functions as an online marketplace that facilitates direct communication between food producers and consumers. In addition to the online directory, producers can post their product profiles and buyers can post specific product requests. The site also provides marketing and distribution support to further boost local food systems. The site is run by the Portland Oregan based NGO, Ecotrust. Ecotrust uses Foodhub to enable a 'farm to school' program in a number of US states, directly connecting local producers with school cafeterias.

[2] www.seasonsapp.com
[3] www.getlocavore.com

- The *Eat Well Guide*[4] is a good example of 'collaborative technology' in this area. The site includes not only information about local farms and markets in the US and Canada, but also provides access to a network of stores, restaurants, bakers, CSA programs and butchers supplying local, sustainable produce. The database is user-generated and includes an interactive mapping tool, *Eat Well Everywhere*.
- *Aglocal*[5] (a web and app currently in its start-up phase from the US) is designed to help users to source sustainable, local sources of meat and meat products and local producers (and distributers) to find markets. Like many of the other sites summarised above, this will enable direct communication and business between buyers, distributers and producers, thus helping to sustain local environmentally responsible forms of meat production.

Another theme that emerged in our scan involves a focus on leveraging technology to give foods greater transparency regarding, for example, food safety, nutritional information or provenance. All of the examples given below involve the capacity of particular mobile phone apps to image and scan barcodes.

- *Goodguide* is an app published by www.goodguide.com that helps consumers to make informed choices about a whole range of products, including food, based on a database of health, environmental and social performance ratings. The user can scan barcodes to retrieve ratings in addition to a browse-able and customisable database. The app also enables users to create and share lists of favourite products with other users.
- *Fooducate*[6] provides impartial information about the nutritional value of packaged foods. The app gives a rating for the scanned food in terms of, for example, trans fatty acids and sugar content, then compares it with other similar products and helps consumers to select better alternatives and deepen their own knowledge about health and nutrition.
- A concept app reported by Pham [39] involves the use of scanning technology: users would be provided with information about how far a product has travelled,

[4] www.eatwellguide.com
[5] www.aglocal.com
[6] www.fooducate.com

producer information, its origins, whether the product is in season, consumer ratings, pricing history and so on. This information would be made available by producers in more detail than labels currently allow. The concept is designed to facilitate local networks of food production through the provision of producer information directly to consumers at the moment that they are making purchasing decisions. The barcode technology would be applied to locally produced foods rather than focusing on pre-existing barcoding on mass produced products. It would help producers communicate about their product directly to the consumers.

- *Harvest Mark*[7] provides a food traceability system for growers, packers and sellers. The system allows consumers to use their smartphones to scan a QR code or type the 16-digit code printed on labels of participating fruit, vegetable and poultry brands and see information about the food, including where it was grown and what kinds of seeds were used. *Harvest Mark* has a 'recall' feature that allows purchasers to be immediately notified if food safety problems are reported. Consumers can also give feedback directly to farmers.

4.1.2. The technology layer: conclusions

Our review of social media and smartphone applications shows the primary trend to be towards technology that heightens people's awareness about their food choices, that is, increasing the evidence base on which users of these applications make decisions about what food to grow, buy, cook and eat. However, while many of these provide people with food-related data and educational information, they may not trigger sufficient motivation to get people to change their habits towards a healthier and more environmentally sustainable food lifestyle. Moreover, we need also to raise equity issues in relation to these developments. How do such ICTs benefit or even include communities that have neither the money nor the time to invest in these technologies or access the type of gourmet food some apps target? While these are very real issues, the diffusion of smart technologies does appear to be making inroads into poorer communities. As well, there have been emerging trends on the technology layer in recent years in digital augmentation of food products (e.g., through QR codes) that allow the addition of qualitative and narrative elements with a view to

[7] www.harvestmark.com

increasing food system transparency. This could include treatment of equity issues in access to and labour for food. In addition to quantitative, nutritional and scientific data about food, this approach appeals to people's emotional and cultural sensibilities through the use of crowd-sourced media content. Such content includes images of the producer and the farm where the food was grown, recipe sharing and other social interactions among the customers. We turn to this theme now. These more value-driven or narrative additions to the meta layer of food information have the potential to reduce the ideological barrier between food producers and food consumers.

4.2. The discursive layer

The discursive layer involves the circulation and exchange of knowledge, ideas, images and stories about food. The following examples focus on sharing knowledge about producing your own food, urban foraging, waste reduction and cooking.

4.2.1. Growing information

For urban populations interested in growing and raising their own food, access to information is a significant issue. Many people were raised in the city, during a period of plentiful, stable access to fresh food, and lack the knowledge and skills necessary to produce food. It is not surprising, then, that the internet is rich with how-to guides to urban agriculture, composting, permaculture and organic gardening on websites, blogs, vlogs (video blogs) and forums. For example, *Gardenate*[8] – an online database for month-by-month vegetable gardening localised to the user's climate zone – has recently launched an app based on its database. The app provides users with mobile access to monthly guidance about what to plant based on their climate. It also estimates harvest dates, helps users to prepare for next month's plantings, provides a gardening diary/notebook /organiser, and enables users to exchange advice and comments online with a community of other users.

There are other examples of websites and apps that provide a similar kind of service: access to a community network of other growers, climate-zone specific guidance and planting calendars, general and customisable plant databases and organisational tools. One site, sproutrobot.com, is currently suspended, but was

[8] www.gardenate.com

providing a seed-mailing service based on a customised calendar specific to the user's climate zone and gardening aspirations and conditions. The seeds would come 'just in time' for the user to plant them, thus functioning as a gardening planner and calendar.

More specifically, however, some apps have been developed with a strong social networking focus. For example, *MyGarden*, which is the mobile version of the US-based social network website mygarden.org, allows users to track their account, plants and friends, and update their garden status. It also has a detailed plant database and customisable calendar. Like many other gardening networks, there is a 'classifieds' section through which users can swap and share plants.

Brisbane Local Food[9] is an Australian-based example of this kind of network. The site is used to exchange and source highly localised information and advice about how to grow fruit and vegetables in the city of Brisbane and surrounding areas, and how to care for livestock such as chickens. The site contains a range of other information such as product recommendations, articles, recipes, events, the location of farmers' markets, and where to study gardening and permaculture. It also allows users to source and support community gardens, and swap, sell, buy or give away seeds and plants.

There is a gardening-specific Stack Exchange currently in development (public beta phase) at gardening.stackexchange.com. The community-driven knowledge hub fuses elements of a wiki, blog, digg/reddit and forum to provide information about garden and landscaping in a direct Q&A format. The social gamification element of 'reputation points', which the user may receive in recognition of their sharing knowledge by answering questions, may encourage further continued participation in the forums.

YouTube is another community-generated information resource for many aspects of urban small-scale food production. For example, *Garden Girl TV: Urban Sustainable Living*[10] provides how-to videos on everything from constructing chicken tractors (mobile chicken coops), harvesting vegetables and building a compost heap, to shearing Angora rabbits for fibre arts.

[9] Brisbanelocalfood.ning.com
[10] www.youtube.com/user/GardenGirltv

4.2.2. Foraging information

In addition to learning how to grow fruit and vegetables, and raise small livestock for meat, eggs, honey, fibre or milk, people are also building and sharing knowledge about existing food resources in the city: edible weeds, fruiting trees and shrubs on the street, in parks or on un-used land. In addition to numerous websites, forums, blogs and vlogs about this aspect of urban food culture, there are a number of smartphone apps designed to support this emerging part of the system. For example:

- The *Forager's Friend*[11] website and app is designed to augment urban foraging by providing information about edible and useful wild plants and a user-generated interactive map of available plants. The app will find plants nearest to a user's location based on GPS information.
- *Wild Edibles*[12] is another app that supports foraging and gleaning by helping users to safely identify wild plants for picking and eating (specific to North America), and provides harvesting advice and recipes.

Leafsnap[13] is another innovation that has the potential to support urban food systems in this way. It is one of a series of smartphone applications under development by researchers at Columbia University, the University of Maryland and the Smithsonian Institute. The app uses visual recognition software (the same kind used in face recognition technology) to identify plant species from their leaves. Users, or 'citizen scientists' [40], can share images, species identification and geo-coded location information to help scientists map and monitor flora biodiversity (currently restricted to the north-eastern parts of the US). Like many other resources, this app harnesses the potential of ICT-enabled crowd-sourcing to produce and share valuable knowledge.

4.2.3. Waste reduction information

The UN's Food and Agriculture Organisation [41] estimates that one-third of all food produced for human consumption each year globally is lost or wasted. In

[11] forag.rs
[12] apps.winterroot.net/WildEdibles
[13] Leafsnap.com

industrialised countries, it is consumers that generate most of this waste. A recent Australian study [42] found that food waste constitutes the largest component of most households' rubbish bins. The study also identified a range of reasons that food is wasted in such significant amounts, including: cooking too much food, letting food go off, forgetting about leftovers and not planning meals or sticking to a shopping list.

Knowledge about how to more effectively manage food consumption and encouragement for doing so is the focus of a number of ICT innovations developed recently. For example, the *Love Food Hate Waste* app was developed as part of the Love Food Hate Waste campaign.[14] The app supports users to use food more efficiently by providing portion, recipe and meal planning tools. Another app, *Best Before*, helps users to track their food purchases and expiry dates.

4.2.4. Cooking information

Many sites and apps concerned with food growing and sourcing include recipe finding and sharing tools. Many more sites more generally have a direct focus on all aspects of storing, preparing and serving food. These include, for example, community recipe sites such as *AllRecipes*[15] and *Food52*[16]. Both provide extensive websites and multiple apps to support world-wide communities of home cooks and foodies, and collections of user-generated and tested recipes. Another example of the use of social media in cooking and food culture is the *Foodista*[17] website and app, which combines both editorial and crowd-sourced content, including a database of recipes.

For people interested in healthy, organic or sustainable ways of cooking food, there are a whole range of websites, blogs and smartphone apps. For example, the *CookWell* app provides a range of healthy eating tools including meal plans, tips and kitchen essentials lists, and tutorials on healthy cooking methods, grocery shopping and kitchen preparation.

There are numerous sites providing information about traditional food preparation and preservation techniques that complement moves towards more home-

[14] www.lovefoodhatewaste.com
[15] www.allrecipes.com
[16] www.food52.com
[17] www.foodista.com

grown produce. For example, *Home Grown*[18] is an online community that brings together information and social connection related to a whole range of traditional food and self-sufficiency skills: growing, cooking, crafting, brewing, making and building.

4.2.5. The discursive layer: conclusions

These examples, across the components of urban growing, foraging, waste reduction and cooking, all suggest the role of communication technologies in reconnecting people to traditional and scientific sources of knowledge about food in socially meaningful ways. Many of these components have traditionally involved highly social activities and the knowledge required was something shared in communities and from generation to generation. The innovations emerging in urban food cultures suggest a return to this social construction of knowledge and the central role social media can play in facilitating the circulation of socially embedded ways of knowing in contemporary, mediated societies. In practice this includes everything from the informal face to face conversation to the institutions that govern urban food systems. The social domain itself is the focus of the next, and final, part of our analysis.

4.3. The social layer

The sociality of food and connections between people are, of course, central to every aspect of the urban food system and are clearly a factor in many of the above examples and their ability to sustain local forms of action. However, we focus here on the social layer in terms of two components that are traditionally at opposite ends of mainstream food systems: growing and eating.

4.3.1. Growing communities

For commercial and community-based organisations, pre-existing social media networks such as Facebook and Twitter are a substantial part of their efforts to connect people. For example, the *Permablitz*[19] and *Transition Town*[20] movements – both of which have an emphasis on self-organising community-level action – use

[18] www.homegrown.org
[19] www.permablitz.net
[20] www.transitionnetwork.org

blogs and Facebook to help support community action. Community garden and permaculture centres also use communication technologies to help build social networks and bring people together to teach and learn, to grow food, to share produce and to raise community awareness. In addition, the Permaculture Institute of Australia, for example, recently launched a social network (permaculturegloba l.com) for permaculture practitioners, teachers, aid workers, projects and courses.

Community gardens that use public or unwanted pieces of land are one way of meeting the pressing challenge of land access for food production in cities. Connecting people who have the land with people who have an interest, the tools or the time to grow food, is another innovative, ICT-enabled, way of addressing this problem. For example, *Sharing Backyards*[21] – "a combination of online dating and Google Maps" [43] – attempts to make urban neighbourhood linkages between those wanting to farm and those who have available land. The garden partners share costs and the harvest. The network currently has programs in Canada, the United States and New Zealand.

Landshare[22] is a similar initiative. It is also designed to create communities of people interested in sharing resources in order to produce food. Since being launched in the UK in 2009, it has flourished into a national movement of more than 57,000 people, sharing more than 3,000 acres of land throughout the UK. *Landshare Australia*[23] was launched in 2011.

Hyperlocavore[24] is another 'yard-sharing' network. It is based in the US and was designed to promote local, urban food production and transform the food system. The social network facilitates connections between people and the sharing of a range of urban agricultural resources: land, tools, seeds, knowledge, produce and food-related social activities.

4.3.2. Eating communities

Consumers are an essential part of any food systems and their modes of relationship are a key issue in the evolution of urban food systems. The eating of food is the focus of a huge amount of online and social media activity: restaurant reviewers

[21] www.sharingbackyards.com
[22] www.landshare.net
[23] www.landshareaustralia.com.au
[24] hyperlocavore.ning.com

and locators, social media marketing, nutritional and diet planning and tracking tools, and social networks. A recent survey of internet activity by Felton [cited in 43] suggests that up to 70% of all user-generated content on the internet is food-related. For example, *Foodspotting*[25] – both site and app – provides a visual database of user-generated data about finding and rating particular dishes. Other networks and apps help consumers to make decisions about where to eat with issues such as sustainability or health in mind. For example, the *Clean Plates*[26] website and app help users in New York City to choose healthy restaurants according to their individual preferences such as organic meat or vegan dishes.

Apps are also being developed to enable a number of recent trends in urban food culture. For example, with the recent explosion of gourmet 'food trucks', in the US most notably, and the need to compete with stationary restaurants, a number of apps have been developed that use Twitter feeds, GPS, and location data to plot trucks on mobile maps. For example, *Eat St.*[27] helps users to find food trucks in many cities of the US and Canada using an interactive map. *Eat St.* also has a strong social networking component that enables users to share pictures and reviews of local dishes.

The non-commercial, guerrilla and pop-up restaurant movement makes good use of various forms of pre-existing social media to enable the rapid, responsive and direct exchange of information about underground events. There are also social networks completely devoted to the phenomena. For example, *The Ghetto Gourmet*[28] facilitates supper-club networks across the US. Members use the site to create, join or build networks of people interested in community-based dining; to manage and advertise events; and to share recipes, photos and ideas about food. *Place & Pitchfork*[29] is another version of this alternative to restaurant eating. It incorporates a strong local food focus: dinner parties are held at the local farm at which the food has been grown and start with a farm tour. Diners eat with the people who laboured to produce the food that they now share at the table, in the place in which this production has happened.

[25] www.foodspotting.com
[26] www.cleanplates.com
[27] eatst.foodnetwork.ca
[28] www.theget.com
[29] www.plateandpitchfork.com

The social network *Eat With Me*[30] launched late last year in Melbourne, but with its global reach, enables members to stage and participate in a whole range of food-related events, including cooking classes, restaurant outings and pot-luck dinners. Other social networking sites focus on connecting travellers as guests with local people as hosts (for example, www.eatwithalocal.socialgo.com and www.dinewithlocals.com).

4.3.3. The social layer: conclusions

Our sample of HCI innovations in the growing and eating of food suggests the possible role of ICTs in facilitating new social "paradigms" that address food sustainability issues. For example, there is a strong emphasis on local, community-level action and the role that social and mobile media platforms can play in supporting such action. Social media actualises this in particular ways. It accentuates the fundamental interconnections normally effaced by conventional industrialised approaches to food production and consumption. It makes these interconnections tangible and thereby makes the social relations underlying urban food systems more transparent.

5. Conclusion

Changes in ICTs are driving a fundamental paradigm change in industries such as music, broadcasting and retail. This change is undisputable and powerful enough to unseat the major players in these sectors that have enjoyed dominant roles for decades. The role of these same forms of technology in driving the evolution of urban agriculture is not yet mature, but is supported by corollary and theory in the current analysis. The recent advancements in mobile technology have afforded innovative apps not previously possible, for instance. That is, although it is too soon to speculate what large scale systemic change is heralded, the examples discussed give evidence of community level changes of some importance. Furthermore, although there will be churn in these new media innovations, we suggest that innovative multi-platform technical solutions may demonstrate longevity.

[30] www.eatwithme.com

Moreover, the use of communicative ecology as a concept draws attention to the ideational, systemic and social aspects of these changes. The contribution of the communicative ecology concept to this analysis is fourfold:

1. It is a corrective to technological determinism inherent in overenthusiastic speculation about the impact of these new technologies in urban agriculture. By acknowledging the social and discursive, the possibility of raising and addressing political and cultural factors such as the digital divide and also the conditions of labour in agriculture are made possible. The idea of a communicative ecology is reflexive and the new media tools described can be used to critique and advocate.

2. The communicative ecology framework is conceptually compatible with biological systems understandings. This offers a way for different knowledge regimes to be combined through a common language. We envisage, for example, it will encourage agricultural and biological disciplines to find a way to engage with social scientists and system designers through the common meta-language of ecosystems.

3. Without this framework, the ever changing list of innovations might be seen as a grab bag of trends. The framework has guided our sampling of innovations and helped organise them into a taxonomy.

4. We also hope that this descriptive account might be the beginnings of more detailed modes of analysis which support each other. For example, via semantic and textual analyses of the discursive layer; social network analytics of the social layer and critically informed analysis of the technology. Our hope is that these might inspire the next generation of design interventions towards more local, community-driven and sustainable approaches to food and developments in social and mobile forms of technology that involve trust, sociality and network-logic.

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Using communicative ecology theory to scope the emerging role of social media in the evolution of urban food systems

Highlights

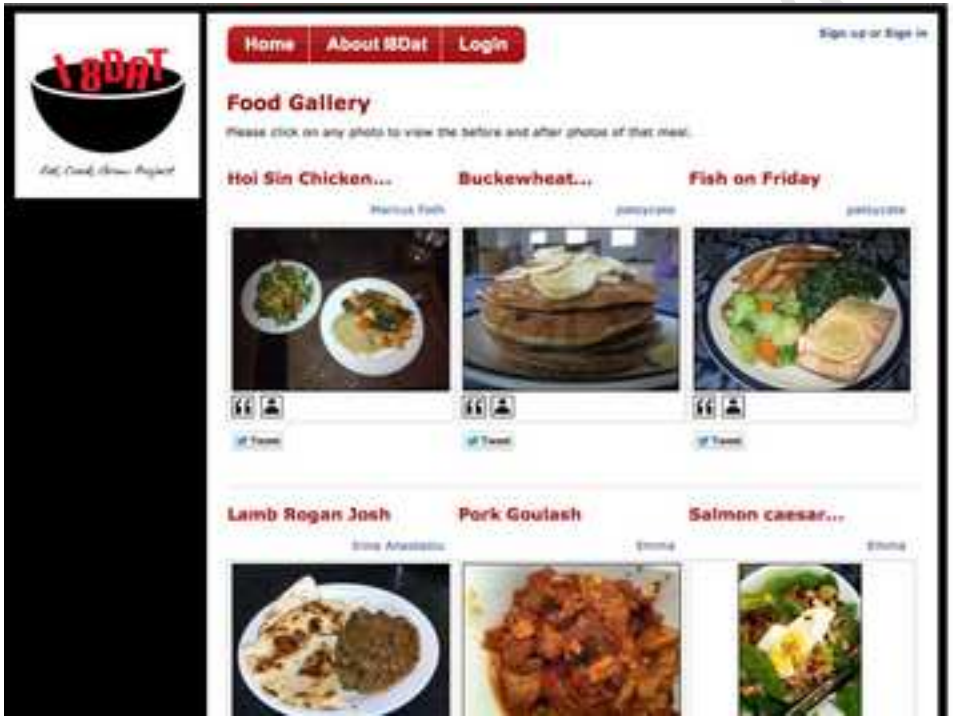
- focuses on the role of social media in the emergence of sustainable urban food systems

- uses a communicative ecology framework to describe a range of urban food projects

- finds that social media accentuates the social relations underlying urban food systems

- concludes that social media can play an important role in the future of sustainable urban food systems

Figure



Communicating Ecology Through Art: What Scientists Think.Ä To assess the response of professional ecologists to the role of the arts in communicating science, a series of constructed performances and exhibitions was integrated into the program of a national ecological conference over five days. At the conclusion of the conference, responses were sought from the assembled scientists and research students toward using the arts for expanding audiences to ecological science. Over half the delegates said that elements of the arts program provided a conducive atmosphere for receiving information, encouraged them to reflect on alternative ways to communicate science, and persuaded them that the arts have a role in helping people understand complex scientific concepts. Ecological problems need urgent and minute observation. If you want to discuss this topic with your Intermediate students, here are some lesson ideas.Â What are the main ecological challenges your country is facing? What measures does your government take to solve the problems? How do wars influence our environment? What are the most important things countries must do after wars to recover the environment? Hopefully, the lesson ideas introduced in the article will turn out to be useful for your classes and your students will enjoy a great deal. Speaking activities are, obviously, essential for English language speaking classes. Communicative ecology is a conceptual model used in the field of media and communications research. The model is used to analyse and represent the relationships between social interactions, discourse, and communication media and technology of individuals, collectives and networks in physical and digital environments. Broadly, the term communicative ecology refers to "the context in which communication processes occur" (Foth & Hearn, 2007, p. 9). These processes are seen to involve people communicating... Landscape Ecology in Theory and Practice. Pattern and Process Second Edition. Landscape ecology in t heory and practice.Â Landscape ecology in theory and practice. Pattern and Process Second Edition. M o n i c a G . Tu r n e r University of Wisconsin-Madison Department of Zoology Madison, WI, USA.Â The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specic statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use. The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication.