

COLLECTIVE PARTICIPATION: TECHNOLOGY-ENABLED SOCIAL ACTION

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Index Words

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Abstract

Collective participation is the part of Essential Computing that uses technology in our social lives to turn our on-line connections into action. Participation is about enabling people to come together to achieve goals that separately they could not achieve. Technological evolution in on-line connection ultimately affects human organization.

This article provides background on what we mean by participation, and why it is emerging now. We identify current research at Intel and identify directions for future research, both technical and social.

Introduction

Have you recently updated your status on Facebook*? Received a tweet? E-mailed a group of friends about doing something together? Sent a group text from your phone? It is clear that electronic communications are today an essential part of our lives. People are now connected to former classmates, receive updates from their favorite news sources, and, all too often, receive unwanted advertising. Although we are now connected, has technology fulfilled its potential to help us accomplish joint action?

NYU researcher and pundit Clay Shirky [19] has called attention to an emerging trend of people using technology to come together in new ways. Shirky argues that information and communication technologies have begun to enable group conversations and collective actions by eliminating hurdles related to time and cost. He notes, however, that the technology tools and social research behind this growth in collective action and group conversations are still in their infancy. Still, there have been some recent prominent examples of people coming together to make something happen.

For example, the 2008 Obama for President campaign shattered previous fundraising records by mobilizing supporters via e-mail, Facebook, Twitter*, and other Web 2.0 media to contribute money to the effort; the *Washington Post* reported that the number of small contributions was remarkable [16]. More recently, the Red Cross raised \$5 million in 24 hours via text messages for earthquake disaster relief in Haiti. These examples point to the power of people acting together—to have a collective focus that can accomplish some end.

The collective participation agenda of *Essential Computing* is to enable people who desire to move beyond Web surfing and update checking to utilize technology to come together and contribute to society in a range of ways and at varying scales of action. Many of the most challenging and important problems that confront our world today, such as reducing the carbon footprint, require collective action in order to effect change. To move technology innovation to support more collective participation, we need new understanding about people and technology-enabled action and we need to apply this understanding to applications that enable social collaboration, cooperation, and action at varying scales of activity.

The following outline presents our definition of collective participation and the parameters that we use to guide our research activities. In this article, we provide two examples of current research on collective participation from the Future Technologies Research (FTR) group at Intel, and we suggest further directions for exploration.

Participation and Collectives

Thus far, we've made repeated use of the terms "collective" and "participation." Before proceeding further, we would like to explain how we are using the terms in this article.

Enabling Participation

In its most basic sense, participation means active engagement. Henry Jenkins [13] describes the concept more fully as "participatory culture" and specifies the following conditions in which this concept can be realized: 1) relatively low barriers to expression and engagement; 2) strong support for creating and sharing with others; 3) members believe that their contributions matter; 4) members feel some degree of social connection with one another; and 5) participation has some result.

In the spirit of Jenkins' concept of "participatory culture," FTR researchers view participation as an act of doing something for some end; an engagement with purpose. Through our research we seek to empower people, to encourage engagement in (public and private) decision-making, to foster ownership of informed opinions, and to influence issues that affect everyday lives at varying scales of action. Participation can take many forms since it needs to accommodate a variety of organizational and lifestyle constraints (for example, modifying personal water consumption to conserve water, commenting on mainstream media or blog sites, providing air quality data to neighborhoods). Wikipedia* and the open source movements are both excellent examples of technology-enabled social participation that are motivated by a shared interest and have resulted in collective action.

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Our goal in FTR is to create technologies that expand how people participate and to give people powerful new ways to make a difference. We want to allow people to use technology to build on their personal interests and everyday activities and participate more fully in the social world.

Creating Collectives

We use the term “collective” to denote a *group* of people taking purposeful action motivated by shared interest. Since the rise of enterprise computing, Human Computer Interaction (HCI) research has expanded its traditional focus on one “human” interacting with one “computer” to include group-oriented use of computing, a move that is consistent with the research agendas of “community informatics” and “computer-supported cooperative work (CSCW)”. The HCI community has recently paid considerable attention to large-scale Web 2.0 initiatives such as Wikipedia.

“Community implies a shared sense of values and an engagement of a long duration.”

Our own focus on collectives represents an important extension of this shift in HCI research from individual towards group computing use. We use “collective” to highlight the participation of many individuals, but not necessarily in a well-defined and persistent context such as an existing work group or community. Collectives are, after all, fundamentally different from communities (real or virtual). “Community” implies a shared sense of values and an engagement of a long duration [3]. Collectives are groups of people with some shared sense of purpose and togetherness. Unlike communities, however, collectives do not necessarily entail an extensive sense of shared values nor do they have to persist over a long period of time. Collectives do not have to be large. Collectives vary in form, sizes, temporal duration, and internally they can vary in the values held by their members. Table 1 illustrate the many forms that collectives may take :

Collective	Goal	Duration	Shared Values	Number of People
Obama Supporters	Elect Obama to the presidency	Months to Year	Some	100s of thousands
Tuangou	Buy some big ticket item	Months	Few	1000s
Portland Trail-blazers	Enable team victory	Months to lifetime	Few	10s of thousands

Table 1: Example of Range of Collectives Today
Source: Intel 2010

Obama supporters constituted a large collective that lasted a moderate length of time. Members of this collective happened to share many of the same values. They came together with the objective of electing Barack Obama for president. The *tuangou* is a collective that comes together in China to buy collectively. The members have few shared values, but their common goal is to buy the same refrigerator (or some other object) at a reduced cost. Tuangou collectives last a short temporal period and are relatively small (1000s of people). Another contrasting example is sporting fans, in this case, the Portland Trailblazers.

The collective might meet at physical events, like games, but also be in contact on-line. Although any given “season” is short, people might be part of this collective for years.

A research focus on collectives represents a radical shift in thinking about the scale of computing technologies, since the collective as a whole becomes the unit of focus, not the individual user. The collective is also the unit of analysis and design. For researchers and technologists alike, collectives encourage us to look at the social face of the challenge of “computing at scale”.

In short, interest-based collectives are often organized by local, niche, and/or amateur activities that differ in some fundamental ways from standard professional organizations. Just as amateur sports leagues are predicated on a broader base of participation than professional sports, easy to use technologies lower the barriers to broaden the base for active participation with collectives for social action. In terms of collective activities like civic engagement, a recent report by the MacArthur Foundation declared that the most promising direction for involving youth was not from top-down adult mandates but through bottom-up peer based activity that develops a sense of participation by members for collective action [12]. We also believe research about enabling participatory collectives is a fruitful direction for research, though not limited to civic engagement.

Key Challenges

Research into participation builds on the copious research on mobile technologies, sensors, ubiquitous computing, ambient displays, and intelligent software. Many questions remain unanswered. Research on “participation” can focus usefully on the following:

- How can technology support collective action on topics such as environmental sustainability, assisting locally and globally when disasters strike, and other pressing social problems?
- What does scalable interaction look like as more people and devices are involved in the interactions?
- How do collectives conduct themselves?
- How do localized interactions amongst subsections of the collective happen? How do global actions become coordinated across the collective at large?
- How do people become members of collectives and how do they end their membership?
- How do conflicts occur and play out within social collectives?
- What kinds of political and social innovations would independently intercept technologically driven ones—that is, is there something different about some social movements now that can uniquely take advantage of new technology?
- What can be done to make collective action more than mere on-line tokenism?

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- How do sensors, ambient displays, and mobile devices enable reliable information and coordinated action for participating in collectives?
- How can ad-hoc and temporally limited secure communications and connections be made and maintained among members of collectives?

In addressing these and other issues, research should aim to help deconstruct the nature of collectives, the nature of technologically-mediated interactions in and around participation, and the relevance of design and technology development in computing and social sciences.

Current Research

Intel's FTR group continues to work on several projects related to collective participation. In this article, we review two of these in some depth: Consumerization and Common Sense.

Consumerization

The Consumerization project is a social science research project looking at a particularly influential model of participation: i.e., consumers participating in an economy through the consumption of goods and services. This model of participation has emerged out of a long and contested historical process of consumerization that has produced, most famously, the United States as dominant national economy driven by the mass consumption of its "citizen consumers" [5]. However, the consumer-in-a-market model of participation is by no means limited to the commercial sectors of industrialized countries. This way of thinking, behaving, and feeling has been extended into domains as diverse as politics, education, healthcare, the arts, and public utilities; all of these, not without controversy, have come to be organized, conceptualized, and enacted in terms of a "product" being marketed, financed, and consumed.

Drawing upon this larger historical background, the focus of the Consumerization project is to uncover the implications of governments, businesses, and cultures around the globe adopting this consumer model of participation as the basis for large-scale economic development practices, such as efforts to foster the "emerging middle class" in developing countries and to bring "unserved and underserved" populations into the mainstream marketplace in wealthier countries. From these empirical analyses the project seeks to inform public policies around information and communication technologies (ICTs), such as PCs and mobile phones, and around economic development. These policies aim to promote both digital inclusion and economic development around the world through the use of technologies. Findings from this research are also designed to inform Intel's strategies vis-à-vis consumers, specifically to accelerate growth in emerging markets and reach first-time buyers of computers.

The question of whether technology adoption and technologies for economic development for the global poor and emerging middle classes actually lead to improved lifestyles for people in emerging societies is highly debatable. Discussions about who should be using technologies and what income groups should benefit from technology are ongoing. Consumption is a contested topic in these debates. New policies for economic development focus on individuals as “consumers” of technologies and services rather than as aid recipients. This shift is based on the logic that economic development results from a process of entrepreneurship or private-sector-led business initiatives rather than through traditional state- or nonprofit-led interventions targeting marginalized groups. Within this context, the research asks, “What are the institutional, political, and cultural processes that create consumers and what are the implications for societal participation?”

For the purposes of this article, we focus on a case study conducted in Kenya that reveals a set of contradictions, particularly around citizenship, as consumers are created. M-Pesa is a mobile payments service implemented by a privately-run telecom business in Kenya. Consumers of this service use their mobile phones to send and receive money and also to store or “bank” their money. Although implemented with the goal of serving the poor, or those who lacked formal bank accounts, the service became part of the telecom business’ strategy to reach the broader mass market, including the wealthiest segments of the country, and the strategy was highly successful.

Method or Approach

Intel’s Consumerization research has focused on the interactions among three sets of actors: governments/policy makers, businesses, and individuals. These interactions were studied primarily through first-hand, qualitative fieldwork in Kenya, India, Bangladesh, China, Russia, Mexico, and the United States. The researchers also looked across sites of interventions through analysis of development policies, business strategies, and individuals’ self-perceptions through a consumptive lens and within the context of the discourses of inclusion and societal participation. Finally, this research was situated within the larger literature on development-through-entrepreneurship as well as the cultural politics of consumption.

Discourses of Inclusion and Information, and Communication Technologies

Initially, the policies around ICTs and international development revolved around the notion of the “digital divide” and whether the Internet would serve to widen or narrow the gap between information-rich and information-poor countries [17]. The policy discussions eventually moved beyond this problematic divide between information rich vs. poor societies to whether ICTs should be used to tackle development problems [21]. However, the rhetoric and principles of inclusion and participation in the digital world continue today with programs targeting “digital inclusion,” efforts by governments to reach marginalized groups with ICTs and education, and private sector efforts to reach new markets in the name of connecting and bringing broadband to remote areas.

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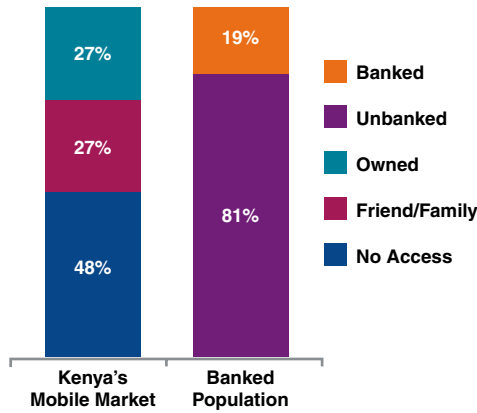


Figure 1: Gap Between Mobile Market Penetration and Banked Population
 Source: Finaccess National Survey 2006 [7]

The Kenya M-Pesa project was initiated in March 2007 by Kenya’s largest mobile network operator, Safaricom (which is part of the United Kingdom-based Vodafone Group). The payment service via mobile phones was introduced with the goal of “deepening financial access for the poor” [10]. The goal was to enable consumers to make payments via their mobile phones and use the network of Safaricom airtime resellers as agents to facilitate the process [10]. The service was successful in reaching a broad range of consumers in Kenya partly because the cost of the service was cheaper than traditional services (see Table 2). It also served to bridge the gap between mobile phone penetration and banking penetration (see Figure 1).

METHOD	COST (Ksh)
M-Pesa	35
PostPay (money transfer operated by the post office)	75
Akamba (bus company)	175

Table 2: Cost Comparison of M-Pesa and Other Traditional Money Transfer Services
 Source: Morawczynski 2009 [15]

M-Pesa is an example of a service that was introduced in the name of inclusion to target the lower income groups in the country who lacked formal bank accounts. As the service gained penetration in the market, the image of the target consumer shifted away from the poor and from visions of them participating in a banking intervention, to an even broader understanding of inclusion that included national images of the consumer as “everyone.” The service became part of Safaricom’s successful strategy to reach the broader mass market, including the wealthiest segments of the country. They have now expanded the M-Pesa services beyond basic banking services to include services that provide convenience, something for which our research showed all income groups in Kenya are willing to pay.

With this shift, there is a process of abstraction that blends the challenges and politics facing the different “consumer” populations into one that is “Kenyan.” Inclusion in this sense came to represent being part of a unified Kenya. The violence following the elections of 2008 resulted in hundreds of dead. The contested election result fueled tribal fears, anger, and divides. Our research found that a unified notion of what it means to be “Kenyan” and a “consumer” appealed to the mass market, to the private sector, and even to bureaucrats working within the government. Low-income Kenyans who used M-Pesa expressed a sense of belonging to a larger market. Further, people felt that they were participating in a national “action” rather than feeling like they were the “poor.” With the “consumer as everyone” concept, there is an attempt (conscious or not) by the government and private sector to smooth over the divisions within Kenyan society. Such a strategy implicitly promotes equity between the poor and rich as well as between rival tribes by treating them all as equals from a consumer perspective [14].

The definition of “Kenyan” is highly contested, but the abstracted notion of “consumer as everyone” somehow transcends politics and brings people together. Further, the “consumer as everyone” promotes a sense of societal participation, and meets the goals of inclusion (at least on the surface). By no means does it guarantee equity in terms of actually reaching everyone it sets out to, but it enables the private sector and governments to at least appear to be reaching out to all. Further it enables the poor to participate in the digital world, a high stake gambit in a politically and ethnically divided environment. In this case, citizenship, identity, and nationhood are slippery concepts fraught with tensions and contradictions. However, these contradictions reveal a set of collective desires and anxieties of a nation upon which governments and businesses can strategically build. The M-Pesa banking experiment enabled participation of the poor not just in the digital world, but also as citizens. The research shows that these contradictions can be seen as opportunities for policy and market intervention.

Common Sense: Mobile Environmental Sensing Platforms to Support Community Action and Citizen Science

The Common Sense project’s approach differs from that of the Consumerization project by (1) focusing on units of society rather than on whole societies, (2) being located in a modern-day city with concomitant infrastructure, i.e., San Francisco, and not in an emerging market, and (3) developing technology for implementation. Common Sense is developing mobile sensing platforms to support personal environmental awareness and grassroots community action. To this end, a family of hardware and software components was built that can be used with a range of applications, and new communication paradigms were developed that enable communities of non-experts to gather and produce information that is “credible enough” for experts and policy makers.

Overview

The research area of mobile participatory sensing involves the use of consumer electronics (such as mobile Internet devices and mobile phones) to capture, process, and disseminate sensor data, complementing alternative architectures (such as wireless sensor networks) by “filling in the gaps” where sensor infrastructure has not yet been installed [1,9,18]. While some sensors are already common in consumer devices (e.g., geolocation, motion, audio), there are other types of sensors that are not yet common that offer the ability to collect additional data of individual and social interest. In our research, sensors that measure gases relevant to environmental air quality were used.

To make environmental sensing useful for practical action, one must do more than just “collect” and “present” data [9]. Environmental activists are continually required to produce information artifacts that are “credible enough” to engage with policy makers and the relevant bureaucracy; appealing enough to be useful in community mobilization; and personally relevant enough to keep people interested and motivated [4]. The research seeks to enable community members to engage in collaborative “citizen science” [11] or “street science” that will be useful in interactions with government agencies and non-government organizations (NGOs).

“The definition of Kenyan is highly contested, but the abstracted notion of consumer as everyone somehow transcends politics and brings people together.”

“Environmental activists are continually required to produce information artifacts that are credible enough to engage with policy makers and the relevant bureaucracy.”

“The research seeks to enable community members to engage in collaborative citizen science that will be useful in interactions with government agencies.”

To this end, the Common Sense project is developing the following:

- Hardware- and software-sensing platforms that allow individuals to collect environmental information. Some consist of custom data acquisition boards that contain environmental air quality sensors that are paired with commercial mobile devices; others are standalone mobile devices.
- Mobile and Internet-based software applications that allow people to analyze, share, and discuss environmental information in order to influence environmental regulations and policies.

A Family of Research Prototype Platforms

For prototyping, a set of board designs and embedded software was developed with the intention of releasing these components to the research community as they stabilize. These components can be selectively populated with off-the-shelf carbon monoxide (CO), nitrogen dioxide (NO₂), and ozone (O₃) gas sensors as well as with temperature, relative humidity, and motion (3D accelerometer or orientation) sensors. Designs so far include single sensor boards for integration with commodity mobile devices and split sensor boards for vehicular use that enable isolation of the processing electronics from exposure to the environment (Figure 2, right-side).

These boards are meant to be paired with a user's mobile device via Bluetooth. The user's mobile device uploads the sensor data (along with geolocation data) to a database server via the phone network. A standalone, handheld, environmental monitor was developed that includes its own GSM/GPRS phone module and a GPS-based geolocation module, obviating the need for a separate mobile device. All designs use microcontrollers to manage the low-power sensing; the handheld monitor is based on the Epic Core* module developed at Berkeley [6].



Figure 2: Handheld Monitor Design and Enclosure
Source: Photo by Mazzarello Media and Arts 2009

Community Sensing

To facilitate the primary research agenda of participation for “citizen sensing,” a complete (standalone), handheld environmental monitor was developed. The standalone monitor is more practical in that it reduces the number of separate devices the user must charge and carry; it also eliminates the need to use mobile “user apps” in a software environment that is not really intended to support applications that run continuously for months at a time.

A trial deployment of the handheld monitors has begun in collaboration with an environmental NGO working near the Port of Oakland. A website, “Common Sense Community,” has been designed to provide on-line community features to support discussion of interesting phenomena and strategies for practical action (Figure 3) as well as individual exposure information (Figure 4). The research continues by working iteratively with community members to ensure that the visualizations and features answer the type of questions frequently posed by users who are not environmental experts [20].

Just as with the San Francisco trial, a rich set of research questions emerged concerning the use of environmental data. For example, questions came up regarding different stakeholder interests and the balance between what is possible (technically) with these kinds of relatively inexpensive sensors versus what is desired (scientifically and politically). To enable informed participation by community members in environmental decision-making, it is important to consider how visualizations can appropriately represent the credibility of the data as well as facilitate citizens’ understanding of the environmental conditions around them. These types of questions are what will be explored in the near future with this project [2].



Figure 3: The Common Sense Community Site Showing Data Collected by a Single User. The *My Exposure* Widget (a) and *Tracks* Visualization (b) Are Visible with the Commenting Panel (c).
Source: Intel Corporation, 2010

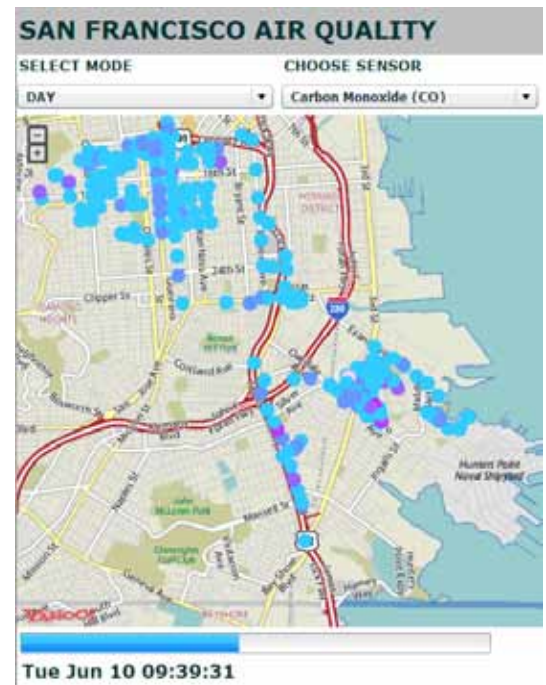


Figure 4: A Visualization Tool
Source: Intel Corporation, 2010

The two research projects (Consumerization and Common Sense) demonstrate the breadth of the problems associated with creating participatory collectives. The participation of Kenyans as citizens and consumers highlighted the interconnection of large social and technological infrastructures in “participation.” The Common Sense project in San Francisco points to the importance of small local collectives who are enabled through technology to attempt changes in their communities. Both of these studies highlight (1) the importance of focusing on the scale for design and research, i.e., moving from the individual to the collective; and (2) the implications of our work in terms of how socio-technology interventions can support a more engaged stance toward public participation generally.

Conclusions

In 1990, Jonathan Grudin published “The Computer Reaches Out,” in which he drew attention to a particular pattern in the disciplinary evolution of human-computer interaction [8]. As computer systems became more complex, as they became more widespread, and as interaction paradigms become better understood, Grudin argued, the focus of technology research attention would expand beyond the device, through interaction styles, organizational contexts, and broader social settings. Research, since the time of Grudin’s publication, has shifted from what might be technologically feasible to what might be interactionally sensible, and today it focuses more on the concerns with technology systems embedded in the social practice of wider networks. Intel’s research on participation is at the forefront of expanding interest in the intersection of technology, social organization, and participation. Collective formations and their desire for action pose exciting new challenges for the design and implementation of technology. Our research program on participation seeks to address the issues surrounding the integration of collective participation with the highly varied assemblies of technology that exist already in our homes and public spaces today, or that will be deployed in these areas in the near future. This research highlights the importance of understanding what is essential to people today in order to design for essential computing for tomorrow.

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