

# Grounding Activity in People-Centered Smart Territories by Enhancing Community Awareness

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**Abstract.** Contemporary life can seem rushed and overloaded. We argue this may be due *not* to merely having too much to do, but rather with experiencing fragmentation and inadequate meaning in one's own activity. We suggest that a design approach to this challenge is to enhance awareness of significant and persistent activity, and the themes, values, places, and motivations that unifies it and gives it greater meaning. Specifically, we suggest that people-centered smart territories can enhance community awareness by reminding people of place-based history, heritage, current issues and discussions, and plans for the future in the community through a smart social grid of community information services.

**Keywords:** People-centered smart territories, Community awareness, Grounded activity, Busyness, Overload.

## 1 Introduction

In traditional societies, the institutions of local (place-based) community were overdetermined as a primary social rubric. People worked where they lived and, at least since the Neolithic transition, tended to stay where they worked and lived. They cooperated with their neighbors in every facet of life out of common interest, notably, their own survival and procreation. Indeed, their children were most likely to marry their neighbors' children. This paradigm of place-based community was preponderant for 10,000 years, and in the last century has become a nostalgic touchstone for perceptions of deterioration in personal intimacy, trust, and empathy, and in collective identity, participation and support networks due to industrialization (Tonnies, 1887), television (Putnam, 2000), and information technology (Stepanikova et al. 2010), among others.

The discourse of "lost community" is an inspiring meme for deconstructing contemporary social institutions and practices, as well as for envisioning new possibilities for human cooperation, and sustainable alternative ways of living (Putnam, 2000). Designers might respond to contemporary social and socio-technical forces by asking how these forces can be transformed into new resources for strengthening personal intimacy, trust, and empathy, and in collective identity, participation and support networks. Most notably, designers can envision approaches

to strengthening human community in ways that were never before possible; transforming current challenges and threats into new possibilities (Carroll, 2012).

In this paper we suggest that the busyness and fragmentation of contemporary life can provide its own solution - a new resource for strengthening community through an ensemble of community information services. Based on our previous work with the design and implementation of community mobile apps, our design hypothesis is that mobile/personal applications can act as sensors of the experiences of community. Just as we might have a collection of smartphone applications to apprise us of national headlines, weather forecasts, business appointments, messages and email, and so forth, we also might have a collection of applications linked to community information services that enhance our awareness of, participation in, and sense of belonging for our local community. Our vision is to make the places people live smarter in the sense of being more responsive to and supportive of human needs for awareness of local community, sense of belonging, engagement and participation.

## 2 Grounded Activity

Busyness can be positive and desirable, as connoted by *busy bees*, but it can also be problematic, as when people feel stress because there is not enough time to carry out planned or committed endeavors, or when it seems that many small and inconsequential tasks are displacing activities that might be more engaging, important, and satisfying. The problem of busyness is not busyness per se, but the frustration, stress, and alienation people can experience when they are busied by activities that are insufficiently engaging, meaningful, integrated, and/or consequential.

Contemporary life presents an increasing number and variety of such tasks to people. For example, a person on the sidewalk may only be thinking of his/her destination, and not even noticing the people and places passing by. The walk is not part of a larger activity; it is a minor nuisance, barely experienced. Social media and other computing often mediate contemporary busy interactions. Thus, the person hurrying along the sidewalk might very well be checking email, Twitter, news headlines, local weather, and/or creating a text message or a tweet. In many respects these are wonderful ways to optimally utilize interstitial time, the time between more significant and meaningful tasks or events (Dimmick et al. 2011).

However, pursuing myriad, small and independent tasks could evoke a sense of busyness. Indeed, mobile information interactions are continually emerging; it can seem that as soon as one has defined a practice with respect to a given set of such interactions, the ecology expands, and implicitly demands new behavioral accommodations, and ultimately, more of one's time. Moreover, pursuing these interactions, while nonetheless in the midst of place-based events in the world, not to mention other people, could also have the effect of removing a person from the world (Dreyfus, 2002).

We hypothesize that one feature of desirable busyness is that activity is *grounded in the world*: it is about and contributes to something significant and persistent (a theme, a human value, an objective or motivation), and has proximal consequences

for people, places, and events. Obviously, this is a problematic distinction, though there are clear cases: Bees are collecting food for the hive; their activity is about their own survival, and grounded in nearby places and events in the world. People browsing and tweeting their way down the sidewalk may be doing fascinating things, but they are often small and fragmented things, not part of significant or persistent activities, and they are typically without proximal consequences for nearby people, places and events. Indeed, their defining characteristic is that they have nothing to do with nearby people, places and events.

If we want to help people to experience their own activity as grounded, we can help them become more aware of what it is about, how it contributes to significant and persistent themes, values, objectives, and motivations, and how it is consequential for people, places, and events.

### **3 Smartphone Affordances in People Centered Smart Territories**

People experience and interact with public space in many ways. We are investigating ways that smart public spaces can enrich the range of possible mobile experiences and interactions, specifically to enhance citizen awareness of and increase participation and engagement in local activities, news, plans, and possible social opportunities. Our work is carried out in the United States: According to a recent study by Pew Internet & American Life, 56% of US adults now own smartphones; adoptions have increased rapidly since 2011 in every demographic category (Smith, 2013). People use smartphones not only as communication devices, but also for personal computing (Karlson et al. 2009). The especially high adoption rate among young adults is an indicator of future societal trends. New information infrastructures raise many new possibilities. Smartphones enable mobile/location sensitive information interactions that were not before possible (Geser, 2004; Green, 2002). We assume that analogous trends of adoption and appropriation are occurring in many societies.

Smartphone affordances can transform everyday citizen awareness and information interactions. One might access the history of municipal plans for a specific location through smartphone GPS functionality, be able to read information and stories of locations, be able to view images – for example of buildings that were there in the past, in the present, or planned to be built there in the future, or be able to read and contribute personal preferences (e.g., I like this building) or comments, reconstructing the spatial environment into more meaningful interactive local places. One could access stories from local news feeds presented together with tweets from local Twitter accounts discussing those stories (based on keyword analysis), and thus be able to see, at a glance, both what the local news is, as well as what people are saying about it. One could also express personal thoughts, concerns, or perspectives to local topics displayed in the system, leading to the creation and facilitation of local online discussion. Based on lightweight profiles (checking off local issues of interest), one could make oneself available to pings and meet up with neighbors interested in the same issues, possibly including neighbors one has not met before. One might be on the way to a meeting, experience car trouble, and be able to broadcast a request for a

ride to neighbors, or look for opportunities to help others by utilizing one's skills or resources (Bellotti et al. 2013).

Such services can be implemented and evaluated to investigate critical research questions regarding what kinds of mobile information and interactions people are attracted to and wish to engage in, can understand and appropriate, and can experience as intelligible and motivated, as well as the consequences of various mobile information and interactions for the development of trust, community collective efficacy, sense of community, sense of well-being, and other significant social and psychological outcomes. While it is certain that many new mobile and location-sensitive services will be developed and researched, it is not at all a given that those initiatives will focus on, or even notice direct and indirect social and psychological consequences of enhancing citizen awareness in smart cities.

## 4 Enhancing Community Awareness through a Smart Social Grid

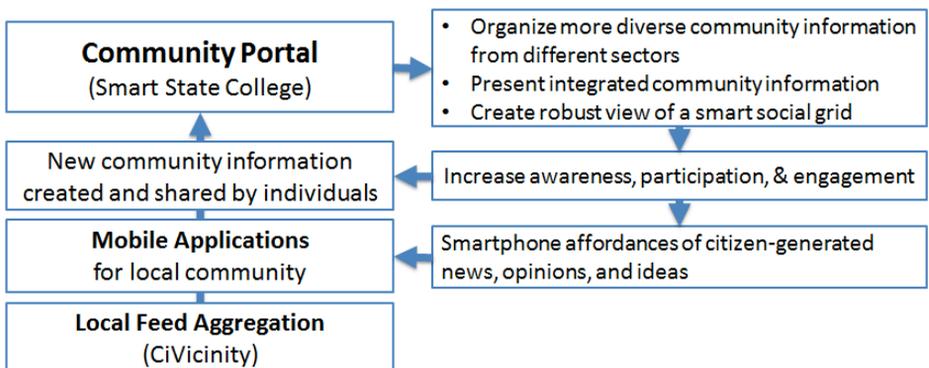
We are investigating current municipal planning processes through an ongoing large-scale participatory planning process. This involves partnerships with the local government, the chamber of commerce, the historic resources commission, as well as a number of local nonprofit organizations. Our user field notes from our collaborations with local stakeholders and user studies have led us to design rationale to support enhanced citizen awareness and toolkit abstractions for smart city social technology. Our work responds to both a clear need and an exciting opportunity. Many cities still rely on periodic economic impact studies developed by outside consultants to help them plan. In contrast, business organizations identify marketing trends continuously and at scale through big data social media analytics. Municipal governments see this asymmetry, and indeed are under pressure to promote channels for citizen awareness and participation (Isaacs, 2012). Giovannella (2014) recommends that a benchmark of smart cities may be to measure the *state of flow* of a city wherein main stakeholders carry out cooperative and convergent actions. Similarly, we propose a way to facilitate better utilization of analytics by municipality stakeholders to leverage, integrate, and ground community-building activities.

Cities have always been centers of information intensity and resource transformation. Emerging "smart cities" leverage big data analytics to improve outcomes of municipal operations, and are finding new ways to capitalize these data (Celino, 2013). Smart cities integrate the physical capital of a location with the social capital of a community in a way that improves urban infrastructure as it enhances awareness, participation quality of life for a community (Campbell, 2012). For example, smart energy grids have allowed cities to adapt to changing electricity needs; combining these data with *smart social grids* (of collective knowledge, resources, and awareness shared online) unmask even more potential for cities to adapt, learn, and innovate (Coe et al. 2001).

This combination of capitals requires a balance that not only makes local knowledge available, but presents it in a way that is engaging enough to inspire citizen-led dialogues about local issues. For us, this grounding and integration is the key to the promise of smart cities. In this way, smart social grids can enhance

community awareness and help citizen's ground online activities in a way that makes them more significant to themselves and their communities. We are only beginning to understand the impacts that smart cities have on citizen awareness, local decision-making operations, economic development for organizations, community planning, and many other purposes.

In the balance of this paper, we describe how the news feeds generated through mobile applications are combined and organized into an asset-based community portal "Smart State College," combining information services of community data about (and generated by) local people, places, and events, and grounding this data through significant and persistent assets that are consequential for citizens. As illustrated in Figure 1, this work builds upon and extends lessons learned in prior projects with local feed aggregation and mobile applications in which we explored the potential of community feed aggregation to evoke hyperlocal engagement, awareness, and participation (Han et al. 2013; Hoffman et al. 2012). Our methodology is to propose a value added infrastructure to build upon community information services and their social effects in detailed scenarios and design rationales, to design and develop functional prototypes, to work closely with community partners, and to extensively test in laboratory and field contexts (Carroll & Rosson, 2008, 2013).



**Fig. 1.** Proposed value added infrastructure of community portal supported by mobile applications.

Smart territory infrastructure has improved dramatically, raising our attention from merely aggregating feeds (i.e. local news articles, community calendar feeds, Tweets, local databases) in mobile applications, to mining and organizing community information through ontologies of community assets (i.e. people, places, institutions, and events). Once our established information services of community information have been aggregated, big data analytic techniques can identify trends, support profiles, and recommendations for municipalities. The resulting summaries of community information are then able to contribute to theory and practice of smart social grid development by providing a deeper understanding of (1) information services that are available in a local community, and (2) interactive community development systems for consuming such data. Such an understanding will help to

empower citizens and community stakeholders to retrieve community information in ways that are relevant to their particular concerns.

#### 4.1 Creating an Asset-based Community Portal

Our community partners reported difficulty tackling the sentiment that there is simply “nothing to do” in the downtown despite their efforts to promote local events. CiVicinity community portal project integrated place-based activity with community knowledge and awareness. For example, CiVicinity aggregated online community calendars, placing events on a map along with distances from the user’s location. The objective was to broaden citizens’ awareness of what is going on and where it is going on, and thereby make it easier for citizens to take advantage of opportunities for social experiences within the local community (Hoffman et al. 2012). CiVicinity also aggregated community feeds, from news organizations, local groups, and individual blogs, which provide a variety of local information in one centralized location. This site facilitates users’ exposure to community knowledge by aggregating information about active locations and entities within the community.

Smart State College will build upon the CiVicinity infrastructure by not only aggregating community news feeds, but also combining and summarizing community data in a way that allows citizens, local decision-makers, and entrepreneurs to better recognize and interact with community assets. McKnight and Kretzmann (1990) developed the neighborhood asset map as method of community building that focuses on the skills and capacity of a neighborhood and its residents. Asset maps articulate three levels of building blocks: *Primary building blocks* consist of individual, associational, and organizational capacities while *secondary building blocks* consist of institutions and physical resources and *potential building blocks* are those located and controlled outside of the community, such as public information, capital improvement projects, and welfare expenditures (McKnight and Kretzmann, 1990).

Our CiVicinity research identified community information feeds pertaining to primary and secondary building blocks; however, we wish to combine these building blocks and organize information by economic sector in the Smart State College portal. An asset-based depiction by economic sector will highlight the most active sectors of the community while also pointing to opportunities for new organizations to fill gaps in less active sectors. While automatic aggregation an organization of community feeds is useful for making information transparent, we found that it does not always produce useful information to citizens. Mobile applications create opportunity to directly associate citizen information with geographical locations using GPS coordinates. Allowing community places to speak for themselves hyperlocally cuts out some of the “junk” that is automatically aggregated from feeds. Smart State College is a more articulated community information infrastructure through the use of citizen-generated information. Our improved community portal will exploit the community information services from individual mobile applications and connect this information with existing community databases for a robust view of a smart social grid.

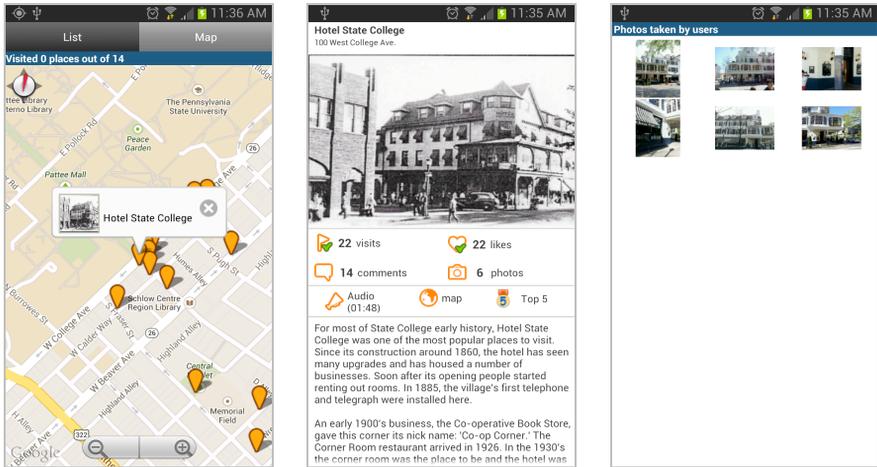
Community groups can use this interactive hub organized by community assets to approach community building from a positive perspective. Too often, community

development discussions linger on the problems and deficiencies of a community rather than realizing assets and opportunities. Not all assets in a community have information services associated with them, but by articulating new combinations of information we hope to uncover synergies among this data.

## **4.2 Community Information Service: Past and future of location-based knowledge**

Understanding the past is an important part of planning the future, as well as feeling grounded in the present. One's understanding of the past can be vague or mythologized, but we hypothesize that making community heritage, planning and management more vivid to citizens can engage their commitment to the community, their willingness to become more aware and to participate, and their sense that activity within the community is meaningful and consequential. Individually, our community-based mobile applications have focused on how place-based access to and aggregation of community information can convey a broader and richer sense of community identity and activity. Each of these community information services can be mined for information pertaining to a particular segment of the community to garner more information about the status of the overall community.

We worked with the Historical Resources Commission of the Borough of State College, Pennsylvania (USA), to create the Lost State College application (Figure 2; Han et al. 2014). This information service consists of a collection of self-documenting places. We geo-coded photographs and other historical documentation for 43 historic buildings and 14 plaques in a downtown neighborhood. A user of the application standing at one of these locations can view records including images from different points in time, the street address, textual and audio descriptions, and web links. The user can also interact with the place record through standard social media functions such as checking-in, liking, commenting, and adding one's own photo and caption. From the Lost State College study, we found that the application allowed participants to access official historical information and augment hidden stories and personal experiences or reflections to the local historical places (Han et al. 2014). Lost State College makes community heritage a collective activity, instead of just an archive.



**Fig. 2.** Elements Screenshots of Lost State College: Map view (left), detailed view of the historical landmark (mid), and a list of photo taken and shared by participants (right).

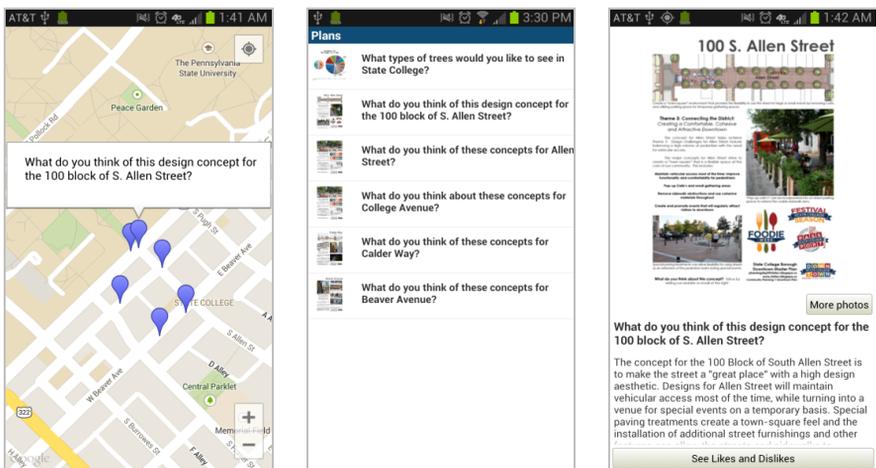
We developed an analogous application and information service to support the municipal planning processes through enhanced citizen awareness. The municipal government of State College, like many municipalities, develops a decadal master plan to guide local development. The master plan includes many detailed sketches and other images of future streetscapes, however; we have found that citizens have difficulty understanding the plans and seeing the future environments in context. Our partners in the local government have told us that it is a typical and serious challenge to help citizens understand municipal plans, and that this is an obstacle to more effective participation in local government planning processes. In response to this challenge, we designed the mobile application called Future State College, which has a similar rationale to Lost State College with respect to enhancing civic awareness and participation, and evoking community identity, but uses different content (Figure 3). A user of Future State College can access plans and images from the community master plan based on location through their personal mobile device. Our design rationale is that situating the planning materials in the physical places to which they refer will make planning more vivid and concrete, and thereby more accessible to citizens, removing the participation “costs” of attending formal planning reviews, and helping bridge the gap between municipal planners and community residents.

As we developed Future State College, we found that the municipal planners we are working with were quite interested in the various feedback and comments evoked from local citizens. In other words, beyond merely engaging citizens in municipal planning, Future State College constitutes a new potential channel between municipal planners and citizens. The planners saw the application as a way of gathering citizen input earlier and more continuously through the planning process. We implemented a simple voting and comment interface to the application to allow citizens to up-vote or down-vote plan elements, add their own comments, and like or dislike others’ comments. Participants in user studies all agreed with the statement: *“I can have an impact on local plans, even though I am only one member of this community”*. The

majority of users indicated that they would be willing to share these plans with friends through their social media account. Over 60% of users reported that if they used Future State College on a regular basis that they would be more likely to participate in neighborhood listservs and local elections. Half of all users indicated that they would be more likely to contact elected officials about concerns, however only a small number of participants stated that they would be more likely to attend public meetings. Future State College provides complementary benefits to citizens and municipal government, leveraging place and lowering cost of participation for citizens (time attending public meetings), a method to spread information to a larger portion of the community, while also creating a new feedback channel for municipal planners.

Similar to Lost State College, the Future State College participants not only become more aware of municipal plans of their community but also became motivated to add their personal thoughts or opinions about the plans by voting or adding comments. Unlike comments crowdsourced in social media, the contents and interactions generated by participants through each smartphone application create a new layer to the local places, transforming them more meaningful and interactive ones that will be appreciated by both local residents and the community. This again highlights potential opportunities of having an integrated space that combines unique and different aspects of the local community.

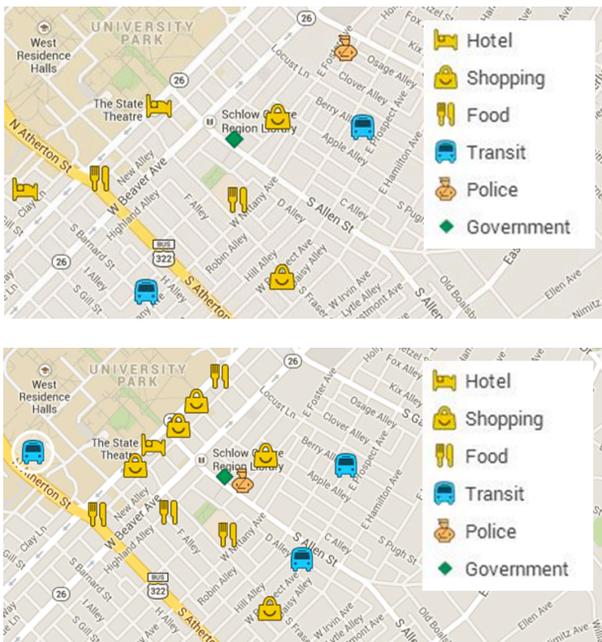
Lost State College and Future State College are examples of how valuable community assets, in this case, specialized information services can be incidentally created by citizen activity within a smart social grid. The use of these applications grounds individual activity in community themes, values, objectives, and motivations, and how it is consequential for local people, places, and events. Use of these applications can be interleaved with ordinary daily activities of modern busy lives; individual contributions are reintegrated through the applications, strengthening community by embodying community identity, awareness, and participation.



**Fig. 3.** Screenshots of Future State College: A map view with the plans presented as pushpins (left), a list of the plans (mid), and a detailed view of the plan (right).

As we progress with defining the Smart State College portal, our objective is to identify further information services that can codify various community assets, and to identify further ways to mine and integrate information services in a smart social grid. For example, an on-going focus of local planning is to maintain vitality of downtown districts, but vitality is a complex consequence depending on transit infrastructure, design of sidewalks, streets, and other public space, proximity and other relationships among various kinds of spaces, demographic balance among types of businesses, among other considerations. Figure 4 is a design for a community asset map, depicting locations of hotels, restaurants, shops, police, government, and transit services that can be browsed through time. This concept integrates Lost State College and Future State College as a more specific planning information service for understanding community development.

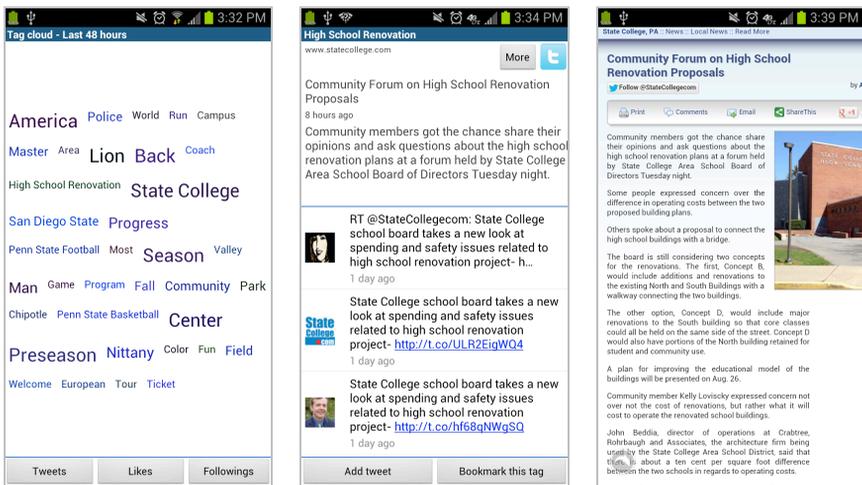
In the Smart State College community portal, the past, present, and future of local places can be combined and labeled by sector to more deliberately ground the spatial distribution of assets over time. As in the case of Lost State College and Future State College, making information services of community development trends accessible to citizens could make citizens more aware of history, trends over time, and future possibilities, grounding their daily interactions. It could evoke more informed and more engaged public discussions and other feedback – and these, in turn, produce further information services to be integrated into the smart social grid. From this, the less accessible potential building blocks can be realized in the form of public information and capital improvement projects, which are important to local development.



**Fig. 4.** Screenshots of Asset-based Geographical Map View: historical locations of community assets (top), present locations of community assets (bottom).

### 4.3 Community Information Service: Local News and Social Media Chatter

Local News Chatter (Han et al. 2013) is an example of a community application that creates a higher order information service. The application aggregates formal news articles from local media with local microblogging in social media (e.g., Twitter). The application performs text analysis on current local news articles, and extracts a set of topic tags. It uses these tags to associate current articles in formal news feeds (for example, the local newspaper) and current microblog posts. Users are presented with a tag cloud (Figure 5) containing a mix of relatively higher and lower frequency current topic tags. Selecting a tag displays a related formal news article and associated microblog posts. This is a simple example of creating potential synergies of local information and citizen awareness through aggregating information services. A key to this concept is that the local news feeds and local microblog information services already exist; they were created for distinct purposes and typically by different community members, but, based on keyword analysis, they are “about” the same topic, for example the high school renovation project (Figure 5).



**Fig. 5.** Screenshots of Local News Chatter: A tag cloud presents the overview of the most recent trend of local news (left), the combined view of formal news articles and socially-generated tweets (mid), and a more detailed formal news information (right).

Local News Chatter can not only help citizens understand local news topics more broadly, for example by reading perspectives their neighbors posted in microblogs, but it can also facilitate connecting with neighbors who have similar topical interests. In our design rationale, the aggregated tweets would not only help attract users to come to read, but also provides users a starting ground and prompts them to further comment or tweet about the news, creating online space and environment of community discourse for local news, events, and activities. Our user study with 30 local residents also indicates similar perspectives (Han et al. 2014). Participants found the aggregated local news articles and local tweets interesting and engaging, because they were able to read and interact with richer and more diverse local information

from their mobile device, which also encouraged them to create and broadcast local information to the public.

In the Smart State College portal, we will expand and specialize information service aggregation. For example, instead of identifying topic tags empirically by frequency analysis, we can extract specific community asset tags to support citizen interactions around targeted issues. More generally, we envision a set of community asset tag clouds targeting a variety of specific community assets and sectors. The parsing of keywords by sector may be a potent enough tool to illuminate news information that might otherwise be overlooked, even unaccompanied by trend information. Data-mining news articles and socially generated tweets can highlight trends in each sector over time. For example, text analysis can be used to gauge frequency of sentiment usage (i.e. positive or negative words) over time, or even to frame the tone of the community by comparing words used to tweet about a particular issue, such as words of aggression (i.e. name calling, profanity) compared to words of collective identity (i.e. “we” or “our”).

## 5 Discussion

Our premise is that one’s experience of quality in daily activity can be enhanced by grounding that activity in significant and persistent themes, values, places, and motivations that unifies the activities and gives them greater meaning. Specifically, we suggest that people-centered smart territories can enhance community awareness by reminding people of place-based history, heritage, current issues and discussions, and plans for the future in the community. Design affordances of community data aggregation enable people centered smart territories in ways not before possible.

In this paper, we briefly reviewed mobile application projects that create and aggregate community information services illustrating the vision of a smart social grid. Our investigation raises many more questions than it answers. For example, what community information services are accessible or can be developed, and how can they contribute to the vision of a smart social grid? What are tradeoffs in supporting grounded activity through a smart social grid of community information services? Our investigation has been productive and exciting, but also quite opportunistic. Our guiding analogy is that as we might have a collection of personal applications to apprise us of national headlines, weather forecasts, business appointments, messages and email, and so forth, we also might have a collection of community information services linked through a smart social grid that enhances our awareness of, participation in, and sense of belonging for our local community. In order to really understand design possibilities for grounding activity by enhancing community awareness we need to construct the design spaces or ecologies of community information services and smart social grids.

Another interesting question refers to the impacts of these mobile applications back to our partners and stakeholders. For example, regarding Lost State College and Future State College, because our local municipal government provided us with contents of local history and future development plans, we were able to design and implement those applications. Although our user studies showed some meaningful

insights on the consequences of using those applications, with respect to increasing community awareness and promoting participation and engagement, we have not yet empirically analyzed the impact of our work on our partners and stakeholders, which is considered to be one of our future research directions.

Lastly, we are interested in studying the relationship between the space or ecology of community awareness applications investigated here and the emerging space of peer-to-peer exchange applications, including those for ride sharing (blablacar.com, carpooling.com, lyft.me, side.cr), performing everyday tasks (taskrabbit.com, airtasker.com), accommodation sharing (couchsurfing.org, airbnb.com), car sharing (citycarshare.org, relayrides.com, getaround.com), sharing parking spaces (parkatmyhouse.com, divvy.com.au), local food exchanges (farmigo.com), sharing household items (yerdle.com, openshed.com.au), exchanging home-cooked meals (cookening.com, leftoverswap.com), and sharing workspace and expertise (liquidspace.com, greenspacehome.com, makermedia.com, wework.com). In most cases, peer-to-peer exchange is also place-based, though dyadic, instead of collectivist. The information services generated through these peer-to-peer exchange applications may provide additional data about community assets that may be otherwise overlooked.

While this paper has encouraged lifting information services out of smartphone applications and delivering them to a community portal, the goal of this project is not to divert attention away from smartphone applications, but rather to utilize the location-based information services that they create in new ways. Our mobile community network project also underscores to us how important user-centered design is for creating community information services to inspire grounded activity. When we seek to integrate these services into grounded activity infrastructures, we must leverage the actions of citizens who will use this information for the betterment of the community development process.

**Acknowledgments.** This work is supported by the US National Science Foundation (1218544).

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