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City of Turku
Turku Urban Research Programme

RESEARCH BRIEFINGS
6b/2013

M-participation: the emergence of participatory planning applications

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Key messages

- **Governments seek to use citizen e-participation to improve the dialog with their constituents, provide transparency, and promote democratic goals.**
- **Mobile applications seek to remove barriers of time and space and allow citizens to participate on-the-go.**
- **First generation of participatory applications allow citizens to report issues. In the future, their interactive features and goal definition are expected to develop further.**

Citizen participation is a process by which members of the civil society share power with officials in decision-making and action taking.[1] Participation is considered to ensure better plans[2] at a time when planning problems are complex. Planning theory considers under what conditions "a better city for all citizens" is created in a democratic and inclusive manner.[3]

In practice, commonly used citizen participation tools and methods include referenda, public hearings, public surveys, consensus conferences, public advisory committees, or focus groups, most of which require the physical presence of the participants at a particular time and place. Identified challenges of these methods include citizen selection, citizen briefing and expertise, and time to organize participation. Another great challenge has been the capacity of local governments to absorb citizen opinions in policy-making in the first place.

The adoption of information and communication technologies (ICTs) in public participation, termed electronic or e-participation, has gained considerable interest[4]. Proponents argue that the use of ICTs may help to overcome some of the problems of traditional participation methods, such as accessibility of information to citizens, facilitation of collecting, and analyzing and hence using the citizen views, as well as the cost-efficiency of the process.

Mobile participation (*m-participation*) represents the latest development within e-participation. It uses mobile devices, specifically applications ("apps"), as tools to engage with citizens. The main advantage is portability: m-participation removes barriers to access according to

the "online whenever wherever" principle. Citizens no longer have to attend time-consuming meetings scheduled at certain times. Beyond the "usual suspects", the promise of m-participation is to reach out to diverse audiences, such as young adults, who tend to be severely under-represented in traditional forms of participation.

In this study, I investigate how currently available apps facilitate citizen participation in urban planning. I present a typology of these apps, describing their main differences and the direction of likely and required development in the light of theories of participation. This is a complementary step forward compared to earlier studies[5, 6], which have mapped urban governance apps based solely on their characteristics.

Levels of participation

In her seminal work, Arnstein[7] recognized that there are different levels of participation, ranging from "non-participation" (manipulation and therapy) through "tokenism" (informing, consultation, placation), and increasing to "citizen power" (partnership, delegated power, citizen control). *Tokenism* "allows the have-nots to hear and to have a voice", while *citizen power* is defined as decision-making power. Since the publication of Arnstein's seminal ladder of citizen participation, participation has been discussed using various attributes, categorizations, and levels. Conceptualizing participation in terms of levels acknowledges that there are multiple ways to participate and that involved stakeholders – public agencies, citizens, and businesses alike – have diverse expectations as to what participation should accomplish. For example, power relations and information flow are normative attributes frequently used when analyzing participation.

Winstanley et al.[8] address stakeholders' power dynamics on two axes. *Criteria power* refers to the ability to determine policy and *operational power* to the ability to decide how such strategic power should be carried out. Yet an alternative division of public participation types is based on information flow[9]. *Public communication* refers to a one-way transfer of information from the "sponsor", meaning the party commissioning the engagement initiative, usually a governmental agency, to the public. In *public consultation*, the information flows from the public to the sponsors. Both processes are initiated by the sponsors and no formal dialog exists between the public and the sponsors. In contrast, *public participation* assumes information exchange between the public and sponsors; through deliberation and dialog, the opinions of both parties are communicated, reflected upon, and transformed.[9]

Electronic and mobile participation

Electronic participation (*e-participation*) means participation using ICTs to enable citizens to connect among themselves, as well as with their elected representatives. Typical e-participation methods include electronic voting, consultations, and petitioning. Proponents of e-participation contend that the use of ICTs may alleviate at least some participation impediments and invoke benefits such as overcoming democratic deficit[10], implementation ease and cost-efficiency[11, 12], easier citizen participation and access[13], or increasing of trust[14]. It is also considered as a tool to ameliorate the relationships between citizens and government in terms of quality and access to services, and transparency of decision-making.[15]

Many e-participation tools have been developed specifically for planning. Public Participation Geographic Information Systems (PPGIS) enables the collection of local knowledge from citizens – mostly non-experts and occasional users – using geographic information systems (GIS) technology[16] and broadens options for public involvement in policy-making.[17] In PPGIS, individuals access available data sets about a specific location;in Volunteered Geographical Information (VGI), individuals create data about locations themselves.[18] E-planning tools have been used extensively over the past decade, for instance in environmental planning[19] and municipal planning.[20, 21] More recently, SoftGIS - "soft" pointing to citizens' experience of the city - has also been used with satisfactory results.[22]

In this study, I focus on a sub-area of e-participation, namely mobile participation *(m-participation)*. This uses mobile devices as tools to engage with citizens. On mobile devices, such as smartphones and tablets, participation is facilitated by applications ("apps"), which are small programs downloadable from application stores. I call the apps used in planning *participatory planning apps*. In previous research, Desouza and Bhagwathar have used the term "citizen apps", based on a notion that many such apps have been developed by citizens themselves in apps competitions[5]. Differently from them, my focus is on the specific topic of planning, not who has produced the particular apps. Recently, Matthias Korn, has provided an enlightening overview of the new possibilities of ubiquitous infrastructure for civic engagement in particular spatial contexts. Such infrastructure includes mobile phones, interactive public screens, and augmented signs.[23]

Planning-related apps tackle a wide range of different issues, such as planning and transportation needs, tourism, and recycling. Salil Kanhere[24] distinguishes between people-centric and environment-centric apps. People-

centric apps document user activities and aim to understand user behavior, while environment-centric apps collect environmental parameters. This distinction is important and helps to structure the multitude of apps.

Notably, the biggest benefit of mobile participation is portability. Citizens carry phones with them and can now provide feedback in real time from wherever their location might be. This provides true potential for engagement, because it removes traditional barriers of space and time - to *come* to a public meeting at a *specific* time. Rather, it thrives on their current position and allows participation "on the go".

Participatory sensing is an additional advantage. Smartphones come equipped with sensors such as cameras, GPS, audio, and voice recognition, which enable data collection. Auxiliary sensors, which can be added to the phones, extend their capacity to measure air quality, noise, or sunlight, for example. These sensors create "the real-time city, in which system conditions can be monitored and reacted to instantaneously", as Townsend[25] puts it.

Using smartphones instead of personal computers has additional benefits. Smartphone ownership has been increasing steadily[26] and may exceed that of computers. Compared to computer programs, smartphone app development costs are relatively low, while distribution to users takes place through app stores and is usually free of charge or at minimal cost. In addition, smartphones bridge the digital divide by providing Internet access to those without computers. Currently, manufacturers cater for a wide range of smartphones, including in low price ranges, the last of which has been the launch of the Nokia Asha. In Finland, for instance, it is estimated that by 2015, smartphone penetration will reach 90 per cent of all sold mobile phones.[27]

Some concerns related to e-participation, including m-participation, have also arisen. M-participation may require constant monitoring[21], although automated algorithms and evidence-based decision-making from "big data" are increasingly cost-efficient.[28]

Privacy concerns arise in all electronic participation. In practice, these have been addressed by controlling personally identifiable data with opt-in permissions, meaning permission from citizens to use their personal data or data collected by them.[29] Electronic services have been, so far, mostly one-way, with limited evidence of transactional and interactive features[30], and there might be the risk that such a one-way nature is inherited in m-participation, although phones have always been about dialogue. As to other kinds of concerns, it should be emphasized that e-participation is no panacea for all challenges of citizen participation. As Pia Bäcklund and Raine Mäntysalo[31] put it: "from the point of view of democracy the technology of communication is of minor importance in relation to how different means of communication are connected to planning and decision-making". In their study on (physical) participation practices in five Finnish cities, they found the profound problem to be that the actual purpose of citizens' participation was not well-defined in relation to planning and decision-making within the processes of representative democracy.

Research setting

In this article, the research question is how do currently existing apps facilitate citizen participation in urban planning? I have studied existing participatory apps worldwide (beta-versions included). In order to understand the contribution of these apps, specific research questions have been:

1. What specific goals do apps aim to reach?
2. What kind of information flows through apps and how?
3. What kind of impact do they seek to accomplish?

The unit of analysis in this study is apps. I investigated nearly 100 urban governance apps, of which 35 were analyzed in depth. Initially, the study was supposed to focus on urban planning apps only. However, actual urban planning apps proved still to be small in number, while many apps relate broadly to planning aspects of urban governance. The sample represents the current status of participatory planning apps. Data on these applications was collected using web portals, social-media sources, and distribution lists, as well as via colleagues.

Apps were selected based on the following criteria. *a) Relevance for urban planning*: in particular, apps dealing with master plans, zoning, strategic and development plans, and so on. However, in my sample, many apps deal with urban infrastructure, such as transportation or utilities, and could be referred to as planning-related urban governance apps rather than planning apps. *b) Geographical distribution*: examples cover different regions worldwide, from the United States to Hong Kong, and from Australia to Finland. *c) Multiple roles of citizens*: citizens can retrieve information, generate content, and even interact with "smart objects", which refers to embedded information that can be retrieved by users. *d) Ecosystem of participation*: apps present opportunities for collaboration between citizens, local governments, and other agencies, research institutes, and grass-root organizations. *e) Transferability*: the potential of local apps to be upscaled.

App typology

To discuss how existing apps facilitate citizen participation in urban planning, I have plotted the apps in a typology using the dimensions of *goals, information flow*, and *leverage*. These dimensions are based on theories of citizen participation. The result is eight types of participatory planning apps, which represent a different combination of attributes (Figure 1). I provide a short description of each and clarify the type with a few examples.

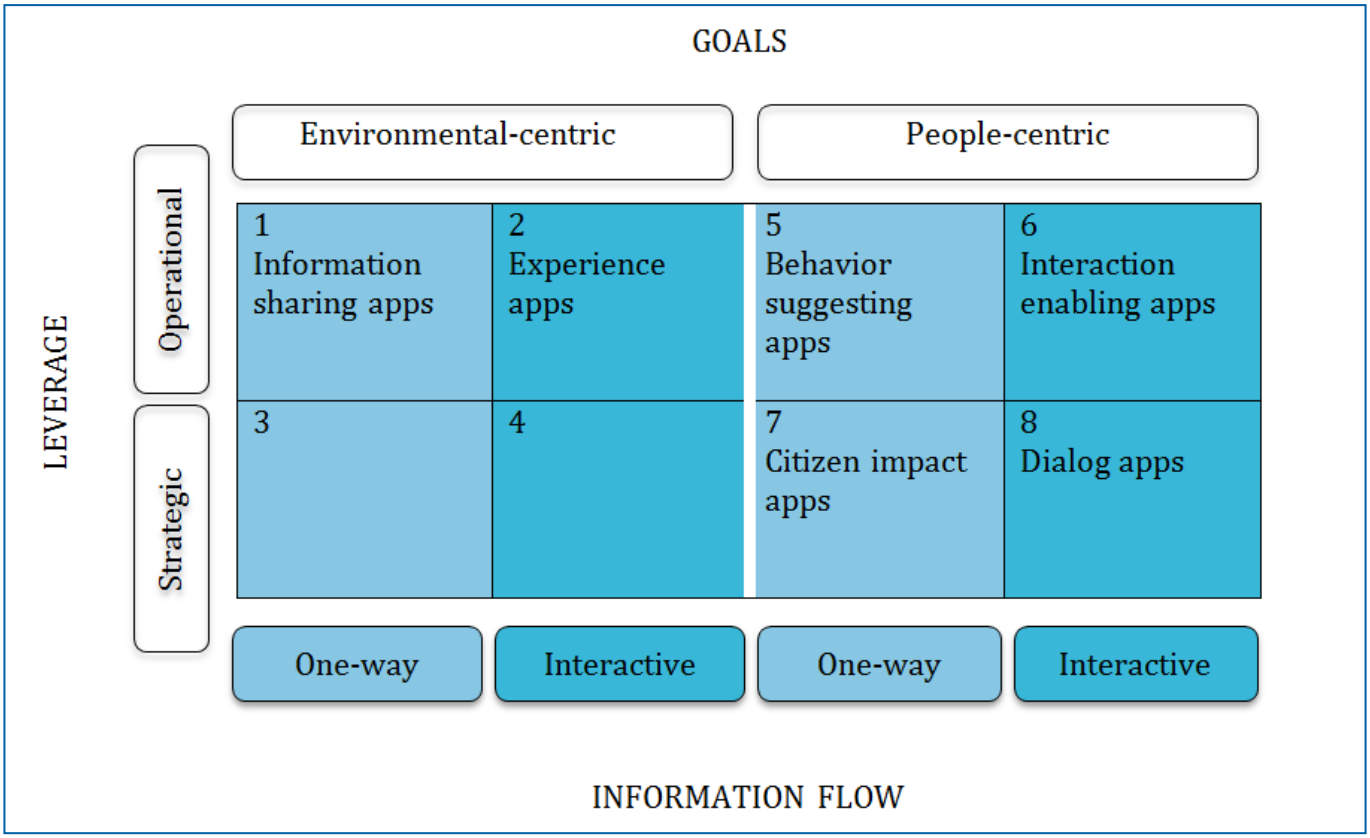

Figure 1. Typology of participatory planning apps

1. Information sharing apps

The first and largest category of apps retrieves environmental parameters for daily operations. In prepopulated apps, such as news updates and online maps, the environmental parameters have been collected previously and fed into the app. Information flows one way *from the organization managing the app to its users* and serves the users' daily information needs. *PlanningVIC, Master Plan 2008 Singapore, MetroPulse,* and *Zoner* are planning-related apps sharing information. Other types of information can be local conditions and news regarding transportation, crisis management, or tourism. Such apps have also been developed in app challenges, including many navigation apps. For instance, *Blindsquare* is an app that helps visually impaired individuals to navigate in cities.

In the so-called "reporting apps", user-generated content (UGC) on environmental parameters is *collected by the users and reported to the organization*. User input is used for managing operational issues, for instance fixing broken things. Citizens moving around the city environment detect and create data with the help of sensors in their mobile devices, mostly GPS positioning and cameras. This data is captured and transmitted to the cities' internal systems, where service needs are registered and solved. These applications also allow citizens to track the progress of their reporting, but lack further interactivity. In a unique example, *Street Bump* employs a non-anthropocentric design to detect and report potholes. The application picks up on potholes via sensors in the phone, with little actual handling required from the user.

2. Experience apps

The one-way dimension of the previous type is gradually replaced with more interactive features. Sensed user-generated content and "smart objects" are hidden in the environment for others to uncover and interact with, and users may share such interactions on social networking sites. These applications enable a shared user "experience" either because the information is generated by peers and accessible to all subscribers, so that users participate in creating data, which is later aggregated or visualized on a map, or because the prepopulated data is presented in a particularly attractive manner, for example as augmented reality.

Peer-to-peer sensed commercial applications include the likes of *Evzdrop*, a development of the Foursquare concept, which enables users to record facts, tips, and news for others nearby to listen to. *WideNoise* lets users sample noise in their environment, evaluate its perception, and share it through social networking. The app creates an interactive map of sound pollution as a visualization and awareness-raising tool. Augmented reality applications are still in their infancy, but a few promising applications have surfaced in tourism promotion and city branding.

3 & 4. Non-existent

I did not find any available apps that would fit into types 3 and 4. These kinds of apps would retrieve environmental parameters that could be used in strategic decision-making. The difference between them is given by the information flow: the former type assumes one-way information flow, while the latter would be based on dialog. A hypothetical example of such apps could be developed for natural catastrophe situations. Data collected with sensing apps could help authorities prioritize and target resources to specific areas (type 3). By adding interactive features such as follow-up questions, a deeper understanding could be reached and more substantive policy knowledge could be used potentially in the long term (type 4).

5. Behavior-suggesting apps

There are, as yet, few citizen-centric applications that document user behavior and suggest available choices. *Re:route* is an application aimed at reducing congestion in London and promoting healthy life-styles through individual transportation-related decision-making. For routes chosen by users between a start- and end-point, the app suggests "environmental-friendly" ones and documents whether these have actually been chosen. It also indicates the amount of carbon dioxide saved in comparison to driving by car, shows the calories burned, and offers reward points as incentives to support "green" transportation decisions. Accumulated points can be traded for discounts at partnering shops. Walking or biking are thus encouraged through monetary incentives. Currently, apps like *Re:route* support operational decision-making. However, if a critical number of users was reached, transportation planners might find such information useful. Instead of traditional descriptives, such as car ownership or driven distance, such information could help planners to understand under what circumstances users are more likely to use public transportation, cycle, or walk. Such information could have strategic leverage when implemented and might well contribute to less congestion.

6. Interaction-enabling apps

These applications have emerged mostly through app challenges and merge open software, open data, and user-generated data. They focus on every-day interactions between user-citizens and have operational leverage. For instance, *Bulky Basics* provides bulky furniture pick-up timetables (open data) and additionally lets users upload information about furniture they wish to sell or donate. *Survive: SD* is meant for use in emergencies situations (open data), but also facilitates contact with friends and family. The *Local Data* app provides cleaned data from neighborhood-level surveys (user-generated data) to be used by community groups, planners, and government agencies. Still in its beta-version, the app has been used in two pilot surveys in Detroit: one on commercial corridors and another on housing conditions. *Local Data* uses open-source software, while the data itself is crowd-collected. In order to increase the leverage of such apps, more focused, problem-oriented goals are needed. This, in turn, would focus the dialog on problem-solving and would provide fine-grained knowledge that planners could use.

7. Citizen impact apps

By citizen impact apps, I mean that citizens' input has strategic leverage despite a one-way communication flow. *Cycle Tracks*, which has been used in San Francisco, is an ideal example of a people-centric strategic policy application. Cyclists download the app and let it track their routes. This user-generated information on cyclist behavior is factored into larger models to help predict future transportation trends. On the other hand, beta-tested apps such as those developed by the Technical Research Centre of Finland *(VTT)* will hopefully provide

tools for assessing urban planning exercises in future. In the deployed beta-version, a selected group of users could visit development sites and see through their mobile devices, as augmented reality, 3D models of proposed buildings, in order to assess how they fit into the present urban environment. If such an app had interactive features, which the one tested by VTT currently does not have, citizens could provide insights to planners or discuss with them or among themselves. In both this and other similar cases, the focused goal and strategic policy commitment is promising, and the emerging apps should continue to develop two- and multi-way communication.

8. Dialog apps

People-centric interactive apps with strategic leverage, which request citizen input on planning and development issues via mobile devices, are a rather new phenomenon. An example is *Textizen,* an SMS-based service designed to collect citizen input in preparation for Philadelphia 2035 plans. After submitting one answer on the survey, follow-up questions are sent and thus a dialog is established between city planners and residents. Nonetheless, the service does not offer possibilities for deliberation between citizens. Importantly, however, by using the attributes of feature phones, namely short messaging, *Textizen* aims to bridge the digital divide by supporting equal opportunities for participation, giving a chance to everyone who has some sort of mobile phone.

Conclusions

Governments seek to use different ICTs to improve the dialog with their constituents, provide transparency, and promote democratic goals. Citizen participation is also considered to have positive effects on the development of citizens' knowledge, skills, and virtues.[32] Citizen participatory methods have started to shift to online and only recently to mobile contexts. The typology presented in this research briefing aims to capture the current state of affairs. However, it is acknowledged that the most interesting applications are yet to be developed in further generations of participatory apps. Admittedly, because the field is only emerging, the boundaries between the eight types of apps are both porous and overlapping: reporting apps contain some feedback mechanisms; daily operations might have potential for long-term policy leverage; and experience apps are, until now, mostly perceived individually and are context-bound.

Planning-related apps in use are still few in number, but they already represent different types. Of the apps investigated, some deal with land-use and zoning, but most serve information dissemination purposes (one-way communication, from local governments to citizens) with operational leverage. Focused participatory planning apps, which afford strategic leverage, are still rare. Other investigated apps focus on participation in a broader governance context, such as service provision (reporting apps), transportation planning, or neighborhood surveying, with various degrees of operational and strategic leverage. Notably, in relation to planning, these applications share location-based data on cycling lanes, parking spaces, or touristic sites. Such data could be used in different stages of participatory decision-making, from agenda setting to problem analysis and solution implementation.

There seems to be an indirect association between the typology's dimensions of goal, information, and leverage: the more apps focus on environment parameters, the less leverage they exhibit; the more apps are human-centric and tap into citizens' tacit local knowledge, the more strategic leverage they entail. Reciprocally, the more apps *record* behavior, the more one-way communication they display; the more they seek to *understand* behavior or opinion formation, the more two-way communication they involve. Except for one case investigated (Textizen), there is still little evidence of sustained dialog between local governments and citizens through mobile-based services. Future apps should try to understand how citizen preferences are formed, not only to record them. Importantly, these alternative views should also be incorporated into policy-making. The way to achieve this goal is by supporting dialog and deliberation among citizens, and between them and public officials.

The typology's individual dimensions also provide revealing insights. In planning, goal finding is one central function.[33] Most of the available applications address rather mundane matters, such as news and updates, reporting, visualizations, awareness raising, and 3D experiences of urban environments. Only a few existing apps have a citizen-centric design and focus on substantial matters such as infrastructure, real-estate, public spaces, or sustainability issues. With the gradual uptake of apps in future generations, problem-solving oriented goals should become more common.

With regards to the information flow, my findings add to Rowe and Frewer's[9] types of public participation: besides *public communication*, *consultation*, and *participation*, citizens can now also communicate among themselves using apps, which initially build on open data, as

well as interact with "smart objects", or embedded information that can be retrieved by other users, which is a more sophisticated type of public communication.

My research approach did not allow an evaluation of how much the citizens' views produced by each app are factored into the decision-making process. I could only assess what kind of information input they can provide in the first place. Nonetheless, I used the kind of information produced via apps as a proxy for leverage. In *prepopulated apps*, where information is given one-way for citizens to use, nothing is transmitted in the other direction. These apps might contribute to citizens' capacity building and raise awareness, but do not contribute to their participation. *Reporting apps, experience apps, behavior-suggesting apps*, and *interaction-enabling apps* enable governments to know "what is happening on the ground". These apps can provide them with pragmatic information, which they can use in service delivery. In citizen-centric strategic apps, such as *citizen impact apps* and *dialog apps*, citizens can provide input into policy-making, because the apps tap into their local tacit knowledge. Nevertheless, they cannot follow what influence their contribution will have in policy-making.

An interesting question still remains: *why do so few participatory planning apps exist?* The increased popularity of reporting apps has, at least momentarily, caused a 'lock-in' of these features without considering the versatility of technology at hand. For instance, the winner in the 2012 San Diego Apps Challenge, called *Street Report*, proved to have greatly similar features to an application called *Fix My Street*, launched as a web page in 2008 and as a mobile application slightly later.

Participatory planning apps are a rather new concept on the whole. Only a few apps have harnessed "crowdsourcing", which collects and uses citizens' knowledge in problem-solving.[34] Nonetheless, many people propose a crowdsourcing approach to the public sector, through open government or government 2.0.[35, 36, 37] Given the current domination of sensing apps, for now it would be appropriate to talk about participatory sensing rather than participatory decision-making through apps. The results of crowd-sourced sensor data via apps are still promoted otherwise, for instance in social media.

Bäcklund and Mäntysalo[31] have argued that challenges of citizen participation will not be solved by merely focusing on *gathering* planning information, but on how the citizens' diverse input is handled and evaluated as part of policy-making. In the future, the way that the collected information will be actually used in decision-making should be addressed for citizen participation in general and for app development in particular. It then becomes vital for local governments to put forward a goal-oriented approach, because this helps to structure the multitude of citizens' ideas, and to crystalize the added value of the interactions, which could provide concrete, usable policy input as a result of citizen participation.

ICT penetration has been argued to represent a reorganization of society and a decentralization of power relations.[38] Mobile participation, one of many technology-mediated tools, is a rather new phenomenon and its long-term implications remain to be seen. So far, however, the impact of participatory planning apps is modest. Nonetheless, apps have already changed the roles of citizens from information receivers (app users) to sensors (content providers) and partners (app developers). It is expected that apps will continue to thrive on location-based data, but also include more of the citizens' own views and interactive features. This will also exploit the technological features of mobile phones much more than the current apps. The gradual emergence of dialog and goal-oriented apps will facilitate making the gathered information relevant for policy-making.

Web resources for apps mentioned in the article

APA https://itunes.apple.com/us/app/american-planning-association/id514114782?mt=8

Baltimore https://itunes.apple.com/us/app/visit-baltimore-maryland-for/id423388373?mt=8

BikeCityGuide http://www.appsforamsterdam.nl/

BlindSquare http://blindsquare.com/

Bulky Basics http://www.appsforamsterdam.nl/

CA Desert http://apps.usa.gov/ca-desert.shtml

Calgary https://itunes.apple.com/ca/app/city-calgary-road-conditions/id482156663?mt=8

Citizens Connect https://itunes.apple.com/us/app/boston-citizens-connect/id330894558?mt=8

CycleTracks http://www.sfcta.org/modeling-and-travel-forecasting/cycletracks-iphone-and-android

Evzdrop https://itunes.apple.com/us/app/evzdrop/id560224104?mt=8

First Aid https://itunes.apple.com/US/app/first-aid-by-american-red-cross/id529160691?mt=8

Gothenburg AR City Guide https://itunes.apple.com/se/app/cityguide-goteborg/id403215626?mt=8

Hong Kong https://itunes.apple.com/us/app/hong-kong-police-mobile-app/id535359319?ls=1&mt=8

Kuopio https://itunes.apple.com/fi/app/kuopio-mobiilikunta/id512318883?mt=8&ign-mpt=uo%3D4

Local Data http://localdata.com/about.html

Master Plan 2008 https://itunes.apple.com/us/app/master-plan-2008-singapore/id571242365?mt=8

MetroPulse https://itunes.apple.com/sn/app/metropulse/id440768203?mt=8

MyColumbus https://itunes.apple.com/us/app/columbus/id444745167?mt=8

MyDelaware https://play.google.com/store/apps/details?id=com.apporder.myDelaware&hl=en

Park-Shark https://itunes.apple.com/us/app/park-shark-amsterdam/id510032256?l=nl&ls=1&mt=8

Reitit v2.0 ("Route v2.0) https://itunes.apple.com/fi/app/reitit/id474018978

Philly WatchDog https://itunes.apple.com/us/app/philly-watchdog/id428024273?mt=8

PlanningVIC https://itunes.apple.com/au/app/property-planning-report/id416457935?mt=8

Report a Weed https://itunes.apple.com/us/app/report-a-weed/id547471331?mt=8

Rio de Janeiro https://itunes.apple.com/us/app/rio-de-janeiro-travel-guide/id350555387?mt=8

re:route http://www.wired.co.uk/news/archive/2012-05/08/re-route and https://www.recyclebank.com/faq/index/category/url/reroute-uk?store=uk& from_store=us

San Diego Street Report https://itunes.apple.com/us/app/sd-street-report/id518218814?mt=8

Street Bump https://itunes.apple.com/us/app/street-bump/id528964742?mt=8

SubwayTime https://itunes.apple.com/us/app/mta-subway-time/id561507659?mt=8

Survive: SD https://itunes.apple.com/us/app/survive-san-diego/id516776036?mt=8

TaxiMagic https://itunes.apple.com/us/app/taxi-magic/id299226386?mt=8

Tuscany https://itunes.apple.com/it/app/tuscany/id365739194?mt=8

Textizen https://www.textizen.com/welcome

VTT http://www.vtt.fi/news/2012/04112012_VTT_tuo_laajennetun_todellisuuden_yhdyskunta_ja_rakennussuunnitteluun.jsp?lang=en

WideNoise https://itunes.apple.com/us/app/wide-noise/id302052132?mt=8

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Research Briefings (Tutkimuskatsauksia) is Turku Urban Research Programme's publication. It is published regularly in Finnish and occasionally in English or other languages. The briefings reflect the views of their author(s) and these are not necessarily those of the City of Turku.

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Publisher:
The City of Turku Administration
City Development Group
P.O.Box 355 (Yliopistonkatu 27a), FI-20101 Turku

ISSN 1799-5124 (online publication)

www.turku.fi/kaupunkitutkimus/julkaisut/