

# Enhancing Knowledge Discovery and Innovation in the Digital Era

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## Chapter 14

# Innovation Contests: How to Engage Citizens in Solving Urban Problems?

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### **ABSTRACT**

*Cities all over the world are challenged with problems evolving from increasing urbanity, population growth, and density. For example, one prominent issue that is addressed in many cities is mobility. To develop smart city solutions, governments are trying to introduce open innovation. They have started to open their governmental and city related data as well as awake the citizens' awareness on urban problems through innovation contests. Citizens are the users of the city and therefore, have a practical motivation to engage in innovation contests as for example in hackathons and app competitions. The collaboration and co-creation of civic services by means of innovation contests is a cultural development of how governments and citizens work together in an open governmental environment. A qualitative analysis of innovation contests in 24 world cities reveals this global trend. In particular, such events increase the awareness of citizens and local businesses for identifying and solving urban challenges and are helpful means to transfer the smart city idea into practicable solutions.*

### **INTRODUCTION**

Today, many governments as well as municipalities open up their data and make them available online on governmental open data portals. Such open data portals are available on the international level, e.g. <http://data.europa.eu/euodp/en/data/> (European Union Open Data Portal), on the national level, e.g. <https://www.data.gov/> (U.S.), <https://data.gov.uk/> (United Kingdom), but also on the city level, e.g. [DOI: 10.4018/978-1-5225-4191-2.ch014](https://open.</a></p></div><div data-bbox=)

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wien.gv.at/ (Vienna, Austria) or <https://opendata.cityofnewyork.us/> (New York City, NY) and typically provide data that is available free of charge and possible to be re-used without any limitations or technical restrictions (Open Knowledge International, n.d.a). This data is often referred to as open government data and offers non-rivalrous, non-excludable as well as valuable information to citizens (Jetzek, Avital, & Bjørn-Andersen, 2013). Primarily on the municipal level, there are huge amounts of data generated e.g. by sensors which are relevant in citizens' everyday life and can be referred to as open urban government data (Mainka, Hartmann, Meschede, & Stock, 2015a). By opening their data, governments aim at fostering participation, collaboration, and transparency, as well as economic and social values as citizens and companies can or will use the data to produce innovative products and services (Albano, 2013; European Commission, 2011). In particular, open data competitions (European Commission, 2011) or digital innovation contests are assumed to be helpful means to foster civic participation in the re-use of open data. Hjalmarsson & Rudmark (2012, p. 10) define such a contest as “an event in which third-party developers compete to design and implement the firmest and most satisfying digital service prototype, for a specific purpose, based on open data.” This idea is taken one-step further by the concept of app competitions or hackathons (hack marathons) where governments and citizens develop new (mobile) applications in cooperation. These events are aimed at involving citizens to solve specific problems or address stated topics and are assumed to be a new way for civic engagement and participation. People from different backgrounds can come together at one table and try to create something value added to improve city life. The involvement of citizens in developing problem-solving innovation can be referred to as open government (Mainka et al., 2015a). However, do hackathons or similar contests help to develop value added services? Do all municipalities host the same events or are there differences? What are the outcomes of these events and how do governments accomplish them? This chapter aims at exploring the phenomenon of open innovation contests like hackathons and app competitions in more detail in order to figure out whether these events are indeed used by smart cities around the globe to engage citizens, to highlight differences between contests, and emphasize best practice examples. The analysis is based on informational world cities defined by Mainka et al. (2015a). Those cities are prototypical cities of the knowledge society and provide an enhanced ICT infrastructure. Hackathons and app competitions often take place in big cities, therefore a set of 24 cities was chosen as a starting point of a global investigation of innovation contests.

## **THE IDEA OF INNOVATION CONTESTS**

More than the half of today's world population lives in urbanized areas. This evokes many problems for citizens, urban planners, and the government. In addition, smartphones and mobile connectivity have gained increasing importance in recent years and mobile exceeds fixed broadband subscriptions (Burger, 2012). In so-called “informational cities” (Castells, 1989) or “smart cities” (Castelnovo, Misuraca, & Savoldelli, 2015) citizens own and use mobile devices (Stock, 2011) and their demand for “services that increase their productivity, efficiency, communication skills, or create experiences that enhance their quality of life” (Walravens, 2015, p. 282) rises. Thus, especially in larger cities, governments are increasingly challenged to solve citizens' problems, improve their services and the quality of life. Data driven investigations and mobile apps that help citizens in everyday life could be a solution.

In informational cities not only a well-developed ICT infrastructure plays a crucial role in a city's growth and development but also human and social capital. Therefore, smart municipalities should aim

at enhancing the quality of life in the city and boosting its economic growth in order to create a public social and economic value for all citizens (Caragliu, Del Bo, & Nijkamp, 2009). However, citizens' participation is required in order to fulfill their needs and provide services that indeed ease their everyday life. In our history citizens often have volunteered, e.g. as bodyguards in neighborhood safety patrols. According to Bellone & Goerl (1992), in some cases, citizens are able to provide better service than their government is able to. Since governments have opened their data and publish it on public data portals, citizens can help themselves and their community to transform open data into value-added services, for example through developing new smartphone apps. To take this one-step further, the data of smartphone applications can then again feed into governments' open data portals as for example in the case of the 311 service response system via which citizens can report issues or request city services via mobile apps. Thus, citizens do not necessarily have to be in the app development in order to create valuable services based on open government data, also citizens who do not have any programming skills may be asked to participate by using apps, "for example helping to redesign the park you're walking in" (Millard, 2010, p. 8). In this case, citizens are "data prosumers (both providers and consumers of data)" (Charalabidis, Loukis, & Alexopoulos, 2014). The data provided by the citizens, e.g. via 311 is also often published on governmental open data portals and can be used as a starting point for hackathons and app competitions (Hartmann, Mainka, & Stock, 2017). Hence, the data flow from the government to the citizens, who work with the data, has now changed into a bi-directional data exchange and even co-production becomes possible with the help of hackathons and app-competitions (Robinson & Johnson, 2016; Sieber & Johnson, 2015). It is not only the cities' government that plays an important part in transforming their city into a smart city but also the people within the city are a critical factor for success (Chourabi et al., 2012).

If citizens became developer of urban applications, the services are called 'citizen apps' (Desouza & Bhagwatwar, 2012). But designing mobile apps by end-users "can require significant technological innovation, and prizes can act as an inducement for innovation to such challenging development tasks" (Desouza & Bhagwatwar, 2012, p. 109). Therefore, innovation contests like app competitions or hackathons can be organized to develop mobile services collectively and motivate the public (Baraniuk, 2013; Briscoe & Mulligan, 2014). The concept of innovation contests refers to the use of these events in order to benefit from innovative ideas and solutions submitted by people outside of the organization that is hosting the contest (Hjalmarsson, Juell-Skielse, & Johannesson, 2017). However, hosting these events, which can last from one or two days up to several months, requires much support which in some cases is offered by governmental agencies like the Infocomm Development Authority (has now been renamed to Infocomm Media Development Authority) of Singapore, a supporter of the *AppVenture Challenge* (Chan, 2013). This is aggravated by the fact that still less is known about how to construct such events in order to achieve citizens' engagement as well as valuable and successful services. Juell-Skielse, Hjalmarsson, Johannesson, and Rudmark (2014) found out that fun and enjoyment, intellectual challenge, and status and reputation are the top three drivers of participation in innovation contests. By contrast, extrinsic motivation like money was stated to be less important for participants. In addition, Immonen, Palviainen, and Ovaska (2014) propose that the development of urban apps should be embedded in an "open data based business ecosystem" (p. 88), which consists of elements such as key partners, co-creation, revenue strategies, customers and markets, data structure, business development, and the value added. Such a business ecosystem is targeted at ensuring the sustainability of mobile apps (and not a quick development of an app followed by stopping the product some weeks later).

The question arises whether city governments in fact involve their citizens in the mobile app development process by hosting innovation contests and if they aim at creating successful and valuable solutions

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for their citizens, which can be assumed to be only seldom successful ad hoc, but to need further support in most cases. Furthermore, not only governments can be the initiators of these events, also citizens could organize them in order to build useful services based on the data that is available on governmental open data portals. The need for a long lasting support as well as the continuous development of the resulting apps might be only a few of the challenges that have to be met. Therefore, it is still unclear if these events are indeed useful, for example, to increase citizens-to-government communication and collaboration, or merely a hype with less effect (Johnson & Robinson, 2014; Hellberg & Hedström, 2015). For these reasons, an overview of innovation contests in 24 informational world cities will be given in the following and shall help explore different types of contests, their outcomes, organizers and supporters, as well as the challenges and opportunities that governments should consider before hosting such events.

## **METHOD**

In order to answer the afore-mentioned issues, the innovation contest movement was analyzed through a web content research, since hackathons and app competitions are related to online available resources, i.e. promotions and reviews are hosted online, e.g. on government websites, blogs, as well as online news platforms. For this reason, an Internet search for announcements of hackathons and app competitions as well as experience reports using Google as a search engine was conducted. As it can be assumed that there is a greater need for these events in world cities, 24 informational world cities (as defined by Mainka et al. (2015a)) were used as the basis for the investigation (see appendix). To identify the respective competitions and events keywords like government data, open data, competition, contest, hackathon, and app in combination with the specific city name were used. The findings of this chapter have previously been published in the International Journal of Knowledge Society Research by Hartmann, Mainka, and Stock (2016) but were revised and updated extensively in June 2017.

## **INNOVATION CONTESTS AROUND THE GLOBE**

For all 24 cities, hackathons or app competitions could be identified. Popular terms to describe open data contests are hackathon, app challenge, app competition, prototype-athon, appathon as well as hack or code festival which all can be summarized by the term 'innovation contest'. The first events of this type presumably took place at Sun Microsystems and OpenBSD. Both used the term hackathon independently from each other for the first time in 1999 to announce a hack event for their employees. By using this term, they referred to events which were aimed at developing new software and not at committing computer crimes (Briscoe & Mulligan, 2014). However, differences between app competitions and hackathons can be found in their duration and setting. A hackathon is usually held offline, which means that people meet locally between one and three days, often at weekends, whereas app competitions take place for several months with a deadline till then the finished projects have to be handed in online. In addition, hackathons often allow for developing a new service in a small team whereas competitions in many cases call single persons or companies for submitting their applications. The initiative to host the event was found to come from the government (top-down) in most cases. Often they work in cooperation with local companies as well as NGOs and NPOs but also the hacker community hosted events in some cities (bottom-up). Additionally, several cities, e.g. Los Angeles, have already hosted specific hackathons

(e.g. *Hack for LA*) several times (as in the case of LA every year since 2013) whereas others have only taken place once heretofore, e.g. the *Data in the City Hackathon* by Singapore in 2013.

## **Scope of Innovation Contests**

Although it was searched for events in relation to cities, it turned out that hackathons and app competitions are not only a city-specific phenomenon. They can be hosted for different areas, for example, New York City (city level) or larger areas like New South Wales (state level), Finland (national level), the whole European Union (trans-national level), or all over the world (international level). Nowadays this concept of app development takes place in cities and regions all over the world, e.g. Boston, Amsterdam, and Paris, but it has its origins in the US where one of the first innovation contests called *Apps for Democracy*<sup>1</sup> was held in Washington in 2008 (Johnson & Robinson, 2014). The aim of this contest was to make the DC.gov's data catalog useful for everybody within the city. They managed to achieve 47 mobile applications with an estimated value of \$2,300,000 by spending \$50,000 on the contest (ISL, 2017).

An example of a nationwide competition is *Apps4Finland*, which is hosted in collaboration with the city of Helsinki since 2009 and was renamed in *Open Finland Challenge* in 2015. Often the resulting applications from other challenges, e.g. *Open Helsinki – Hack at Home* are handed in for competitions which address larger areas, as e.g. the *Open Finland Challenge*. Those competitions are organized, partnered, and sponsored by a wide range of institutions. In the case of the *Open Finland Challenge* the Open Knowledge Finland, the Forum Virium Helsinki as well as over a dozen additional partners support the event (Open Finland Challenge, n.d.). Some federal states, like New South Wales, use a concept named *apps4nsw* to call for applications based on the government data of NSW. This was the first competition in Australia which encouraged its participants to use state government data (N. S. W. Government, n.d.) and tries to bridge between government, citizens, and industry on the level of a federal state. Also the *Canadian Open Data Experience {CODE}* is a 48-hours hackathon on the federal level that invites participants to use open government data from all levels, i.e. provincial, territorial, municipal, and federal data to build applications (Canada.ca, n.d.).

Furthermore, there is a concept called *Apps for Europe*, which could be understood as an international network that hosts hackathons (among other events). They want to support valuable applications in their whole development process and “provide tools to transform ideas for data based apps into viable businesses” (Apps for Europe, n.d.a). Similar to *Apps for Europe* is the *National Day of Civic Hacking*. This concept started as a national one and has grown up by 2014 to be international, which is special as hackathons – usually – are held locally. However, although it is an international event by now, local meetings still take place but henceforth all over the world at the same time and aim at raising collaborations between residents, communities, and governments (DHMN Civic Hacks, April 09, 2015). An example of an international hackathon is also the *International Open Data Day* that is held in the seventh year now (Open Data Day 2017, n.d.). This event takes place once a year at one single day all over the world and had more than 140 participating cities in 2014 (Weissman, February 24, 2014). In addition, it is one of the few examples which are not awarded but for fun. Instead of monetary awards, the support of open data usage and development of useful services for the neighborhood should be the main motivations to join these hackathons but also meeting new people, discussing ideas, and improving skills can be reasons why people attend the events. Some cities also use this international hackathon day as a starting point to set up a city-wide hackathon that addresses their specific issues as for example in the case

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of the *Democracy Hackathon Helsinki* that should bring together developers who like to develop new tools that enhance democracy and are based on open data (Forum Virium Helsinki, February 12, 2016).

The *Open Stockholm Award* is a noteworthy competition which not only allows Stockholm's residents to take part in the contest but calls for participants from all over the world (Stockholms stad, n.d.). Some originally national level competitions started to build broader networks by forwarding their contributions to an international competition like the *Smart City App Hack*. For example, participants of the *Open Finland Challenge* also took part in the *Helsinki Smart City App Hack* and competed with contributions from Barcelona, Dubai, and Phoenix at the *Smart City Expo* held in Barcelona in October 2015 (Appcircus, 2015). However, not only citizens can hand in their ideas and solutions in innovation contests, even city governments' themselves have a chance to compete with their ideas and innovations that are supposed to improve the quality of life in their cities and the work of their governments at the *Mayor's Challenge*. This competition is hosted by the Bloomberg Philanthropies, founded by Mike Bloomberg, and aims at improving civic life all over the world as well as it shall help city governments to get their innovative ideas implemented, earn recognition and learn from each other how they can overcome challenges as for example climate change, civic engagement in public problem solving, and aging populations (Bloomberg.org Group, n.d.).

Civic hackathons and app competitions do not only address people of different nationalities but also with very diverse skills. They primarily appeal on engaged and creative persons to join the events and not for developers and programmers exclusively. For example, Singapore invites "urban planners, architects, sustainability experts, technologists, researchers, developers, and designers to co-create new prototypes to help Singapore become a more livable, competitive and sustainable city" (Newton Circus Pte Ltd, 2017). In addition, Vienna states that the citizens are the most needed and emphasizes that especially statisticians, as well as librarians are wanted participants (OpenDataHackathon 2011, June 18, 2013). By contrast competitions like *apps4austria* also allow companies, institutions, and administrative organizations to participate (Digitales Österreich, n.d.).

## **Topics and Outcomes**

Similar to the scope of competitions also the announced aims and topics can be various. The *Apps for Amsterdam* competition, for example, announced six general themes (vacancy, tourism & culture, democracy, mobility, security, and energy) to which contributions should be addressed (Waag society, Institute for art, science and technology, November 7, 2012) whereas others aim at solving specific problems like the *Safer Communities Hackathon*. This event was held by the Chicago Police Department in 2013 to see in which ways their new API could be used and to improve their interaction with residents (Whitaker, May 14, 2013). In addition, there are special series of hackathons, like the *Green Hackathon* or the *Open Energy Data Challenge* which aim at developing services for sustainability (Green Hackathon, n.d.; Vienna City Administration, n.d.). Another mentionable example is hosted by the citySDK project whose goal it is to harmonize application programming interfaces (APIs) of different cities so that they can be accessed by one common API, e.g. the issue reporting API Open311 (Forum Virium Helsinki, n.d.). This API could then be used for the *citySDK challenge* in 2014 to develop the "best cross-city Smart Participation app" (Hanna, April 17, 2014).

Beside topics also the preferred outcomes of innovation contests can vary. In most cases, hackathons are aimed at developing mobile applications and prototypes, although the *Open Data Day Helsinki Hackathon*<sup>2</sup> primarily focuses on teaching its participants about open data and how it can be used. In a



few cases also ideas to solve problems are highly welcomed and awarded, e.g. for the Stockholm Award. With this award, Stockholm not only rewards apps or web services but also project plans which offer solutions within the stated categories (e.g. traffic and accessibility). Furthermore, they ask people who have an idea but do not want to participate to share them via their Twitter feed (Stockholms stad, n.d.). The Singapore government took the call for citizens' ideas one step further and established a platform called *eCitizenIdeas!* (Government of Singapore, 2017). It is supported and funded by a number of city agencies, e.g. Smart Nation and Digital Government Office (SNDGO), the Government Technology Agency (GovTech), Infocomm Media Development Authority (IMDA), National Environmental Agency (NEA), and shall enable citizens to share their ideas and solutions with their government. These ideas do not necessarily have to address hackathons. It is a platform for governmental challenges in general where citizens are asked to co-create innovation by sharing and voting for ideas and distribute the city's challenges in their social networks" (Government of Singapore, 2017). With this platform, the Singaporean Government outsources the generation of ideas to the public what is also known as "crowdsourcing". The term was introduced by Jeff Howe in 2006, who defines it as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call" (Howe, June 02, 2006).

## **Organizers and Supporters**

As the afore-mentioned examples show, lots of hackathons and competitions are organized by governmental agencies. San Francisco is reported to be one of the first cities that published datasets online (they started in 2009) and thus foster the use of open data (Franks, January 11, 2013). The first governmental hackathons and app competitions according to our study were found in Chicago, Helsinki, and New York. In addition, there are also new companies that emerged to host hackathons. One example is *AngelHack* which is operating since 2011 and organizes hackathons for other companies. Whereas their first hackathon was held at Adobe in San Francisco they are now operating internationally (Casecase, n.d.). Besides governmental agencies, NGOs, and companies that organize and support civic innovation contests, there are bottom-up initiatives as well. One example is a group of Chicago volunteers who name themselves *Open City*. Their goal is "to create apps with open data to improve transparency and understanding of our government" (Eder, May 15, 2017). In March 2012, they started to organize weekly hackathons for designing new mobile apps based on open data. These hackathons are open for everyone and have grown up to a group of more than 100 participants (e.g. developers, designers, researchers, journalists, policy wonks, and curious citizens) by now (Eder, May 15, 2017).

An outstanding example of governmental support for app competitions and hackathons is shown by the Infocomm Media Development Authority (IMDA). They are aimed at establishing a whole ecosystem where foreign companies, local enterprises, and start-ups collaborate and grow. They support this by setting up the necessary policies and regulations, infrastructure (e.g. by delivering ultra-high speed broadband access) as well as education for the required workforce (Info-communications Media Development Authority, November 28, 2016). Accordingly, they not only support a large number of innovation contests but also workshops to help people with the development of mobile applications, prototypes or open data visualizations. However, the IMDA is not the only supporter of such events, also a large number of enterprises, NGOs, and other governmental institutions, as well as citizen communities (Urban Prototyping (UP) Singapore and DEXTRA) have worked together to host dozens of hackathons. The Barcelona City Council shows similar ambitious work as it targets to foster innovative mobile applica-

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tions and supports idea competitions and hackathons, but not only for the city itself. With hackathons like the *Smart City App Hack*, they want to establish “a global network of smart cities that face similar challenges and share one vision: to turn citizens into App Makers, empowering them to build apps and businesses that will make for a better city” (Dotopen S. L., 2015).

Many European hackathons and competitions are supported by a foundation called *Open Knowledge Foundation*, which is separated in single countrywide foundations. This non-profit organization is aimed at opening knowledge and information, supporting projects and collaborations in regard to open data (Open Knowledge International, n.d.b). Another non-profit group of volunteers on a city level is *BetaNYC*, which was founded with the aim of making its government more open, transparent, and participatory. They describe themselves as “a civic organization dedicated to improving lives in New York through civic design, technology, and data” (BetaNYC, n.d.) and organize monthly meetings, events, and support startups in order to create an “informed and empowered public that can leverage civic design, technology, and data to participate in the political process, and hold government accountable” (BetaNYC, n.d.). As members of the *Code for America’s Brigade* they are part of a global network of volunteers, local governments, and community partners that aim at building new tools to solve urban problems, connecting people, and exchange about technologies and processes (Code for America Labs, n.d.).

## **Challenges**

It is questionable which status the developed applications or services have. Are the winning services and prototypes indeed ready for use? In the case of *CodeAcrossNYC 2014* hackathon hosted by New York, most of the developed applications are web apps (BetaNYC, February 24, 2014). Whether web applications or smartphone apps, based on specific operating systems were developed most, is difficult to determine since not all events report about their success and publish the winning services. Nevertheless, organizers of hackathons and app competitions have to think not only about the issues and topics for which these events should find solutions but also about the users of the outcomes and their technical environments. Depending on the respective operating system various mobile applications could be needed, whereas mobile web apps would run notwithstanding the operating systems but with limited access options instead. One smartphone application which has become very successful is *Bike Citizens*<sup>3</sup> formerly known as *BikeCityGuide*. It has won nine awards since 2011 (e.g. *Apps for Amsterdam* and *Apps for Europe*) and the Android version has been downloaded between 100.000–500.000 times according to the Google Play Store. But also web applications can become successful, like the Chicago *Flu Shot App*, which was built by a civic hacker in cooperation with the Chicago Health Department and was then also adopted by the Cities of Boston and Philadelphia (Howard, January 17, 2013). The advantage of web apps is that they can be used by a broader range of people since they are independent of any device.

In order to bring a social or economic value out of the competition, the resulting ideas and products have to be accepted and used by citizens. In some cases, the developer gets some assistance from the city or the initiators of the hackathon. This can be in the form of financial, technical, as well as social support, e.g. to connect the developer with existing project groups. The *Apps for Europe* contest even brings it to the next level and not only looks for valuable open data based applications, the competition even aims at bringing the new apps into business (Apps for Europe, n.d.b). For this purpose also a *Business Lounge* event was established that shall give selected startups an opportunity to socialize with international experts (Waag society, Institute for art, science and technology, n.d.). In turn, this event offers the opportunity to win a pitch to the investors of *FutureEverything*<sup>4</sup> in Manchester which is a world leader

in the digital and art sector. However, the literature has shown that extrinsic motivations are not among the top drivers of participation in open data competitions and participants seem to be aware of the low chances to enter the market and making a profit in the end (Juell-Skielse et al., 2014). In addition, these events are hosted with the aim to increase awareness and promote open data, which finally may lead to a collectively shared mission where everyone can make a difference (Hellberg & Hedström, 2015).

Similar to the outsourcing of ideas, also financial support can be outsourced to citizens which may “donate sums of money to support or finance a specific project” (Zogaj, Bretschneider, & Leimeister, 2014). Such an example of “crowdfunding” is the platform *citizenvestor* where citizens are invited to fund projects they like (Franks, January 11, 2013). The platform *ioby.org* takes this idea one step further and combines crowdfunding with resource-organizing. This means that they try to connect project organizers and supporters to make the projects successful also in the long term. They call this approach crowd-resourcing (Ioby, 2015). In most cases, the resulting services are aimed at solving specific issues with relevance for the city. Therefore, the challenge is not only to develop mobile apps but to make them successful and available to a broad range of citizens. The products of civic hacking or app competitions have to be promoted after these events so that they get recognition from a larger audience. For this purpose, Chicago provides a good example. They call for residents to become members of *The Civic User Testing Group* (CUTGroup) which is a project by the *Smart Chicago Collaborative*. The members of this group are paid with 20\$ for testing new apps (Civic User Testing Group, n.d.). In addition, the *Smart Chicago Collaborative* offers free space for hosting new innovative applications and provides a good starting point for civic app projects (Whitaker, May 14, 2013).

The outcomes of hackathons and app competitions have shown that there is a need for financing and promoting the developed products. However, what if the hackathon is not only announced to develop a product for the market but also to develop tools for the whole city’s engagement? This has happened at an international hackathon event in New York. They hosted a prototype-athon called *CodeAcross-NYC2014* which belonged to the international hackathon weekend *CodeAcross 2014* and was hosted under the slogan “Beyond Transparency. Let’s take the open government movement one step further, by focusing on not only making data open, but actionable” (Bracy, January 13, 2014). This means that participants should work on datasets, portals, policies, and many other tools and topics concerning the provision and administration of open data and build prototype tools for city council members and community boards to help them to use and understand open data (BetaNYC, February 24, 2014). Thereby, the city officials’ awareness was raised to the data they provide, since a lot of data has been published that was of poor quality. A major task at this event was to recognize how satisfied the participants are with the data provided by its government as well as to raise city officials’ awareness for the importance and usefulness of open data (Weissman, February 24, 2014).

## **Potential for Change and Innovation**

It still remains unclear whether hackathons are indeed able to make a difference and engage citizens in governmental processes. A survey conducted by the City of Vancouver was carried out to get more feedback from participants at hackathons (City of Vancouver, 2017). Vancouver’s city government found out that participants demand further hackathon events and more support for the community. They like the exchange between participants and city officials. But there is also a claim for longer hacking sessions, faster Internet access, as well as more people with different backgrounds. In addition, participants prefer to be informed about upcoming events on the government’s website, social media channels, as

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well as via emails (City of Vancouver, 2017). The city government should show that they strongly support these events and attach importance to participants' contributions. For instance, Vancouver's third *International Open Data Day* was accompanied by more than 20 city officials as well as the Federal Minister for Open Data at the national government. In addition, a meaningful location, like a city hall, is assumed to be helpful in order to underline that these events and their participants are highly welcomed by governments (Eaves, March 11, 2013). This confirms the government's aim for change to a more open and participative culture. Furthermore, the participants should be as much diverse as possible, since also people without programming skills can come up with great ideas (Eaves, March 11, 2013). This is one aspect that has changed over years. These events are not addressed to developers and computer programmers only, but allow everybody to participate and ask for a wide range of people with different skills. Innovation contests should be open to participants all over the world and cities should try to work in cooperation with each other. However, the analyzed cities perform very differently in doing so, e.g. in German and Italian cities innovation contests are scarcely available, whereas many other cities like e.g. Amsterdam, Barcelona, Chicago, Helsinki, and Singapore offer a wide range of competitions. Many cities tend to team up and host innovation contests jointly in order to build up global competitions which reach larger audiences. Although, not many contests seem to be well established as several ones were organized only once and only a few have been running yearly. In addition, not all of the apps and prototypes developed during these events can become successful in the long term, but to support some innovative ones, it might be helpful to build a whole innovation contest ecosystem, like it is targeted by IMDA of Singapore. Such an ecosystem could not only foster transparency and accountability but also participation in terms of the generation of ideas, services, and projects as well as their success. Similarly, Almirall, Lee, and Majchrzak (2014) claim that companies can learn from city governments' fast adaptation of open innovation and see a need for an integrated ecosystem approach to open innovation where initiatives, collaborations, and technologies are designed in order to be easily adopted by other cities and stakeholders. Furthermore, the focus should not be on developing solutions for one's own needs but to collaborate and interact with others and drive innovation proactively. A similar goal is pursued by the *Mayor's Challenge* hosted by the Bloomberg Philanthropies and also many other hackathons and app competitions that have been presented in this study show how governments already share their data and innovations with others.

More importantly than building successful applications, is to establish a community that aims at solving problems together regardless whether they are city officials or citizens. This could be achieved in cities like Chicago, Vancouver, and Singapore. Strong citizen communities, who organize visible events on their own, like in the case of Chicago, are in the minority and most hackathons and competitions are organized by governmental as well as non-governmental institutions and organizations. For this reason, still more governmental efforts seem to be needed to establish a culture of civic engagement and making citizens aware of the importance of open data, civic technologies, and innovations in general for the city. Citizens should recognize that they can benefit from these contests through making their city more livable and open. One group of citizens, who have recognized that, is *OpenDataBC*. They state on their website that governments should not have to do all of this alone, their citizens should help them so that they can "just concentrate on getting the data out there, in raw form, and we will help organize it, assemble it and tag it so it's more easily used by everyone" (OpenDataBC, n.d.). Thus, innovation contests can help to establish collaboration between citizens and governments as well as co-creation of public services that improve citizens' everyday life and address public issues. This also happens for example by means of the innovation competition *NYC BigApps* with which solutions for New York's

three mayor challenges, i.e. “transportation, access to knowledge, and community resiliency” (NYC BigApps 2017, 2017) should be found.

## CONCLUSION

This chapter contributes to the discussion on innovation contests as it shows how these events can be adapted to a wide range of different needs and issues within a city and offer a platform to generate ideas and solutions for city-specific problems. In particular, since the implementation of innovative projects and services is often too risky and resource consuming to be integrated into city departments’ daily business (Almirall, Lee, & Majchrzak, 2014), innovation contests and the support of external partners and supporters can be valuable in order to find solutions for citizens’ problems and improve governmental service provision. However, also more tangible results have already been achieved, for example the increasing popularity and re-use of open data has already led to enhanced data quality and new jobs have been created, e.g. a Chief Data Officer was proved for the city of San Francisco (San Francisco Mayor’s Office of Civic Innovation, January 11, 2013). Hackathons and app challenges have even become so popular that guides, e.g. “How to run a hackathon”<sup>5</sup> and books, e.g. “Civic Apps Competition Handbook”<sup>6</sup> were published to support hosting these events. Furthermore, many governments started to work in cooperation when hosting innovation contests. Nevertheless, the scope, topics, outcomes, organizers, and supporters of hackathons and app competitions were shown to vary greatly between the analyzed cities and there are only a few concepts that take place in several cities in the same way, e.g. the *International Open Data Day*. Today’s app challenges can range in size, e.g. from the city level up to an international level, in the addressed topics, from very broad themes, e.g. mobility up to specific solutions and tools for APIs, and the competitions’ outcomes range from ideas up to market-ready mobile apps. In many cases, we see that the initiatives of opening data or initiating a hackathon or app competition come from the government but in some cities also the citizens build strong communities and are aimed at supporting their municipalities.

Among the cities’ biggest challenges is the applications market launch. Only a small number of apps will be able to enter the market successfully and most of those will need much support. Therefore, especially the outcomes’ financial support and competitive power are the biggest challenges. Also the success of the events’ outcomes is still questionable. However, the great chance of these events is to bring people together as a community and develop city services, which could make the city smarter and enhance the quality of life. A great advantage is to solve urban problems collectively and foster the collaboration between governments and citizens. It can be concluded that innovation contests could have the potential to improve the government-to-citizen relationship since they call for civic engagement and help to overcome the cities’ mayor challenges. Although it remains questionable if the potential of the crowd can be embedded into a successful ecosystem which helps to survive or even increase civic engagement to build value-added services for a livable future. At least, city governments should aim at cooperating with as many stakeholders as possible. They do not have to bear the burden of becoming a smart city alone. The example cases of many cities that have been described in this study show that hackathons and app competitions, i.e. innovation contests, can be helpful means in order to bring citizens, companies, and governments – also beyond the city level – together in order to discuss problems and find solutions in terms of specific services and tools but also in the form of financial, technical, or organizational support.

## **INFORMATIONAL CITY RESEARCH PROJECT**

The investigation presented in this chapter is part of a research project on informational cities at the Department of Information Science of the Heinrich Heine University, Düsseldorf (Germany), started in 2010. Stock (2011) has laid the basic idea of how to analyse informational cities in the 21<sup>st</sup> century. His approach is multidisciplinary and joins urban studies, sociology as well as information science. In best practice investigations the cities Singapore and London have been analyzed (Khveshchanka, Mainka, & Peters, 2011; Murugadas, Vieten, Nikolic, & Mainka, 2015) and further regional investigations have been conducted in cities of the Gulf Region (Kosior, Barth, Gremm, Mainka, & Stock, 2015) as well as in Japanese cities (Fietkiewicz & Pyka, 2014; Fietkiewicz & Stock, 2015).

The increasing use of technology and the digital infrastructure have played a crucial role in the investigation of public services in informational cities. Thus, public libraries have been investigated according to their digital and physical services (Mainka, & Khveshchanka, 2012; Mainka et al., 2013; Orszullok, Peters, Stallmann, & Stock, 2013; Orszullok, Stallmann, Mainka, & Stock, 2012). Further, the integration of social media services as part of the digital library and in addition, as general digital service for governmental purpose (Mainka, Hartmann, Stock, & Peters, 2015) complemented the investigation of informational cities. One of the services used very frequently is the short messaging platform Twitter. As public libraries and governmental departments spread a lot of information through this service further investigation has focused on the information dissemination via Twitter (Förster, Lamerz, Mainka, & Peters, 2014, Förster & Mainka, 2015). Governments increasingly use e-services whereas the maturity of e-government services is on different levels in informational cities (Mainka, Fietkiewicz, Kosior, Pyka, & Stock, 2013). In some cases, the municipalities start to offer open data platforms and even present showcases of projects that reuse the available data (Mainka, Hartmann, Meschede, & Stock, 2015). However, municipalities are still looking for solutions and ideas how the digital transformation may lead to enhanced services and to solve urban problems. They are challenged by their own digital transformation of the administration (Hartmann, Mainka, & Stock, 2017). Thus, the increasing involvement of citizens in design thinking or open innovation processes has been introduced in some best practice examples (Mainka et al., 2016), but evidence of success factors are missing. Therefore, the chapter at hand contributes a qualitative study to this lack in research.

Investigations of the financial market, the labor market as well as the importance of entrepreneurship and creativity complement the research project (Dornstädter, Finkelmeyer, & Shanmuganathan, 2011; Murugadas, Vieten, Nikolic, Fietkiewicz, & Stock, 2015, Nowag, Perez, & Stuckmann, 2011). Recently, a conceptual framework of informational or smart cities has been developed by the researchers at the Department of Information Science which bridges the different aspects of the city, its society, economy, spaces, infrastructure, and problems (Barth et al., 2016). Furthermore, a qualitative investigation on the defined factors of an informational city has been scrutinised for 30 world cities around the globe (Mainka, 2017).

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## **ENDNOTES**

- <sup>1</sup> <https://isl.co/work/apps-for-democracy-contest/>
- <sup>2</sup> <https://forumvirium.fi/en/open-data-day-helsinki-hackathon/>
- <sup>3</sup> <https://play.google.com/store/apps/details?id=org.bikecityguide>
- <sup>4</sup> <http://futureeverything.org/about/>
- <sup>5</sup> <http://socrata.com/wp-content/uploads/2013/05/How-to-Run-a-Hackathon.pdf>
- <sup>6</sup> <http://govfresh.com/2012/12/civic-apps-competition-theres-a-book-for-that/>

## **APPENDIX: LIST OF STUDIED MUNICIPAL GOVERNMENTS**

- Amsterdam (The Netherlands);
- Barcelona (Spain);
- Berlin (Germany);
- Boston (U.S.A.);
- Chicago (U.S.A.);
- Dubai (U.A.E.);
- Frankfurt (Germany);
- Helsinki (Finland);
- Hong Kong (China, SAR);
- London (United Kingdom);
- Los Angeles (U.S.A.);
- Melbourne (Australia);
- Milan (Italy);
- Montreal (Canada);
- Munich (Germany);
- New York City (U.S.A.);
- Paris (France);
- San Francisco (U.S.A.);
- Singapore; Stockholm (Sweden);
- Sydney (Australia);
- Toronto (Canada);
- Vancouver (Canada);
- Vienna (Austria).