Smart cities built by smart people: How to build Smart cities using a contextual participatory approach?

Maryam NAZARI, PhD
Consultant, Iranian Research Institute for Information Science and Technology (IranDoc), Tehran, Iran
nazari@irandoc.ac.ir; maryamnazari76@gmail.com

Abstract

Objectives: This article argues that unless we understand the context in which we aim to build smart cities, we may fail to develop smart cities that are workable and sustainable. **Prior work**: there is a wealthy body of knowledge on the why, what and how of smart cities, however they do not address the actual needs of the citizens of every city. To make the smart cities solution frameworks work in different cities, we need to tailor these frameworks to the actual needs and constraints of the cities. **Approach**: To address this gap, this article proposes a contextual participatory approach and demonstrates how to use this approach to conduct smart city projects that address real-life problems and generate workable and sustainable solutions.
This study explains why one size smart solution does not fit all cities' problems and delivers a prompt guideline on how to uncover the actual needs of a city and to deliver feasible solutions that make the city smart(er). **Results**: To build smart cities we need to conceptualize the why, what, and how of smart city considering the actual needs of the citizens in a participatory manner. To get the citizens engaged in the building process of the smart city we need to get them in some real-life situations then expose them to well-constructed questions. **Implications**: this approach can be of value to researchers and practitioners who are seeking insights on the concept and practice of smart cities regardless of where they live. If employed correctly, this approach promises results, i.e. smarter cities. **Value**: It generates insightful and practical knowledge on the actual needs of the citizens and the workable and sustainable solutions. The smart cities built by this approach will bring more wealth, ease and happiness to the life of the citizens.

Keywords: contextual participatory approach, conceptualization of smart cities, "why, what, and how" of smart cities

1. INTRODUCTION: WHY CONTEXT MATTERS?

This article argues that unless we understand the context in which we aim to build smart cities, we may fail to design smart cities that address the actual needs of citizens in a workable and sustainable manner.

Although the importance of context and the participation of the community in the building process of smart cities have been well-emphasized in the literature (e.g. Komninos, 2013; Gooch et al., 2015; Deakin and Allwinkle, 2007; Mitchell, 2015), in practice there seems to be some methodological deficiencies on how to design smart city projects that addresses real-life problems and considers the actual constraints surrounding a city.

There is a wealthy body of knowledge on the why, what and how of smart cities and several different frameworks namely, Technology framework, Human framework, institutional framework and Energy Framework (Smart City in Wikipedia) which guide

the design of smart city projects, but in practice many smart city projects fail (Noviko, 2015; Rayal, 2016; Nair & Sharma, 2017). Why is that?

Because one size smart solution does not fit all and every cities' needs. From a contextual perspective there seems to be three reasons for failure of smart city projects as follows:

REASON 1 - COMMON PROBLEMS; DIFFERENT CAUSES

Although smart city has been identified as a solution for many different problems traffic, pollution, transportation, waste management, etc (McLaren & Agyeman, 2015), to make it work it needs to be tailored to the specific needs of the citizens of a city and to the specific contextual constraints surrounding that city.

Problems may be the same but the causes of the problems may vary in different cities and countries. For instance, traffic is a common problem that most countries struggle with but because the causes of traffic are different from one country to another and one city to another, we cannot prescribe the same smart solution for these two places. In one place the traffic is caused by lack of information on where is the nearest car park, in another place the traffic may be the result of some cultural bad habits, e.g. people do not respect driving rules.

REASON 2 - COMMON STANDARDS; BUT NOT TAILORED TO ACTUAL NEEDS

In theory, there are common principles, standards and frameworks are widely-used to design smart city solutions, however they are not tailored to the actual needs of the citizens of every city. To put these frameworks in practice, we first need to understand the problem(s) for which we want to propose smart city solutions. Having identified the problem, then we may use the existing solutions frameworks to explore feasible, workable and sustainable solutions that meet the real-life needs of the citizens of the city.

REASONS 3 - SIMILAR DEFINITIONS; DIFFERENT CONCEPTIONS

Definitions of smart cities deliver certain and quite similar attributes. According to Deakin and Al Wear (2011), there are four factors that contribute to the definition of a smart city:

1. "The application of a wide range of electronic and digital technologies to communities and cities;
2. The use of ICT to transform life and working environments within the region;
3. The embedding of such Information and Communications Technologies (ICTs) in government systems;
4. The territorialisation of practices that brings ICTs and people together to enhance the innovation and knowledge that they offer."

However, the way that smart city, smartness and city itself are conceived may vary from one place to another. This implies to design successful smart city solutions we need to understand the context in which we want to implement the solution. The importance of the context in the construction process of smart cities has been highlighted in several definitions such as the one by Deakin. According to Deakin (2013), smart city is a city that:

- "utilises ICT
- to meet the demands of the citizens of the city
- and that community involvement in the process is necessary for a smart city"

This highlights the importance of citizens' input in the construction process of the smart city, simply because the smart city solution can work well when it addresses a) the actual needs of those who live in that city and b) the contextual constraints affecting the requirements needed to make the city smart(er).

Thus, to design smart city solutions that address the needs of the citizens of a city, we need to move beyond the definitions. The smart city concept should be articulated around the experiences and perceptions of those who live in a city. In this process, the smart city definitions can be used as a theoretical foundation for designing conceptual frameworks to guide such contextual conversations, that is, to get the citizens to reflect on the various aspects of smart city characteristics and to engage them in the conceptualization process of the smart city project, while discussing their wants and expectations in real-life situations.

2. PROPOSAL OF A CONTEXTUAL PARTICIPATORY APPROACH

To address this gap, this article proposes a contextual-participatory approach to conceptualize the why, what, and how of smart city in real-life contexts and with the participation of those who have lived experiences of the city, existing problems and possible solutions. This approach has emerged from the author's PhD research (Nazari, 2010; 2011; 2016a) and has been used to address different problems (e.g. Nazari, 2016b).

As explained thoroughly in the next part of this article, this approach, if employed correctly, will make it possible to gain contextual insights needed to tailor the existing smart city solution frameworks to the actual needs of every city and make cities smarter in that they bring more wealth and happiness to the life of the citizens of that city.

2.1. HOW DOES THE CONTEXTUAL PARTICIPATORY APPROACH WORK?

It explores phenomena in real-life contexts and the why, what and how of the phenomenon is collaboratively constructed with the active participation of those who have lived experiences of the phenomenon. Hence the emergent data from this approach is very insightful and practical as it reflects reality and proposes feasible and workable solutions considering the actual constraints surrounding the context.

In case of smart city projects, as demonstrated below, the contextual participatory approach paves the way to understand problems in real-life contexts as the whole project, from identification of the problem to construction of smart city solution takes place in real-life context.

Secondly, the why, what and how of smart city is collaboratively conceptualized by real-life experiences of those who live in the city, that is, the smart city project is conducted in a participatory manner as it engages the citizens throughout the process. Together these promise feasible, workable and sustainable results as it makes the citizens part of the process.

3. SMART CITY PROJECT DESIGN IN A CONTEXTUAL-PARTICIPATORY MANNER

3.1. PROBLEM IDENTIFICATION

Treating smart city as a solution, first we need to identify the problem that we aim to solve by this solution. As mentioned earlier the problems addressed by smart city solution are almost the same in every city and every country but the causes of the problems may vary from one place to another due to diversity factor. Thus to begin the project first we need to articulate the problem as takes place in real-life context.

To do so, we need to get the citizens into an engaging conversation that encourages them to talk about the problem (e.g. pollution, traffic etc) and challenges they face. As shown in Figure 1, this data can be gathered through interview with the citizens and from open data, if available. We need to seek patterns on the challenges, wants, and wishes of the citizens when facing the problem. This will generate insightful data on the problem and the causes of the problem.

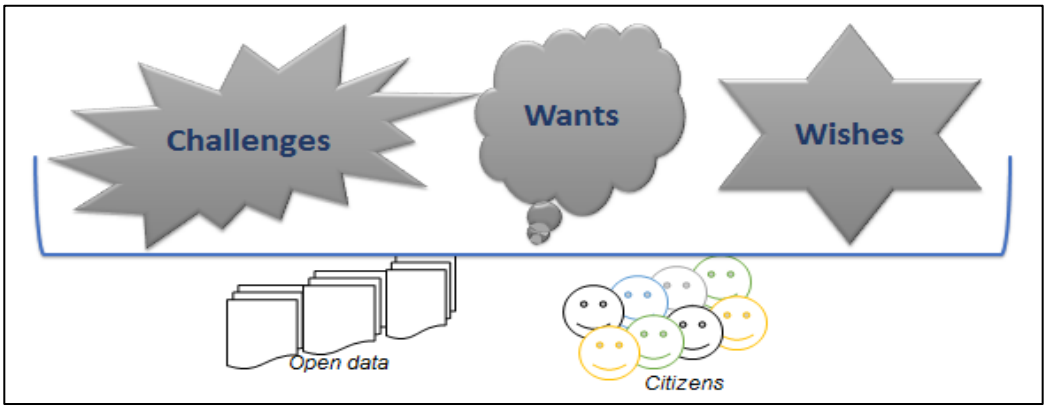

Fig. 1. two main sources of data to gather insights on the problem in smart city projects

As mentioned earlier there are several smart city solution frameworks and a wealthy body of literature which deliver prompt knowledge on the why, what and how of smart cities. However, because the concept of smart city and smartness may vary in

different cities/countries, we need to tailor these frameworks to the actual needs of the city which is the subject of our project.

To do so, we need to design smart city project in a way that it produces practical knowledge on the why, what and how of the smart city considering the context in which we want to design and implement the smart city solution.

As presented in Figure 2, we need to design a conceptual model that explains the why, what and how of smart city and to use that model to design the study protocol. This conceptual model can be built upon existing smart city frameworks, best practices, and the literature. With the

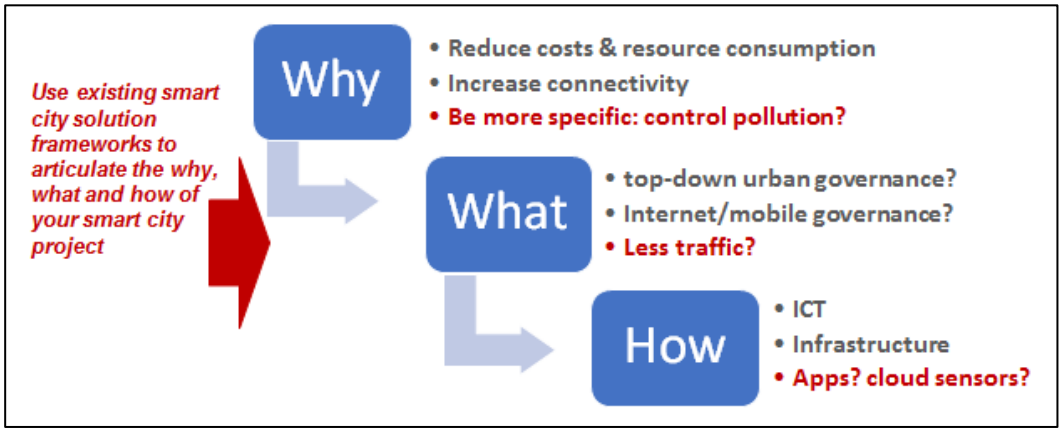

Fig. 2. Three main components of a smart city project conceptual model

3.2. FIELDWORK DESIGN

Having identified the why, what and how of your smart city project (the study conceptual framework), you need to move on to the fieldwork phase of the study where you want to get real-life insights to customize the why, what and how of the smart city in real-life context. The insights may come from a) the experiences of those who live in the city and have a real sense of the problem, and b) those who have a great sense of the constraints and have expertise to offer feasible, workable and sustainable solutions for the problem.

As displayed in Figure 3, the study protocol should be designed around three main questions in the following order:

1. what to ask
2. who to ask
3. how to ask

Unless we are clear on what we want to ask in our participatory research, we may fail to choose right sources to ask the questions. To answer "what to ask" part, you should refer to the conceptual model of your project designed in the previous phase. This

includes specific questions on the why, what, and how of your smart city project. The why refers to the problem that your project wants to address and the what and how are articulated around that problem.

Fig. 3. Smart city project fieldwork protocol

Having identified the "what to ask" part, you may proceed to the next part of the fieldwork protocol: "who to ask".

Who are the most qualified people or sources of data to answer your questions, all depends on the questions. So unless you are clear about what you want to ask, you should not proceed to the "who to ask" part of the protocol. Indeed, the "what to ask" part will guide you to think of right and resourceful sources of data. For instance, if your smart city project aims to create smart solutions for traffic and pollution, you need to choose individuals and resources possessing relevant experience and expertise in these areas.

As presented in Figure 1, there are two main sources of data to understand problem and create feasible and sustainable solutions: a) citizens of the city who have a real sense of the problem and can share experiences on the challenges when they face the problems; b) open source data which can give you some insights on the actuality of the various aspects and signs of the problem.

Having answered the "what to ask" and "who to ask" part of the study protocol, you may move on to the last part which is "how to ask" the questions.

There are various methods and tools which can be used to explore a question and gather data. This includes interview, observation, questionnaire, text mining etc. Depending on what you are seeking to answer and what is your source of data, you may choose appropriate methods to gather data and insights you need to articulate the why, what, and how of your smart city *solution* in a way that it meets the needs of the citizens of the city in a feasible and sustainable manner.

In contextual-participatory research, people are the key source of data and the best method for gathering data from people is interview. However, to get responses that reflect

real-life experiences on the phenomenon under study and delivers feasible and workable solutions require certain considerations. Firstly, people must be situated in real-life scenarios that they experience in their everyday life, otherwise they may not talk about their experiences. Secondly, they should be exposed to questions that will motivate them to share their deepest knowledge and experiences about what matters to your project (i.e. the why, what, and how of smart city solution that works in the particular context of your study).

3.3. BUILDING WORKABLE SOLUTION

To conduct such situational in-depth interviews, this article proposes three constructs as follows:

1. Background
2. Task
3. Solution

CONSTRUCT 1 - BACKGROUND

As shown in figure 4, the interview questions should be designed in a way that gets the interviewees to talk about their background first. Obviously, there has been a reason why you have chosen a particular person and a certain group of people for your study. The background questions should be designed in such a way that the participants get to talk about the relevant background you want them to talk about when answering your questions. This includes a specific job, role or activity they do.

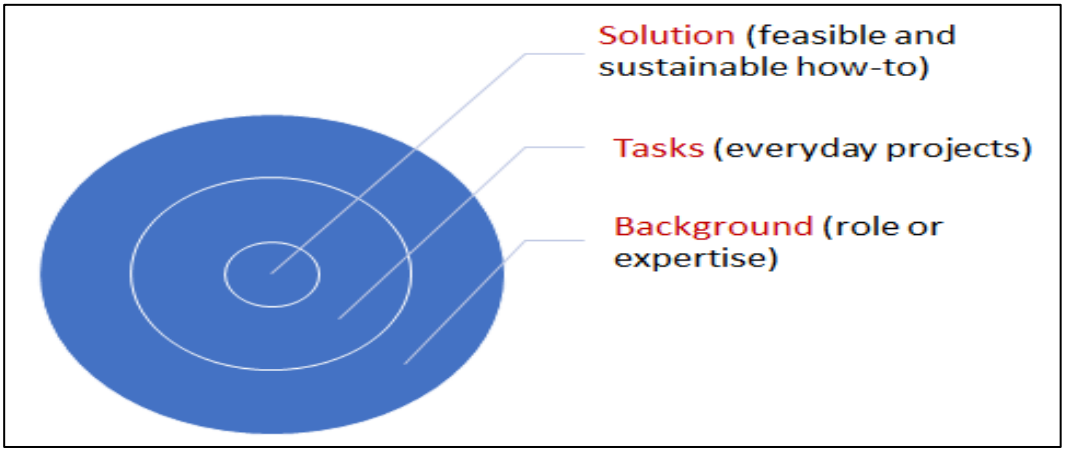

Fig. 4. Three constructs in contextual-participatory interviews

CONSTRUCT 2 - TASK

Having situated the participant in a right context, it is time to get them think of, and talk about, a particular task they do. The task should be a real-life task they do as part of their job or in their everyday life. This task should get the interviewee talk about the

problem that your smart city project aim to address and to share experience and expertise that would contribute to the construction of feasible and sustainable smart city solution.

CONSTRUCT 3 - SOLUTION

Once the interviewee got engaged in the conversation in a situational manner, they are ready to be exposed to the main questions on the why, what and how of smart city. To get most out of the interview, it should be designed in a semi-structured manner. It begins with open questions and it will be proceed with more specific questions. The specific questions come from the conceptual framework designed in earlier phase. For instance, to address the "why of smart city" you will have a list of reasons for why your smart city project is needed. Having heard the interviewee's answer on the open question, i.e. on what problem they face, you may proceed with further questions on some other reasons for why smart city solution may be needed. These reasons come from your conceptual model emerged from the literature in earlier phase.

When situated in real-life context, whatever they say and they suggest will sound real, feasible and practical. Simply because they see themselves in real-life situations, they will share their actual challenges, needs and wants in regard with the questions related to the problem that your smart city project aim to address. Likewise, they will give you insightful information on the concept and components of their desired smart city.

Additionally they will share feasible suggestions on how the smart city can be designed and implemented successfully.

4. CONCLUSION

Contextual knowledge plays a key role in the design and implementation of smart city projects. To build and implement smart cities successfully, we need to have in-depth insights on the actual needs of citizens of a city and build solutions that are feasible, workable and sustainable in that city.

Smart city projects address similar problems but because the causes of the problems vary from one place to another, we need to gain deep understanding of the problem in real-life contexts.

Smart city has common definitions but it is perceived differently in different contexts. To design smart city projects, we need to conceptualize "smartness" and "smart city" based on the words and experiences of those who live in a city.

Smart city solution frameworks provide general guidelines on the why, what and how of smart cities, to make them work in different contexts however we need to tailor them to the actual needs and constraints of every city.

The contextual-participatory approach proposed in this study provides stakeholders with a practical guideline on how to design smart city projects around a real-life problem and how to use the existing smart city solution frameworks to design situational and engaging interviews that addresses the problem and gathers insights on the why, what and how of smart city in the desired context.

If employed correctly, this approach promises results, i.e. smarter cities. It generates insightful and practical knowledge on the actual needs of the citizens and the workable and sustainable solutions. The smart cities built by this approach will bring more wealth, ease and happiness to the life of the citizens.

REFERENCES

1. Deakin, M. (2007), *From city of bits to e-topia: taking the thesis on digitally-inclusive regeneration full circle*, Journal of Urban Technology, vol. 14, no. 3, pp. 131–143.
2. Deakin, M., Al Waer, H. (2011), *From intelligent to smart cities*, Intelligent Buildings International, vol. 3, no. 3, pp. 133-139.
3. Deakin, M, Allwinkle, S. (2007), *Urban regeneration and sustainable communities: the role of networks, innovation and creativity in building successful partnerships*, Journal of Urban Technology, vol. 14, no. 1, pp. 77–91.
4. Gooch, D. et al. (2015), *Reimagining the Role of Citizens in Smart City Projects*, Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing, New York, USA, pp. 1587–1594.
5. Komninos, N. (2013), *What makes cities intelligent?*, In Deakin, Mark. Smart Cities: Governing, Modelling and Analysing the Transition, Taylor and Francis, UK, pp. 77.
6. McLaren, D., Agyeman, J. (2015), *Sharing Cities: A Case for Truly Smart and Sustainable Cities*, MIT Press.
7. Mitchell, V. et al. (2015), *Empirical investigation of the impact of using co-design methods when generating proposals for sustainable travel solutions*, CoDesign, vol. 12, no. 4, pp. 205-220.
8. Nair, P., Sharma, S. (2017), *Smart City: A Failed Approach to Urban Regeneration for Indian Cities*, Mainstream, vol. lv, no. 11, New Delhi. http://www.mainstreamweekly.net/article7010.html, date 15.11.2017.
9. Nazari, M. (2010), *Design and process of a contextual study of information literacy: an Eisenhardt approach. Library and Information Science Research*, vol. 32, no. 3, pp. 179-191.
10. Nazari, M. (2011), *A contextual model of information literacy*. Journal of Information Science, vol. 37, no. 4, pp. 345-359.
11. Nazari, M. (2016a), *Actuality of determining information need in GIS: a context-to-concept approach*, Library and Information Science Research, vol. 38, no. 2, pp. 133-147.
12. Nazari, M. (2016b), *Understanding Information Literacy Requirements Needed for Successful Implementation of Open Government: proposal of a contextual-participatory approach*, presented in the Media and Information Literacy for Building a Culture of Open Government International Conference". Khanty-Mansiysk, Russian Federation, 6-10 June.
13. Novikov, F. (2015), *Why smart city failed and why we should embrace that*, Medium, https://medium.com/@fedornovikov/why-smart-cities-failed-f47c6c5ef73e, date 15.11.2017.
14. Rayal, F. (2016). *5 Reasons Why Smart Cities Fail, Smart City Strategy*, https://www.smartresilient.com/5-reasons-why-smart-cities-fail, date 15.11.2017.

Acknowledgement

I would like to thank the Smart Cities Conference organizers for sponsoring my talk. My special thanks to Professor Catalin Vrabie and Andreea-Maria Tirziu for their kind support and hospitality.