

Untapped Potential of Participatory Design

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Untapped potential of participatory design - citizen centered social data utilization for smart cities

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Abstract. Our society has shifted to digital society, where generates tremendous amount of city activity data or *Social Data*. This potentially rich city resource has attracted attentions of diverse city players, and often described as “the new oil”. Accumulated social data could potentially open to create better society, generate competitive industries, and improve citizen’s well-being. However, majority of societies do not know how to utilize them for future cities, yet. Challenges to social data utilization are profound. Not only technical and political challenges are there also privacy and ethical challenges. Considering these social challenges, we explored potentials of social data utilization through a series of participatory design workshops. In the workshops, participants collected their own social data and used them for collective concerns. Through the case, we found an interesting potential solution of social data utilization for designing future city, by combining concepts of data donation and citizen as co-designer. Because the combination of data donation and citizens as co-designers could provide one of the optimal solutions for utilizing social data the most without violating the data ownership. By participating in the design process, the data owner can reuse their own donated data for their own purposes, holding a right to control and interpret in the design process. This article, by introducing a smart city workshop case, proposes and discuss a potential of data donation and participatory design, which could be one way to promote social data utilization for the greater good.

Keywords: Participatory Design, Data Donation, Social Data, CoDesign, CoDesigner.

1 Introduction

Our society has shifted to digital society, where generates tremendous amount of city activity data. Some leading digital nations such as Denmark has already accumulated national, geographical, citizens data in cities (hereafter *social data*) since 70s. The amount of social data has continuously grown, accelerated with a global trend of digital transformation and automation of data collection. This potentially rich city resource has attracted a lot of attentions of diverse city related players such as politicians, city planners, industries, and most importantly people who live in the city. Social data has been

described as “the new oil” [1], thus we have observed elevated expectations to our social data. With accumulated social data, we believe that possibilities will widely open to create better society, generate competitive industries, and improve citizen’s well-being [2].

Despite the rich accumulation of social data and increased expectations, majority of societies and players in societies do not know how to utilize them for designing better future cities, yet. The unprocessed raw data taken from city activities and human behavior are often cumbersome to collect, refine, cleanse and re-organize. In many cases, not only it is time consuming to lean raw data, but it is also difficult to understand such raw data for ordinary decision makers in city offices or ordinary citizens as data owners with limited data science knowledge.

Previous research and practice have kept showing difficulty of utilizing social data. For example, the city of Copenhagen, Denmark established a novel data marketplace called City Data Exchange for selling and purchasing collected social data. The project unfortunately halted in two years due to a lack of attractive use cases and profitable business models [3]. Similarly, limited research has been conducted to utilize sensor data taken from city and personal activities despite high expectations of sensor data utilizations [4]. Data Driven Design (DDD) reported most social data came from Twitter posts or online SNS comments. This indicates, as a matter of fact, sensor and wearable data, which are regarded as “the new oil” has not been explored enough [5].

Challenges of social data utilization are profound. Not only technical challenges such as cleansing data process and visualization technique matching the purpose [4], there are also human, political, societal as well as ethical challenges. The questions frequently asked in this context are the ownership of the generated data (“Who own the data generated in cities”) and authenticity of data (“Who maintain and guarantee data as genuine”). The latest European law, The General Data Protection Regulation (GDPR), requires respecting data ownership and providing an appropriate control to the data owner such as the right to data portability, and ownership of their own data. But how about other regions of the world? Even in Europe, from the point of date, personal data should be considered and dealt to fulfil its compliance even for societal benefit realization. Then, how can we harness the value of the new oil?

2 A Case

2.1 Background

Considering the challenges of social data mentioned above, we explore potentials of social data utilization in relation to city activities through a series of participatory design workshops. The base setting of the workshops was organized at Future Living Lab (<https://www.futurelivinglab.org/>).

Future Living Lab is a two year’s research collaboration among telecom company, NTT Techno Cross, Roskilde University (Denmark) and Tokyo Institute of Technology (Japan). The lab aims at staging future way of living in 2030 through collective design process with city dwellers. Starting January 2022, the lab has provided collaborative

design stages for co-creation through collective conceptualization, discussion, reflection, and makings towards wicked societal challenges. In the first project year 2022, the lab conducted three projects, and each project has focused theme such as 1) future dietary practice in city, 2) happiness at work, and 3) raising kids together with local community (See **Table 1**). The choice of project themes is made based on three main criteria; closely related to everyday life, geographically rooted, and recognized as societal challenge in our society.

Each project consists of four consecutive workshops, and each workshop has a unique topic and an objective. Briefly explains, the first workshop is to understand the current social situation through objective data such as statistics and subjective stories. The second workshop is designed so that participants would consider and discuss social data utilization. For example, participants discuss what kind of social data could be useful to understand, improve and create new design in cities. In the third workshop, participants were requested to bring their own original social data for collective use. The fourth workshop were used to elaborate their social data related social innovation ideas proposed in the third workshop. Each workshop roughly speaking, lasts three hours with, approximately 20 participants, consisting of university students, professors, industry professionals, and NPOs. Some participants participated all four workshops or several times while there were a few who participated once.

Table 1. The overall schedule of the three projects in 2022.

Projects	1 st Workshop	2 nd Workshop	3 rd Workshop	4 th Workshop
Future dietary practice	March	May	July	August
Happiness at work	October	December	January	March, 2023 (expected)
Raising kids	September	Early Nov.	Late Nov	December

2.2 The food project

In this article, we introduce a project about the future dietary practice in city (hereafter, food project) as a case. The food project had workshops in March, May, July, and August as shown in **Table 1**. Participants were 23 total, consisting of participants with diversity of profession, age and gender. In the project, the four teams with 4-6 members were formulated, and they worked together spanning 6 months.

Table 2 introduces an overall workshop structure. The first workshop utilized varied data in city and city life, which were available as open data such as data from an institution of statistics or research centers. In addition, the workshop organizers (authors) created reference data for discussion based on interview materials. Based on the knowledge the participants acquired in the first workshop, in the second workshop participants identified a societal challenge to tackle through discussion among the team members. The participants discussed and developed their ideas towards an existing challenge regarding food in our society and discussed ideas about potentially valuable social data they could generate or collect on daily life. In the third workshops, participants developed their ideas further based on the collected their own social data taken

from their everyday city activities. In the fourth workshop, each team developed their ideas and created visible and tangible outputs based on their own idea.

Table 2. The workshop structure.

Workshop Number	Purpose and Activities
1 st	Understand. With open data, participants learn and receive knowledge on a designated topic and domain.
2 nd	Ideate and create. Identify a societal challenge to tackle through discussion among the team members. Based on the knowledge acquired in the first workshop, participants create a concept for social challenge. Participants discuss ideas about potentially valuable social data they could generate or collect personally, for understanding and solve the challenge.
3 rd	Iterate and create. Participants developed their ideas further based on the collected own social data taken from their everyday city activities.
4 th	Propose a solution. Each team developed their ideas and created visible and tangible outputs based on their own idea

As previously mentioned, one workshop last approximately three hours. One workshop could often be structured with introduction, data sharing, ideation, discussion, presentation, and conclusion. Below **Table 4** is one example from the third workshop of the food project.

Table 3. A workshop structure.

Schedule	Duration	Purpose and Activities
00:00-00:40	40 min	Introduction. Introduction of the workshop and participants self-introduction, and reflection of the previous workshop.
00:40-01:10	30 min	Data sharing. Sharing, reading, and reflecting data
01:10-02:10	60 min	Ideation. Choose and develop an idea.
02:10-02:25	15 min	BREAK.
02:25-02:45	20 min	Presentation Team presentation
02:45-03:00	15 min	Conclusion. Each team developed their ideas and created visible and tangible outputs based on their own idea

2.3 Presented social data

Social Data were used in the first and third workshops as design materials for the workshop activity, although the other two workshops also utilized social data, indirectly to some extent. Before introducing details of the social data utilized in the first and third workshops, let us briefly clarify how social data was dealt in the second and fourth workshops. In the second workshop, the workshop participants discussed what kind of

social data could be collected for the third workshop, and in the fourth workshop, the participants developed service and product idea based on the particular social data brought to the third workshop.

To begin with, in the first workshop, the workshop organizers prepared three different kinds of social data. First data is statistical data (Fig. 1), which consists of 11 pages of data visualization with summary texts taken from different sources and themes. All collected data were relevant to the theme “food in our future”. For example, data in the sheet #3 introduce eating style, with four figures, graphs and short texts, and the data in the sheet #3 informs the number of people living alone in 2010 through 2022 and consequently showed eating alone have been increased. The sheet #11 describes a global trend of vegan’s food intake. It also introduces a tendency of different vegan styles in the world.



Fig. 1. A collection of statistical data related to the project theme “food in our future.”

The second data is six short videos, which the speaker told own story on food from own perspective. Each video length slightly varies from 30 second to 1 minutes. Six speakers are consisted of four women and two men, and age ranging from 14 to 51 years old and the topic introduced in the short talks varies from own dietary custom to the global trend. For example, 14 years old *Julia* talked about vegetarian and plant-based food, which she believes important shift to take concerning about our future food intake, both for nature and human health. *William*, a university student, mentioned opportunity and possibilities of insect food as key future protein source.

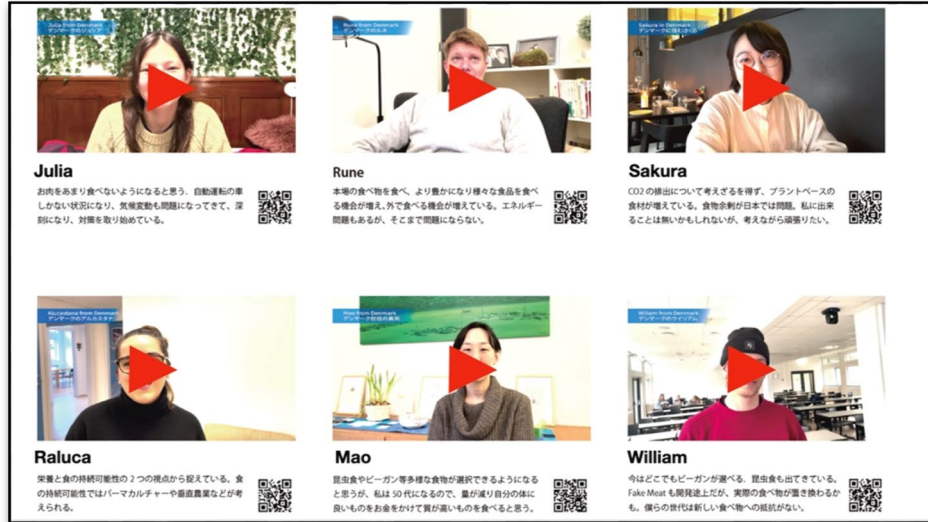


Fig. 2. A list of six video speakers. The story with theme “food in our future” is introduced.

The third prepared data is from Human library. We borrowed a concept of human library, which is defined as “an event that gets strangers talking openly and directly with each other about prejudice [6]”. In our workshop, one person who are knowledgeable about the future food participated as online subject, so that the workshop participants could ask questions to the professional person on “food in the future” in real time.

In the third workshop, the participants prepared social data on “food” by themselves in relation to their everyday activities and brought them to their workshop table. In the second workshop, each team discussed what kind of data could be interesting to collect and each member collected their social data individually during approximately one month. The four teams considered, prepared, and collected different social data based on the discussions on the second workshop. The below **Table 4** shows an overview of the collected social data of the four teams.

Table 4. Collected Social Data.

Team #	Collected Data	Data Attribute
Team 1	Private food intake	Log data
Team 2	Shopping records	Log data
	Electronics usage	Sensor data
Team 3	Shopping records	Log data
	Plant/Vegetation growth records	Log Data
Team 4	Food waste	Sensor data
	Electronics usage	Sensor data

The collected social data was unique in itself. Roughly explained, Team 1 collected a list of private food intake as log data (Fig. 3). For example, one participant brought a collection of ready-made food box, snacks, and energy bars, while another brought a collection of restaurant food. Team 2 collected electronic sensor data in addition to the food shopping records. For example, one sensor owner collected multiple data in the private room (Fig. 4) from temperature, usage of refrigerator, human traffic volume. Although they are very simple data, to some extent, data can easily disclose the data owners' lifestyle.



Fig. 3. An example of log data of food intake. Log data from two participants

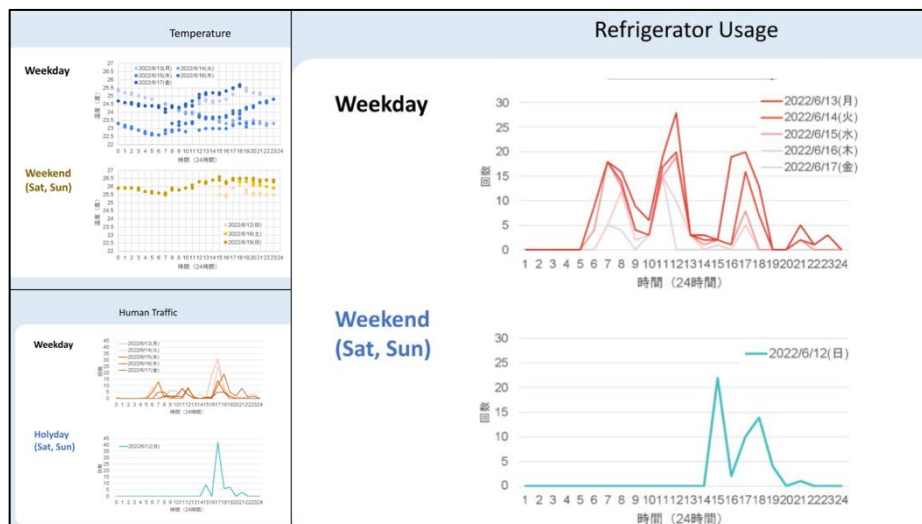


Fig. 4. An example of sensor data representation

3 How the social data were processed in the workshops

The collected data for a month by the workshop participants were brought and used at the third workshop. This section identifies and elaborates how the social data were collected before the workshop, shared, and processed during the workshop, and finally regarded and reflected in the end of the workshop.

3.1 Before the workshop

Before the workshop, the workshop organizers explained the purpose of the workshops and participants were agreed to the data collection such as recording voice and taking pictures. The further usage of collected data during the project period were agreed limited to research purpose.

3.2 During the workshop

During the workshops, participants were requested to collect social data by themselves. Participants' social data were collected often in a shared cloud depository, in this case, Dropbox or Google Drive among team members, where all group members could see who and when the data was uploaded. Social data were shared and viewed both in digital and physical formats. Some data are printed out in paper and put on the workshop table so that everyone can touch, shuffle, and point out to others.

The collected social data was used as design materials for creating new design solutions during the workshops, aiming at improving well-being on *food in future* for city dwellers. Social data were mainly used during data sharing and ideation phase of the third workshop shown in **Table 3**.

3.3 End of the workshop

In the end of the workshop, the social data were left to the workshop depository. The original data owners would not take them back so that it became a shared material for workshop participants and the organizers as we agreed in the beginning. In the end of the workshop, social data were mainly used by the organizers analysis and academic work.

4 Discussion

Through the food project, we found an interesting potential of social data utilization for designing future city. We would like to discuss two unique elements: they are 1) data donation and 2) citizen as co-designer. Although the two elements are independent possibilities, they are, at the same time, complementary to each other. By deploying the

two concepts at the same time, the utility of data would increase for the “greater good” in society.

4.1 Data donation

The workshop participants were surprisingly willing to share their personal data as data owners. The shared data are their vital data, trash data and dietary data, to name a few. Some data could be categorized as sensitive data according to GDPR as data can easily identify personal way of living and sensitive routine. However, it was not a concern of GDPR at the workshop as data was provided by the participants, the owner of the data approved to use their data for the scientific purpose. This action can be interpreted as social data donation of the data owner.

Data donation [7] is defined as an approach to data collection enabled by recent political directives such as GDPR. The data donation makes the owner actively consent to transfer their data to the activity reconstructing its data context. Such frameworks for utilizing personal data have been studied for decades. Epstein et al. [8] investigated opportunities of collecting and sharing personal data and introduced the lived informatics model of personal informatics. During the corona pandemic, data donation in wider scale was testified as well. For example, the Robert Koch Institute in Germany developed the Corona Data Donation App, with which donors could share data from fitness trackers and smartwatches to understand the spread of COVID-19 [9]. Similar trial was conducted by the COVID-RED project, the Julius Center in The Netherlands, where Donors could provide collected data from wearable devices [10]. Studies to date suggests that not only Corona Pandemic crises [9, 10], but also during times of crisis in general such as natural hazards or violence attack [11, 12], citizens were more likely to share data physically and emotionally, to achieve a greater good of society. Thus, their donation were initiated by collective or principlism, rather than other motivations such as egoism or altruism reasons [13].

The increase in successful cases of data donation might raise hope that the use of social data will become easier and flourished. However, at the same time, the lack of understanding how the donated data were used and how the data were useful has also raised concerns persistently around the data donation related actions. Consequently, the importance of a concept citizens as co-designer, discussed in the next section, could become a complementary pair of the data donation.

Similar concept to data donation, information bank has also discussed recently as an entity to utilize social data. However, this approach is still considered as ambivalent solution of social data. First of all from GDPR perspective, the concept is still immature. And secondly as information bank mainly considers and discusses simplistic financial benefits of the data owner based on the egoism or altruism reasons [13], but not discuss wider societal benefits. As an organisation, information bank must collect, control, and manage large amount of personal data centrally, so that it still requires technical development and social considerations.

4.2 Citizens as co-designer

Citizens as data owners acted as co-designers in the workshops by creating solutions collaboratively together with other participants. By participating in the design process, the data owner can reuse their own social data for their own purposes, holding a right to control and interpret in the design process. The owners showed a positive attitude to donate their own data and utilized them for designing solutions in the course of collective design activities. The co-designer opportunity of the data owner could easily enforce this positive data utilization cycle for societal good.

Previous research indicates that currently data owners have utilized their own personal data for reflecting their own behavior but not for designing and creating solutions of collective concerns (Fx. [4, 5, 8]). Data owners might be concerned about not knowing how their data is interpreted and used. Our data supports this view. If the owners have any control over their own data, they could willingly contribute with their social data.

5 Conclusion

This article, by introducing a workshop case, proposes and discuss a potential of data donation and participatory design, which could be one way to promote social data utilization for the greater good of our society.

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