



## Annual report 'designing for controversies in responsible smart cities'

Summary of activities 2018- 2019



# Designing for controversies in responsible smart cities. 1<sup>st</sup> year reflection

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## Project information

This report describes the activities carried out in 2018 and 2019 for the NWO project “Designing for Controversies in Responsible Smart Cities”.

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## 1. Smart cities and controversies

Technology is changing our cities: sensors and cameras everywhere, all services we can potentially imagine just a click away, 5G antennas are emerging in multiple corners. And this is just the beginning. Often, smart city initiatives assume that technology is universally beneficial, providing smart city visions and projects that represent ideal solution-oriented futures. In practice, as with any other socio-technological development, smart technology can empower or disempower, exclude or include stakeholders. As a result, the implementation of smart technology leads to friction.

Tensions occur because the impacts of technology on the city are not univocal: different people frame them differently. For example, a surveillance camera can safeguard safety, but also an invasion of citizens' privacy. When these perspectives conflict, controversies arise. Controversies are 'situations where actors disagree (or better, agree on their disagreement)' (Venturini, 2010), being issues at stake sufficiently important not to be ignored. In this research project, we consider that acknowledging, debating, and acting upon controversies allows representing multiple desires of society, instead of providing univocal smart city visions. We take controversies as a point of departure to envision responsible smart city futures, encourage ethical reflection and stimulate local engagement. These principles contribute to the development of a collaboration platform for the development of responsible and inclusive smart city visions. This is the overall goal of our project: to develop a collaboration platform to support quadruple helix collaboration (government-citizens-academics-industry) and encourage stakeholders to give substance to *their* smart city, using the latest technological developments and a degree of ownership.

This document reports on the activities carried during the period of 2018 - 2019 corresponding to the first year of this research project. During this year, we have developed and reflected on approaches:

- to make smart city controversies come to light
- to help stakeholders anticipate the impact of technology on our values and the city
- to stimulate imagination to foster the development of smart city visions

*Table 1 Overview of methods presented in this report*

Name of approach	Goal	Page
<a href="#">Controversy workshop</a>	Make controversies explicit by imagining smart city future scenarios	5
<a href="#">Value change prototyping</a>	Reflect on and debate value changes because of technological implementation in the city	10
<a href="#">Futuring the city card game</a>	Trigger imagination about smart city futures and provide means to anticipate value changes	13
<a href="#">Macro, meso, micro back-casting</a>	Identify forces leading to specific "controversial" futures to encourage collaboration	17
<a href="#">Controversy walk-shop</a>	Reflect on smart city initiatives and potential controversies by combining walking in the city with a workshop setting.	21



We have tested these approaches in workshop sessions with practitioners, students and project partners. The results obtained during the sessions have provided insights for the requirements of the collaboration platform we are developing as part of this research journey. The following sections describe the goals, method and results of five approaches we developed within the first year of this research project.

### What's in a controversy?

Controversies have five main characteristics (Venturini, 2010) that we appreciate in smart cities: (1) they involve a diversity of actors, (2) unpredictable social interdependencies, (3) they are irreducible, (4) debated and (5) lead to conflicts.

(1) *Diversity of actors*: Controversies involve a diversity of actors including humans and non-humans. In smart cities, technology plays an important role in shaping the interactions of humans with the world they live in. For example, data collection influences the decisions made by policymakers and the awareness of the presence of surveillance cameras in streets modifies the behavior of citizens in the public space. As a result, technology becomes an active actor while reflecting on smart cities.

(2) *Unpredictable social interdependencies*: Controversies lead to unpredictable social interdependencies that evolve over time, creating new nodes and connections that could not be foreseen before. For example, controversies about smart policing trigger discussions related to the connection between technology and discrimination.

(3) *Irreducible*: Controversies cannot be reduced to single questions that require an answer. Asking “how can we make our cities smarter?” will lead to additional questions about what ‘smart’ means, and according to whom. The difficulty lies in agreeing on both what the questions and the answers are.

(4) *Debated*: Controversies lead to debates about issues that used to be taken for granted. A few decades ago, there was not a public debate about privacy issues in the city. Nowadays, with the introduction of sensors in cities to measure human activity, society has become aware of the implications of these technologies for us, making privacy a priority issue at the social sphere.

(5) *Conflicts*: Controversies are conflicts. Given the diversity of frames of reference involved in controversies, controversies result in disagreement and often disputed. As stated by Venturini (2010), ‘controversies decide and are decided by the distribution of power (...) and are negotiated by democratic procedures.’ For example, without proper mechanisms to ensure transparency, data collection from governments and private companies can make citizens vulnerable to the implications of how data is being used.



## 2. Building scenarios to make controversies come to light: The Controversy Workshop

During this first project stage, we have explored controversies in smart cities to understand how, in this context, technology challenges and reshapes societal values. Our premise is that, to gain insights into the impact of technology on societal values, we need to understand where the potential frictions or tensions occur. To achieve this goal, together with the Design Innovation Group, we designed a workshop approach and involved stakeholders that belong to different sectors of society (government, the private sector, citizens and academia) in different exploratory sessions.

### 2.1. Goal of the method

In the workshop session, the main goal is to facilitate the process of making smart city controversies explicit.

The intended outcome of this method is a list of potential smart city controversies based on the interpretations of participants involved in the session. Identifying controversies helps to acknowledge the impacts of technology at different levels, and is the first step for the development of tactics that address the tensions that might originate from the implementation of urban technology.

### 2.2. Method

The workshop approach consists of 5 main steps:

**Step 1- Setting the scene:** We set the scene for the rest of the workshop, giving participants insights into the current data that companies and governments collect in smart cities. We probe participants by showing a visual with a public space and the type of data that private and public organizations collected. Displaying this visual, we ask (1) the first thing they notice, (2) the most surprising element of the visual, and (3) any other additional comments.



Figure 1 Example of visual used in workshop sessions displaying a commercial street developed by the Design Innovation Group

**Step 2- Dream city:** In this step, we ask participants to imagine their dream smart city. To facilitate participants' thinking process, we provide some preconditions, namely: (1) all data can be available, (2) people involved in smart city development have good intentions, and (3) everything that needs to be properly secured is secured. Apart from the existing data collection and usage as shown in the



visualizations, we provide participants with tech-cards including the description of technology such as virtual reality, block-chain, drones or augmented reality. The main goal of the tech-cards is to broaden participants' visions about dream smart cities scenarios, beyond sensors and data-driven solutions. To register what participants consider an ideal smart city, they had to fill 3 cards that stated:

- "In a smart city, it would be wonderful..."
- "In a smart city..."
- "In a smart city, I would use technology and data to..."

**Step 3- Voting:** To number down the amount of options, in this step, participants vote for their 3 preferred dreams.

**Step 4- Nightmare:** At this stage, participants reflect on the potential downsides and nightmares that could emerge from the dream imaginary.

**Step 5- Discussion of controversies:** During the final stage, participants discuss the tensions originating from the use of technology in smart cities, helping to make controversies explicit.

### 2.3. Results

From a research perspective, the main goal of testing this method was to (1) evaluate how eliciting people's imagination to frame and reframe the impacts of technology helps to surface smart city controversies as displayed in figure 2, and (2) collect a preliminary list of smart city controversies that can inform future design interventions.

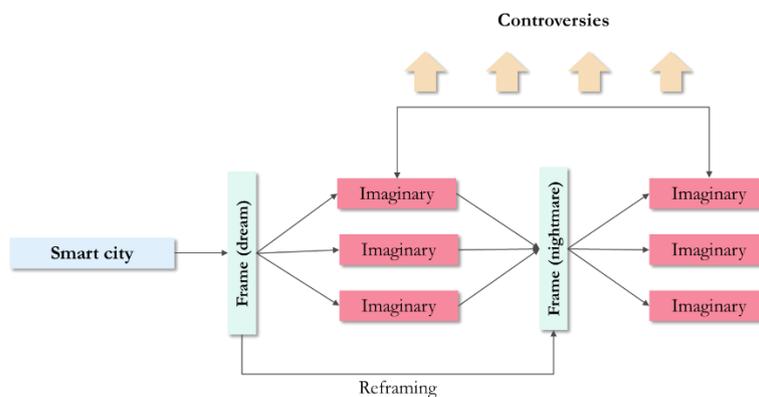


Figure 2 Process of making smart city controversies explicit

This section covers the second point, providing a summary of the controversies we identified during two workshop sessions held in Amersfoort during the spring of 2019. The first session brought together 40 participants, providing a representation of stakeholders of the quadruple helix. During the second session, 20 practitioners with experience in real estate and urban planning participated in the workshop.

This does not attempt to be a list of all potential controversies in a smart city. It illustrates the suitability of scenario development to identify and debate smart city controversies. These controversies will be the point of departure for future design interventions.



Figure 3 Impressions of workshop sessions in Amersfoort

### Level 1. “The city, my city” - the smart city to fulfill individual needs

While dreaming of the ideal smart city scenario, participants envisioned how technology could fulfill individual needs by:

- **Individual quality of life:** Technology as an instrument to make life more convenient and to provide personalized services and targeted experiences based on people’s profiles.
- **Reinforcing individual values:** Technology to empower people so they can be themselves, feel and act autonomously. If they want, citizens have the option to opt-out if they want to, being free to decide not to use technology.
- **Improving personal efficiency:** Technology facilitates synchronized services and services; not only with a focus on transport but other daily chores. For example, the schedule of the trains is synchronized with school hours, so there is no waiting time at school.

The associated nightmares:

- **Passivity and opacity:** Outsourcing the provision of joy and pleasant experiences to technology, citizens can become dependent on algorithms. The control and use of technology would be at the expense of corporates and governments, decreasing the transparency of data use. Focusing on their joy and fulfillment, citizens risk losing freedom and autonomy; becoming spectators of what happens behind “the smart city screens”. This leads to a society where citizens are passive and disempowered. Furthermore, in this scenario, the government and companies could nudge and manipulate citizens without them noticing it.
- **The scripted city:** As a result of monitoring and predicting activities to make urban life more enjoyable and streamlined, the city becomes “a boring uniformity, losing the specific characteristics of the city”. This is detrimental for urban serendipity, reducing the possibility of having pleasant unexpected encounters in the city.
- **The perfect society:** An overdependence on data and quantitative measures de-humanizes people, turning them into numbers. This can lead to a dehumanized society where citizens cannot be imperfect. Full transparency of human data and the setting of standards for all the activities exclude people that do not comply with the norm (as set by the numbers) and leads to stigmatization.



- **Isolated and bubbled society:** Using technology to get targeted experiences could lead to a society where “you stay too much in your comfort zone, with too little contact with other people”. This leads to segregation and polarization. By setting aside those activities, people or experiences that are not pleasant a priori, citizens might end up isolated and disconnected from urban life.

## **Level 2. “The city, our city” - the city to contribute to a sense of community**

In the second level of smart city dreams, participants envisioned the smart city as a place where technology supports the development of a sense of community by encouraging:

- **Inclusive city life:** Technology to make city activities affordable and accessible to all citizens, without any restriction in terms of resources or knowledge.
- **Citizen participation:** technology used to motivate citizens to be involved in policymaking and urban planning processes. Their decisions are part of the decision-making process and they seek to be active and informed.
- **Sense of community:** Technology offers the possibility of meeting like-minded people, since happiness depends on the extent to which people can meet others and feel connected.
- **Solidarity to help people in need:** Technology used to help people in need when and where they need it.

The main nightmares related to the following three topics:

- **The perfect society:** organizing participatory processes through technology could lead to scenarios where “you must participate” and there is no way to opt-out. Furthermore, having full transparency on these processes would lead to extreme peer pressure “because everybody knows what you think”.
- **The participation paradox:** requesting citizens’ input but not acting on it can cause frustration and the feeling that participation is fake, leading to disengaged and frustrated citizens.
- **Passivity and opacity:** losing a feeling for responsibility of taking care of yourself since the system will take care of it for you. Furthermore, determining who is in need and who is not would create situations where citizens are disempowered and might feel stigmatized or might need help but do not get it because they are not part of the “in need” group.

## **Level 3. “The city, a city in the world” - the city contributing to larger societal goals**

In the third level of smart city dreams, a smart city is a place where technology contributes to larger societal goals by:

- **Quality of life at a large scale:** Technology as an enabler for the provision of healthy and clean air quality, water quality, reduction of criminality, preservation of human values, amongst others, to increase the livability, not only of the city but of the planet.
- **Sustainability and the environment:** Technology as a key enabler to support the energy transition. “With better insights of data, it is possible to accelerate the energy transition: with smart grids in combination with investment possibilities and portfolios to encourage multiple stakeholders, provide energy savings”.



The main nightmare scenarios related to the possibility of citizens losing sight of decision-making processes (*passivity and opacity*). One of the nightmare scenarios related to the possibility of “all the data and power ending up in the hands of a couple of corporations that control everything and nudge citizens whatever they want”. While achieving a higher societal goal such as supporting the energy transition “you try to be sustainable, but you may lose control of your own devices and what you do with them”.

### **Common to 3 levels**

For all 3 levels, nightmares about privacy and security were pervasive. During the sessions, participants feared the conversion of the city into a ‘glass cage’, where the city knows everything about you. At the same time, the vulnerability to cyber-attacks put in evidence the fragility of the city.

### **Summary of controversies**

Based on the results presented above, the main controversies that came to the surface during the workshop sessions were the following:

- On the one hand, using technology in smart cities helps to fulfill individual needs and wishes such as improving quality of life, reinforcing individual values and enhancing efficiency. On the other hand, the intensive use of technology and data can detrimentally influence the experience of the city (the scripted city) and the ways of being of citizens in the city (*passivity and opacity*, isolated and bubbled, and losing the right to be imperfect).
- On the one hand, using technology can help to improve the sense of community by encouraging interactions and participation. On the other hand, intensive participation might lead to a responsibility vacuum (participation paradox) and a loss of individual values (loss of the right to be imperfect).
- On the one hand, smart city technology can help to contribute to societal goals such as the energy transition, improving air quality, or enhancing human values. On the other hand, determining the high-level goals leaves the control of technology far from the hands of the citizens’ hands, leading to a loss of autonomy and proactivity (*passivity and opacity*).

**Status of the method:** Tested and ready to use.



### 3. Building prototypes that represent value changes: Value Change Prototyping

Given that the implementation of urban technology influences our values, we tested how design activities facilitated the discussion and debate around value changes in smart cities. Inspired by the approach developed by Forlano and Mathew (2014) we developed a workshop method through which participants prototype a neighborhood based on a specific value and represent how the value changes as a result of the implementation of technology.

#### 3.1. Goal of the session

This goal is twofold: (1) it aims at collaboratively prototype a neighborhood that incorporates specific public values; and (2) encourages reflection on the value changes that originate from the implementation of technology in smart cities. This workshop approach has been based on and inspired by the approach developed by Forlano and Matthew (2014)<sup>1</sup>.

The intended outcome of this method is an overview of the impacts of technology on values and their influence on the city. This overview can inform the development of specific smart city projects and visions that acknowledge the impact of technology on different levels.

#### 3.2. Description of the method

The method consists of 5 steps:

**Step 1- Contextualization:** In this step, participants think about the neighborhood they live in, briefly describing how it is and how they experience it. After describing it, participants choose one of the neighborhoods which will be the focus of the session. At this point, they need to draw it, creating a factual or metaphorical map: where do people interact the most? What are the most important areas of your neighborhood? Why?

**Step 2- What's in a value:** During this step, participants pick a value card from a deck. In this case, a 'value' is something that people consider important. Values exist both at an individual and societal level (i.e. freedom). Once they pick a value card, participants discuss what the value means to them, and tell a personal story about it. At this point, participants start discussing potential ways in which they could embed the value (or their interpretation of it) in their selected neighborhood.

**Step 3- Brainstorming and prototyping for values:** Participants prototype a future city scenario (10 years in the future) that incorporates the value in their neighborhood. At this stage, it is important that:

- Each group brainstorms as many projects, platforms, and services as possible without taking the feasibility of their ideas into account.
- Participants make their ideas tangible by means of diagrams, sketches, stories.

After brainstorming, participants choose one of the discussed ideas and prototype by using low-fi prototypes.

**Step 4- Technology and value changes:** Here is where we modify the approach provided by Forlano and Mathew (2014). Once they have finished their prototype, participants get a technology card, representing a technology that will be introduced in the neighborhood they have designed. At this stage:



- Participants need to reflect how this technology could potentially change the value they designed for, and why these changes could potentially occur.
- At this stage, participants are encouraged to visualize and/or write down these value changes.

**Step 5- Critique:** At the end of the session, each group presents their process:

- They present their prototypes of their value-driven neighborhood and describing their ideas and rationale behind them.
- They present the technology that was introduced and the value changes that this technology could potentially cause.

The facilitators stimulate a plenary discussion about value changes, why these occur, and what we can learn from them.

### 3.3. Results

We tested this approach three times. Twice during the Curious U summer school 2019 at the University of Twente, where 2 groups of 25 and 14 students participated in the session. The third time took place during the course 'Shaping Responsible Futures' where 6 students reflected on value changes. During the workshops, participants prototyped their neighborhoods based on a value and anticipated how technology could change it.



*Figure 4 Impressions of the workshops facilitated during the summer school Curious U 2019*

Similar to the [controversy workshop](#) and [the storytelling game](#), the value prototyping workshop helped participants to allocate collective meaning to the influence of technology on the city. Our experiences revealed the potential of design approaches to open spaces to discuss and confront a diversity of meanings around urban technology. As with the other approaches presented in this report, the value prototyping workshop helped to:



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- Make intangible effects tangible: Values are abstract concepts that have multiple meanings depending on the perspective of the beholder. By building representations of values and their influence on and in the city, participants could allocate meaning and share it with others, stimulating the expression of multiple perspectives and encouraging public debates concerning a wide range of issues. For example, prototyping facilitated discussions around control of technology and the distribution of power linked to surveillance and freedom.
- Reframe technological impacts and develop an empathy for the interests of various sectors of society: By looking at the implementation of technology from a value perspective, participants opened their interpretations to other lenses. For example, considering the impact of surveillance cameras on friendship in the city encouraged participants to identify impacts that were not part of their usually interpretative repertoire.
- Harness participants' imagination: Prototyping encouraged to think of connections between technology and society that were not so obvious in the first place. For example, the exercise encouraged participants to think about changes in romantic encounters resulting from the introduction of wearables in the city. This triggered participants to think of the need to fight loneliness in the city, the need to facilitate interaction with the elderly.

These three characteristics of the activity support the creation of areas of friction or counter participation, that acknowledge the existence of controversies and are the first step to act upon them.

**Status of the method:** Tested and ready to use.



#### 4. Storytelling to stimulate imagination: “Futuring the City”

Imagination is ‘the faculty or action of forming new ideas, or images, or concepts of external objects not present to the senses’ (Oxford Dictionary). It influences how we act here and now, and acts as a self-fulfilling prophecy: our expectations of the future guide our actions (Hayer and Versteeg, 2019). In the context of smart cities, imagining futures is an exercise mostly restricted to governments and corporates. However, we consider it important to make it a collaborative exercise where multiple sectors of society take part in it. Under this premise, we adapted the card game the “Thing from the Future” (Candy and Dunagan, 2017; Candy, 2018) customizing the cards of this game to the smart city context but keeping the game mechanics. We describe our game adaptation in the sub-sections below.

##### 4.1. Goal of the session

The main goal of the game is to trigger participants’ imagination about urban futures, and to reflect on the changes of urban life and our values as a result of the implementation of technology in the city. To this end, participants need to create a thought-provoking short story based on four cards they draw from a card deck.

The intended outcome of this method is a set of narratives that can be used during the ideation of smart city solutions and to anticipate alternative impacts of smart city technology.

##### 4.2. Method

The deck has four different types of cards: (1) arc, (2) technology, (3) city and (4) values.

1. **Arc cards (A)** outline the type of future where smart cities exist, and how far in the future it will take place. There are four types of arc cards:
  - Growth: a future in which “progress” has continued.
  - Collapse: a future in which society as we know it has come apart.
  - Discipline: a future in which order is deliberately coordinated or imposed.
  - Transformation: a future in which a profound historical evolution has occurred.
2. **Technology cards (T)** include different types of technology that could potentially be implemented in the city.
3. **City cards (C)** include places where urban life happens.
4. **Value cards (V)** include values or principles that people consider important in life at the individual and collective level (i.e. autonomy, freedom, friendship).



Figure 5 Impression of the cards used in the game



Participants get one card of each type (ATCV) and they reflect on of how given a specific societal development, the introduction of a technology has led to a specific mood in citizens that changes the city (or places in it).

It is possible to play the game individually or in groups. While playing the game, it is important to remind to participants the following:

- This is an imagination game; therefore, all ideas are welcome and inspiring.
- Do not focus on the feasibility of the story.
- Although all card combinations can lead to inspiring stories, if you feel stuck, feel free to draw another card to avoid being stuck.

#### *For individual play*

When played individually, the game helps to reflect on the interaction between technology and urban life. Technology might be implemented to fulfil a specific goal, but the impact it has on urban life goes beyond its original purpose. Played individually, the game can help lateral thinking, or idea generation for specific urban challenges, as well as helping to anticipate unforeseen technological effects.

#### *For group play*

Played in groups, the game has the same goal as for individual play. It is an imagination game that supports idea development and anticipation. Furthermore, when played in groups of people, it has a competition element since players can vote for the story that they consider most exciting, inspiring or fun.

### 4.3. Results

We tested the game in different contexts. During the Curious U summer school in August 2019, we pre-tested the game with a group of 14 students. Later, at the Dutch Design Week 2019, we encouraged visitors to write stories about the future of the city using the card game. More than 120 visitors wrote stories using the card game.



Figure 6 Impressions of participants using the card game during the Dutch Design Week 2019

Our initial purpose developing and adapting the game was to use it as a method to (1) trigger people's imagination about the future of the city and (2) the evaluate how participants anticipate the impact of technology on our values. Related to our initial objective, the analysis of the outcomes from the Dutch Design Week show the following:

1. The card game helps to trigger people's imagination to verbalize their expectations about the future. Providing constrains gave a foundation for participants to let ideas flow and feel guidance in the process. However, although we encouraged participants to write fictional stories, they used the cards to anticipate the future and provide solutions for a future city as described below:
  - a) **Fiction** – imaginative stories that discuss a far-away future that lays outside the scope of current possibilities and enter the realm of fiction, or that focus on creating a specific atmosphere or vibe.
  - b) **Anticipation** – pieces that consider current trends, developments and challenges and as such try to anticipate what might happen in the (near) future.
  - c) **Solution development** - these narratives reflect possible solutions that technology can offer to societal challenges, or how society can handle threats posed by technology.

Consequently, we conclude that this exercise triggers people's imagination not only to write fiction but to anticipate the future and be solution oriented as well.

2. Our analysis of the stories showed that, rather than getting insights into how values might change as a result of the implementation of technology in the city, the card game helps to understand how people attribute meaning to technology in an urban context, and its role given a certain value.



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As a deliverable of the research experiment at the Dutch Design Week 2019, we have created a booklet that we have distributed to visitors of the event and you may find it online [here](#). In upcoming interventions, we plan to include specific locations in Amersfoort in the city cards to trigger participants' imagination in context.

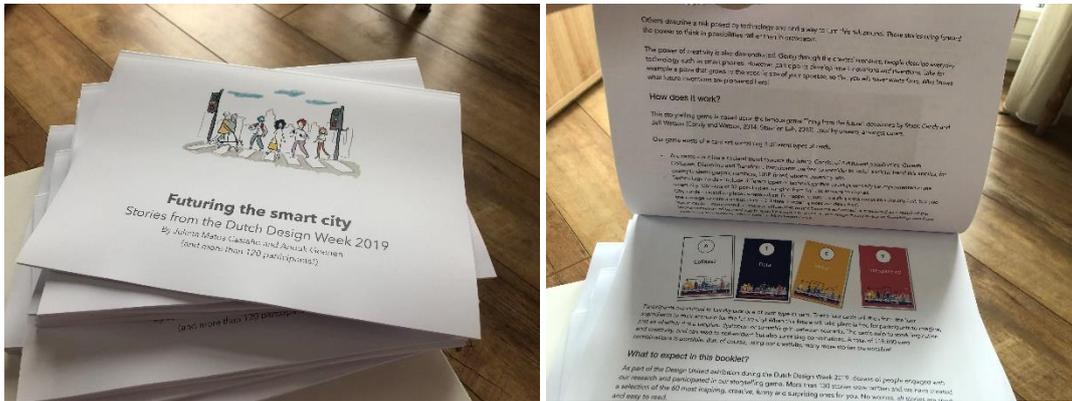


Figure 7 Impression of the booklets printed with the stories written during the Dutch Design Week

Status of the method: Tested and ready to use.



## 5. Micro, meso and macro back-casting

'Back-casting' is a method that starts defining a future and works backward to identify factors leading to this future. In the context of this project, we stretch a potential scenario originating from a controversy, and take this scenario as our future. We then identify micro, meso and macro factors leading to it.

1. **Macro factors** are political (P), economic (E), social (S), technological (T), legal (L) and environmental (E) (PESTLE) forces that lead to a specific future.
2. **Meso factors** relate to collective and organizational practices of 'quadruple helix stakeholders'<sup>1</sup> contributing to the development of a specific future scenario.
3. **Micro factors** relate to individual ways of feeling, being and doing that influence the future.

By identifying factors leading to a scenario, participants can detect areas of action to work towards enabling or avoiding specific futures at different levels.

### 5.1. Goal of the session

The main goal of this method is to identify the factors that could lead to specific smart city futures. Identifying these areas of influence allows stakeholders to collaborate to achieve (or avoid) specific futures. Furthermore, this method helps to prepare guidelines or questions to use during the development of smart city visions to ensure that stakeholders are aware of specific impactful drivers of change.

The intended outcome of this method is a set of factors that lead to smart city futures that can be used as guidelines for the development of smart city visions.

### 5.2. Method

In this case, the method consists of 4 steps:

**Step 1:** Taking a specific controversy as a point of departure, think of potential extreme smart city scenarios. For example, if we consider that technology is leading to increasing isolation of people in cities, we will take two scenarios: one corresponding to a smart city that enables complete integration and interaction among people, and another one that leads to complete isolation and individuality.

**Step 2:** Selecting one of the scenarios, participants reflect in groups what could be the driving forces at the macro, meso and micro level leading to that scenario in 10 years. To this end, participants can think of answers to the questions provided in table 2. These questions are an example of factors to consider, and it is up to the participants and/or facilitators to include or focus on other questions.

**Step 3:** The next step is to focus on defining specific focus areas to intervene or act in case participants want the scenario to occur or, on the contrary, want to avoid it.

**Step 4:** Once they have defined the focus areas, participants can derive some guidelines or questions to consider in the future in case they want to avoid it.

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<sup>1</sup> Government, private sector, citizens, and knowledge institutes.



Table 2 Examples of questions for participants to think about the macro, meso and micro economic forces leading to a specific scenario in 10 years a smart city.

<p><b>MACRO (PESTLE):</b> Political, economic, social/cultural, technological, legal or technical forces leading to the scenario</p>	<p><b>Political (P)</b></p> <ul style="list-style-type: none"> <li>- What are the global/local power relations?</li> <li>- Is there political stability?</li> </ul> <p><b>Economic (E)</b></p> <ul style="list-style-type: none"> <li>- Which economic structures are in place?</li> <li>- What are the market dynamics?</li> </ul> <p><b>Social/cultural (S)</b></p> <ul style="list-style-type: none"> <li>- Are there any grassroots movements?</li> <li>- What are the predominant social behaviors?</li> </ul> <p><b>Technological (T)</b></p> <ul style="list-style-type: none"> <li>- What type of innovations have become mainstream?</li> <li>- Whose technology has been widely implemented?</li> </ul> <p><b>Legal (L)</b></p> <ul style="list-style-type: none"> <li>- Which laws/policies are in place?</li> <li>- How will law be enforced?</li> </ul> <p><b>Ethical (E)</b></p> <ul style="list-style-type: none"> <li>- What are the current predominant values?</li> <li>- How is responsibility distributed?</li> </ul>
<p><b>MESO:</b> Organizational practices leading to the scenario. In this case, we focus on stakeholders belonging to the quadruple helix.</p>	<p><b>Government</b></p> <ul style="list-style-type: none"> <li>- What was the role of the government?</li> <li>- What governmental decisions influenced this development?</li> <li>- How did relationships with other stakeholders changed?</li> </ul> <p><b>Private organizations</b></p> <ul style="list-style-type: none"> <li>- What was the role of the private sector?</li> <li>- How did relationships with other stakeholders change?</li> </ul> <p><b>Academic institutions</b></p> <ul style="list-style-type: none"> <li>- What was the role of knowledge institutions?</li> <li>- How did relationships with other stakeholders change?</li> </ul> <p><b>Citizens</b></p> <ul style="list-style-type: none"> <li>- What was the role of civil society?</li> <li>- How did relationships with other stakeholders change?</li> </ul>
<p><b>MICRO:</b> individual behaviors that contribute to reaching the suggested scenario.</p>	<p><b>Feeling</b></p> <ul style="list-style-type: none"> <li>- Which feeling was the most prominent?</li> <li>- How did you feel in relation to others?</li> </ul> <p><b>Being</b></p> <ul style="list-style-type: none"> <li>- Who did you want to be?</li> </ul> <p><b>Doing</b></p> <ul style="list-style-type: none"> <li>- What did you individually do in your daily lives that contributed to this scenario? Which choices did you make?</li> </ul>



### 5.3. Results

During the NWO partner meeting in June 2019, we tested an early version of this method to reflect on how it helps to identify factors leading to a specific scenario. We started the exercise asking participants to reflect on the macro-environmental factors leading to In this exercise, we asked participants to select a specific smart city technology and, in groups, discuss the type of questions they would ask to understand the impact this technology could have in different areas at the macro, meso and micro levels. Table 3 provides a summary of the discussions held during the session. They do not intend to be an exhaustive list of factors that should be considered while assessing the selected technologies -aerial pictures or predictive algorithms-. Their main goal is to stimulate a discussion about the impact of technologies at different levels.

Table 3 Reflections provided by participants of macro, meso, and micro factors to consider relative to the implementation of aerial pictures or predictive algorithms in a city

Technology 1: Aerial pictures/visualizations	Technology 2: Predictive algorithms
<p><b>Macro</b></p> <ul style="list-style-type: none"> <li>- <i>Control of technology:</i> Who is in control of the data from detailed aerial picture?</li> <li>- <i>Opportunities:</i> What kind of connections can we observe based on having awareness of the whole surrounding?</li> <li>- <i>Value changes:</i> How does it change the concept of private property? i.e. In your own garden, you are not alone anymore, people can see you when you are sunbathing.</li> <li>- <i>Policy:</i> What is the impact it may have in policies? Example: eye on Europe/detailed information/ aerial surveillance</li> </ul>	<p><b>Macro</b></p> <ul style="list-style-type: none"> <li>- <i>Value changes:</i> What will the meaning of privacy become? Is privacy the fundamental right of an individual?</li> <li>- <i>Trade-offs:</i> How to balance the wish to be super-efficient with letting go?</li> <li>- <i>Transparency and trust:</i> How can we see through? Make you open and transparent to be trusted?</li> <li>- <i>Control of future:</i> How will our ideas or controlling the future change?</li> <li>- <i>Knowledge:</i> How do we think different about knowledge?</li> <li>- <i>Ethics:</i> What new ethics do we need?</li> <li>- <i>Quality control:</i> Rubbish in = rubbish out? How to assure quality?</li> <li>- <i>Discrimination:</i> Does the right to equal treatment continue to exist?</li> </ul>
<p><b>Meso</b></p> <ul style="list-style-type: none"> <li>- <i>Surveillance:</i> How would surveillance change if all detailed aerial pictures were available?</li> <li>- <i>Individuality:</i> No individual space (left)</li> <li>- <i>Use of data:</i> How will some organizations make use of these data? What kind of opportunities does it offer? For example, some municipalities use it for tax rating, others don't.</li> </ul>	<p><b>Meso</b></p> <ul style="list-style-type: none"> <li>- <i>Co-design:</i> How can we co-design predictive algorithms, incorporating different standpoints?</li> <li>- Are you allowed to discriminate against a reasonable interest (if you are an interested party)?</li> <li>- <i>Control of technology:</i> Appearance sets of data / who manages algorithm and what is protection against break-in / use for other purposes.</li> <li>- <i>Exclusion:</i> To what new social / societal / inclusion / exclusion processes will this lead?</li> <li>- <i>Influence on behavior:</i> Can the algorithm (influence) behavior/ consequences on data or others?</li> </ul>
<p><b>Micro</b></p> <ul style="list-style-type: none"> <li>- <i>Access to data:</i> Who has access to the data? How does that influence me as an individual?</li> <li>- <i>Behavior:</i> <ul style="list-style-type: none"> <li>o Does this lead to competitive behavior in my neighborhood?</li> </ul> </li> </ul>	<p><b>Micro</b></p> <ul style="list-style-type: none"> <li>- <i>Autonomy:</i> <ul style="list-style-type: none"> <li>o I still have freedom to give where I want to protect it against error</li> <li>o Do I have the right / choice not to know?</li> <li>o How can I nudge / tweak / hack the system?</li> </ul> </li> <li>- <i>Daily life:</i></li> </ul>



<p>(sharing type of data, access to the data)</p> <ul style="list-style-type: none"> <li>○ Does this influence my day to day life? i.e. will I be able to water my garden plants in dry season if detailed satellite pictures are available?</li> <li>○ Obscuring things you don't because others to see (opting out) not because they are wrong or illegal.</li> <li>○ Assessing other, comparing, judging</li> <li>○ Spying (the new peaking)</li> <li>○ All is visible when you hide (all is hidden unless you show)</li> </ul>	<ul style="list-style-type: none"> <li>○ What would be useful in daily life / how is daily level supported with predictive algorithms</li> <li>○ What becomes easier / more difficult, more fun, more lenient if you know the outcome?</li> </ul> <p>- <i>Behavior:</i></p> <ul style="list-style-type: none"> <li>○ To what extent will self-discipline my behavior and (hence altering) my experiences?</li> <li>○ Can you participate / exploit yourself on an individual level?</li> </ul>
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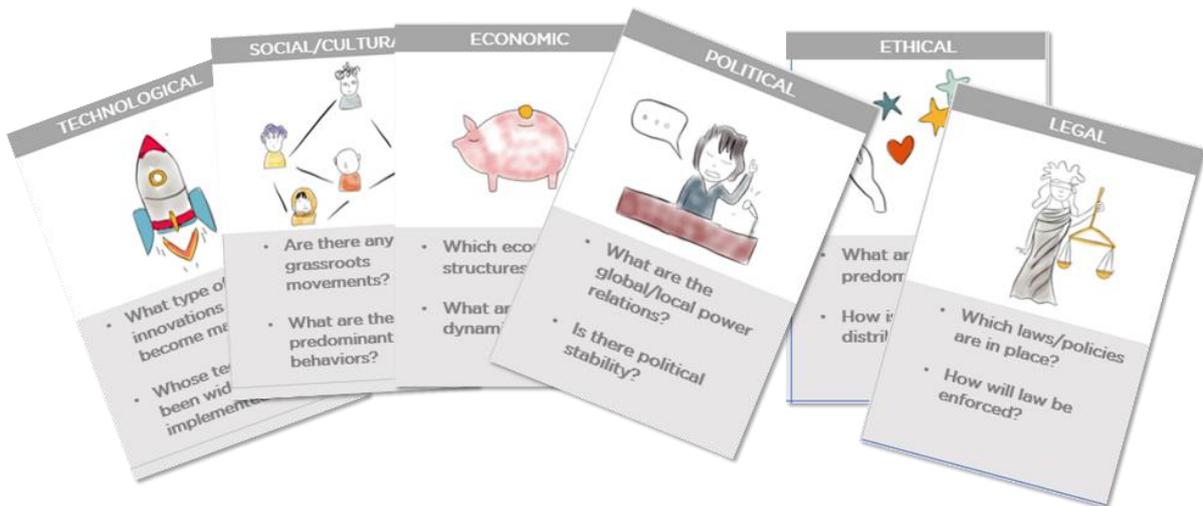


Figure 8 Impression of the cards given during the session including questions to identify macro-economic forces

The back-casting exercises helps to reflect on elements that are relevant for different future directions. Through identifying desirable directions and paths that could lead to them, current-day decisions are informed on potential consequences. As such, specific actions can be taken to either stimulate or steer away from foreseen futures.

**Status of the method:** Work in progress, need further iterations.



## 6. Walk-shop

Initiated by the University of Utrecht, the walk-shop is explored as a situated and experiential co-design method to involve diverse participants in engaging with the smart city on the ground, in real urban contexts, and in teasing out controversies. Through this process, the aim is that citizens do not only become more aware of, or react to externally formulated controversies (e.g., surveillance, 5G health hazards), but also co-produce means for collectively forming questions and publics around shared matters of concern. The walk-shop method is being prototyped in different urban contexts (Amersfoort and Utrecht) with different audiences and in relation to various themes related to the smart city (e.g., urban datafication, sustainability, inclusion).

### 6.1. Goal of the session

This method combines data walking methods (Powell 2018; Van Zoonen et al. 2017) with co-design methods intended at involving non-expert users and enabling the design process. The walk-shop method complements the previous “[Controversy Workshop](#)” by prompting the participants to engage with datafication aspects of the existing smart city through first-hand experiences of space, knowledge sharing and reflexivity.

The intended outcome of this method is a list of potential smart city controversies based on the interpretations of participants involved in the session. Identifying controversies helps to acknowledge the impacts of technology at different levels, and is the first step for the development of tactics that address the tensions that might originate from the implementation of urban technology.

### 6.2. Method

This method was initially prototyped during the NWO Consortium Partner meeting in November 2019 and it consisted of 3 different steps:

**Step 0- Setting the scene:** The session started with a talk about how the material world around us changes due to datafication and other smart city processes, and what it means to make issues visible to encourage deeper engagement in thought and discussion about smart cities. The aim of the talks was to nudge participants to reflect and debate during the session with a specific mindset.

**Step 1- Walk:** Divided in small groups, the participants walked in the city for 30 minutes approximately. During the walk, they needed to identify smart city technology, and debate within the group the values related to this technology in the city (i.e. autonomy, freedom, friendship etc.). To ensure that the participants kept track of their discussions and maps, each member of the group took a different role: note taker, photographer, navigator. The note taker summarized the discussion, the photographer took pictures of the urban technology they encounter in the city, and the navigator drafted the route that they are following.

**Step 2- Map the walk:** After the walk, the co-design session began. In this step, the participants mapped their walk. Based on their experiences, for each technology, they discussed potential tensions among values originating from the implementation of this technology in the city. These tensions could occur within a value or among multiple values (i.e. due to allocating multiple meanings to privacy or an



existing tension between privacy and other values such as security or autonomy). The result of this step was an overview of various controversies associated to technology in the city, in the context of Amersfoort.

**Step 3- Development of tactics:** Having defined controversies in step 2, in step 3, the participants developed tactics to tackle this controversy. To this end, they first reflected in their groups on the levels of visibility of the identified controversies, in reference to how visible they were in the public sphere or to what extent people debated them. The three main levels of visibility are:

- Visible: controversies that are actively debated among multiple sectors of society.
- Less visible: controversies about which only specific sectors of society debate.
- Not visible: hidden controversies that are not at all debated.

Based on the levels of visibility of issues, the participants formulated various tactics or design interventions to make controversies more visible and debatable in the city among various stakeholders.

### 6.3. Results

Combining a situated experience like a walk together with a co-design session proved to be a successful approach to engage participants in discussion about datafication issues in the city by situating the discussion and reflection in context. The walk part of the walk-shop helped to trigger participants' experiences of datafication, enhancing their awareness of aspects that may have been taken for granted or overlooked. The co-design session supported a collective articulation of issues around levels of publicness or visibility; helping to identify ideas and approaches to make controversies debatable in the public sphere. During the session held in November 2019, participants debated the controversies included in Table 4.

*Table 4 Controversies identified by participants during our session in November 2019*

Urban datafication	Value tensions (contrasting values)	
Transport-related datafication	Comfort (i.e. car counting)	Autonomy /Creativity / Serendipity
	Efficiency (i.e. pin only garage)	Surveillance / Exclusion
Sensors and cameras	Privacy (i.e. crowd control cameras, sound sensors)	Transparency /Safety (surveillance) /Diversity
	Empowerment (i.e. citizen science)	Exclusion
Wi-Fi and antennas	Connectivity	Privacy /Autonomy /Sociality
Platforms	Convenience (i.e. food delivery)	Surveillance /Autonomy /Sociality
	Entrepreneurship	Exclusion



Figure 9 Participants creating and discussing their maps during the codesign part of the session

After debating the controversies and discussing their level of visibility, the participants (in groups) formulated various tactics and design interventions to make controversies more visible. We have categorized them into two types: tactics based on the level of visibility of controversies and general activities to increase public engagement.

#### *Tactics based on level of visibility*

Participants suggested tactics depending on the level of visibility of the controversies focusing on activities for (1) staging, (2) interfacing and (3) storytelling. Furthermore, they mentioned examples of specific design interventions, aiming at ‘providing experiences that could make people see things from different perspectives’ and thus potentially making issues with various levels of visibility ‘public’:



Table 5 Types of tactics and activities based on levels of visibility

Type of controversies	Type of tactics proposed	Concrete examples to increase the level of visibility
Visible controversies	<b>Staging:</b> tactics that seek provocation and challenging the current perception about specific datafication issues in the city.	Discussion triggers for visible controversies: Platform for discussion on the site of the controversy (e.g., 5G sticker on antenna); alternative signage that enhances awareness of the implications of current arrangements (e.g. PIN only).
Less visible controversies	<b>Interfacing:</b> tactics that aim at encouraging behavioral change and interaction with citizens.	Provocative images that make data visible and engage people in a political debate (e.g, size of the data that we offer unknowingly); fake cameras in public spaces to augment the controversy surveillance / privacy and highlight desired values (e.g., safety, autonomy).
Invisible	<b>Storytelling:</b> tactics that aim at imagining and creating scenarios to verbalize and materialize specific tensions.	Use light to make visible the presence of sound sensors (e.g., different sensorial experiences); show invisible value flows (personal data) as part of payment receipts (e.g., Thuisbezorgd).

*Strategies to increase public engagement*

In addition to discussing ways of making smart city controversies more visible in order to encourage wider debate and engagement, one group formulated a potential process that could be used by municipalities to enhance civic participation in smart city projects. Such a process could involve the following stages:

- **Education:** Educating citizens and organizations about the reasons behind implementing a technology.
- **Incentives:** Provide incentives for stakeholders to encourage participation and the use of a specific technology.
- **Means:** Make sure that there are means for evaluation to assess the levels of success of the initiative of implementing a technology.
- **Evaluation:** Based on the outcomes of evaluation, improve / replace the technology.

**Status of the method:** Tested but planning further iterations in 2020.



## 7. Reflection and next steps

This past year we have worked on surfacing and analyzing controversies, identifying value-tensions and potential value changes, and imagining possible futures for the city. The methods here presented are the first elements of the toolkit and guidelines that will constitute the collaboration platform for responsible smart cities. Table 6 summarizes the methods here presented.

Table 6 Summary of types of methods presented in this report

	Goal	How?	Method
	Make controversies explicit	Using scenarios and situated approaches	<a href="#">Controversy workshop</a> <a href="#">Controversy walk-shop</a>
	Anticipate the effects of technology	Making intangible effects tangible, making things public, imagining smart city futures. Consider impact of technology at different levels	<a href="#">Value change prototyping</a> <a href="#">Macro, meso, micro back-casting</a>
	Imagine smart city futures	Provide approaches to trigger people's imagination to engage in deeper thought and discussion	<a href="#">Futuring the city card game</a>

The upcoming year(s) we will build on the presented methods to work towards a collaboration platform that builds on the following three pillars:

- **Civic engagement:** how do we make sure local stakeholders are involved in experiencing, imagining and shaping a smart city that reflects their values? How can participation be instigated in relation to relatively abstract topics, like 'data', and how can we develop empathy among stakeholders with diverse, and potentially conflicting perspectives?
- **Collaborative futuring:** how to support the process of collective sense-making while envisioning smart city futures? How can stakeholders collaboratively act upon the dilemmas emerging from the existence of controversies while implementing smart city technologies?
- **Ethical reflection:** how can we make sure critical questions about societal and ethical desirability are incorporated in the development of smart city projects? When should this reflection take place, and who should be incorporated? A real smart city is human-centred, not technology-driven.

## 8. Research output

Alongside the development of the 5 workshops as presented in previous sections, this first year of this research project has resulted in the following publications and public events.

### Research output

- Glas, René, Sybille Lammes, Michiel de Lange, Joost Raessens, and Imar O. De Vries. 2019. "The Playful Citizen: An introduction." In [The Playful Citizen: Civic Engagement in a Mediatized](#)



*Culture*, edited by René Glas, Sybille Lammes, Michiel de Lange, Joost Raessens and Imar O. De Vries, 9-29. Amsterdam: Amsterdam University Press. [Available [Open Access](#)]

- de Lange, Michiel. 2019. "The right to the datafied city: Interfacing the urban data commons." In *The Right to the Smart City*, edited by Paolo Cardullo, Cesare Di Felicianantonio and Rob Kitchin, 71-83. Bingley: Emerald.
- Matos Castano, J. & Geenen, A.J.P., Oct 2019, *Een slimme stad, zo doe je dat: Verbonden, flexibel en betekenisvol; maak de echte future city*. Wesselink, J-W. (ed.). Future City Foundation, p. 162-163

#### Activities for the general public

- Future City Foundation kick-off (Amersfoort, April 5 2019) (<https://future-city.nl/saai-of-spektakel/>)
- TostiTalk DesignLab - 'Designing for controversies in responsible smart cities' (Enschede, May 28 2019)
- Workshop at Vastgoedforum Midden-Nederland (Amersfoort, May 29 2019)
- Participation in Dutch Design Week, as part of Design United. Journalist of the Future City card game (19-27 Oct 2019) (<http://www.design-united.nl/evolving-cityscapes/journalist-of-the-future-city/>)
- Media exposure: interview Trouw: 'De slimme stad is heel efficient, maar leeft die nog wel' (25 Oct 2019) (<https://www.trouw.nl/leven/de-slimme-stad-is-straks-is-heel-efficient-maar-leeft-die-nog-wel~b3b18587/>)

## 9. References

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- Zoonen, Liesbet van, Fadi Hirzalla, Jiska Engelbert, Linda Zuijderwijk, and Luuk Schokker. 2017. "Seeing More than You Think': A 'Data Walk' in the Smart City." *Bang the Table* (blog). 2017. <https://www.bangthetable.com/blog/data-walk-in-smart-city/>