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# TOWARDS RESPONSIBLE SMART CITIES: COOK-IT BOOK

FROM THE PROJECT "DESIGNING FOR  
CONTROVERSIES IN RESPONSIBLE SMART CITIES"

UNIVERSITY OF TWENTE.



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# COOK-IT BOOK

## TOWARDS RESPONSIBLE SMART CITIES

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“IN THE CENTER OF FEDORA, THAT GRAY STONE METROPOLIS, STANDS A METAL BUILDING WITH A CRYSTAL GLOBE IN EVERY ROOM. LOOKING INTO EACH GLOBE, YOU SEE A BLUE CITY, THE MODEL OF A DIFFERENT FEDORA. THESE ARE THE FORMS THE CITY COULD HAVE TAKEN IF, FOR ONE REASON OR ANOTHER, IT HAD NOT BECOME WHAT WE SEE TODAY.”

ITALO CALVINO; INVISIBLE CITIES; CITIES AND DESIRE





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UNIVERSITY OF TWENTE.



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And our consortium project partners: AeroVision, Design Innovation Group, Future City Foundation, Gemeente Amersfoort and Marxman Advocaten. With the additional collaboration of Dr. ir. Deger Ozkaramanli for the development of the “Network of conflicts” tool on page 14.

Interested in knowing about the perspectives of our project partners on responsible smart cities? Check this QR code:





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In this book, we have chosen the metaphor of cooking as a guide towards developing responsible smart cities. Food is an essential part of our lives, and also a 'glue' that can bring different people together. It is a common language that we all speak, yet often in very different ways.

Cities can be an exciting melting pot for diverse traditions, recipes and ingredients. How might technological innovations support us in our journey towards 'cooking' cities that truly acknowledge and flourish through difference?

*Cooking* responsible smart cities is not only about having the right ingredients or recipes. It is equally important how we understand and act in the world around us. In other words, it is important to have **mindsets** that allow us to explore, reflect, and envision urban futures in which different kinds of flavours can coexist.

In this book, as well as ingredients and recipes, we provide mindsets that uncover what is behind our approach and open up exciting possibilities for cooking responsible smart cities together.

### WHAT IS A MINDSET?

It is an attitude and way of acting you adopt.

## OUR 3 MINDSETS



**The 'Explorer':** As an explorer, you are an adventurer, and you are open to discover controversies arising from the implementation of smart city technologies. This is important at the start of a project to better understand the context of a project, and to reflect on the implications of technology at different levels.

*Think about a cook that pushes the boundaries of conventional flavours. That French cook that mixed cheese and marmalade for the first time!*

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**The 'Philosopher':** As a philosopher, you think critically about the world around you. You are enthusiastic about thinking and debating about values. What are the things that matter to us? What are the differences between my perspective and the perspective of others?

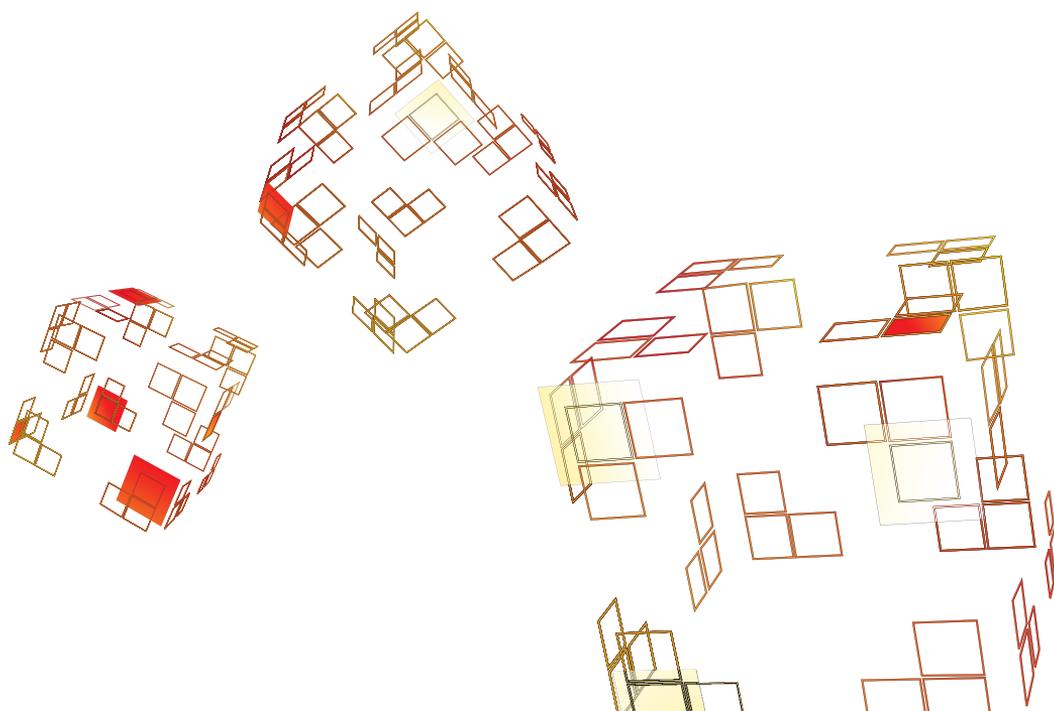
*Think about a cook that cares about the source of the ingredients: Are they seasonal? Are they healthy?*

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**The 'Dreamer':** As a dreamer, you love coming up with different visions of desirable smart city futures. You enjoy working with others and thrive when looking for ways to make sure that your visions include multiple perspectives.

*Think about a cook always looking for new recipes to make sure that the menu is creative and appealing to different tastes!*



# HOW TO NAVIGATE THE COOKBOOK?



## 1. Ingredients

Become acquainted with the terms and theories informing the methods we propose for moving towards responsible smart city futures.



## 2. Recipes

Get to know the methods we have developed.



## 3. Cooking experiences

Learn from the lessons we learnt when testing the methods.



## 4. Chef's provocations

Get inspired by potential smart city futures.

## WHO CAN I COOK WITH?

With your team members, to understand various perspectives within your team.

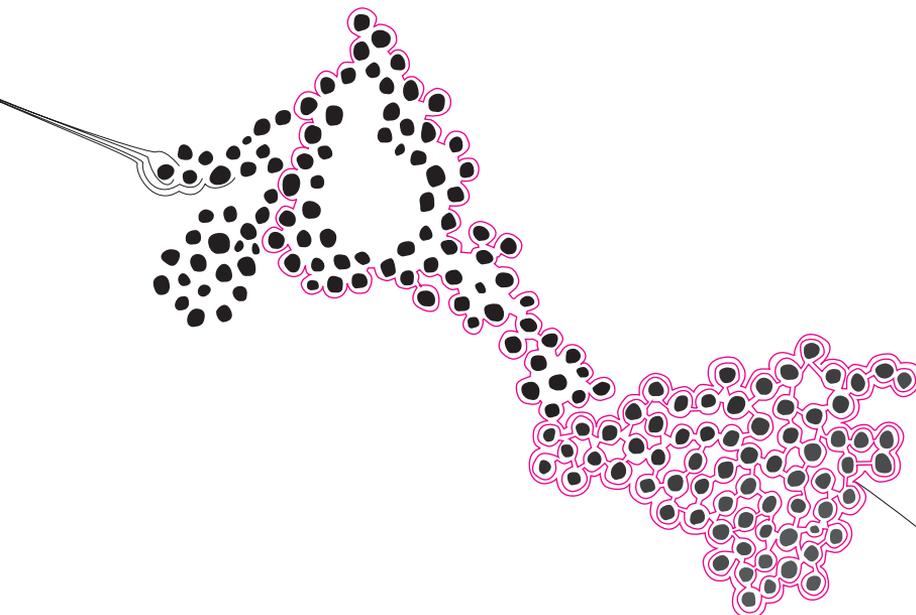
With a group of external stakeholders, when you want to get to know different perspectives.

Individually, to explore your own views on smart city technology.

## WHAT IS THE IDEAL 'COOKING CREW'?

Smart cities are complex socio-technical contexts. This means that they influence not only various stakeholders, but society as a whole. Technology, societal challenges, and complex relations between people, the city and technology are at the core of smart cities. That's why developing smart city solutions calls for the involvement of what is called 'quadruple helix' stakeholders: the public sector, companies, research institutes and, very importantly, citizens.

The ideal 'cooking' crew for responsible smart cities involves participants from all four groups.



# INGREDIENTS

**Working on a recipe requires specific ingredients that make it unique. In our project, the recipes we propose are the experimental methods we have developed and tested.**

**The ingredients that we use are existing terms and theories that inspire us and inform our take on responsible smart cities.**

Technology is changing our cities: sensors and cameras are everywhere, all services we can potentially imagine are just a click away, 5G antennas are appearing on 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, 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 perceive them differently. For example, a surveillance camera can safeguard safety but can also be an invasion of citizens' privacy. When these perspectives conflict, controversies arise. Controversies are situations where people disagree, where the issues at stake are sufficiently important to not be ignored.

In this research project, we consider that acknowledging, debating, and acting upon controversies allows the representation of multiple desires of interest groups in society. We take controversies as a point of departure to envision responsible smart city futures, encourage ethical reflection and stimulate civic engagement. These principles contribute to the development of responsible and inclusive smart city visions and projects.

## Why are 'terms' important ingredients?

Terms are important because they inform and inspire the methods we have developed for responsible smart cities.

## TERMS

These are terms that have guided the development of the methods we present in this cookbook. They are based on existing theories and work that inspired us.

**Agonism:** political theory that, unlike consensus-seeking theory, acknowledges the existence of different values and perspectives, and aims to channel potential conflicts positively.

**Controversies:** situations that arise from clashes between different values, interests or viewpoints.

**Controversing:** a strategy of creating fruitful spaces for controversies and using them as a means for civic engagement in democratic debates about public values and smart city futures.

**Ethical reflection:** acknowledging and thinking critically about the potential impacts of our actions from the perspective of different groups that may be affected.

**Futuring:** engaging with design methods for engaging different groups in imagining and reflecting on futures.

**Responsibility:** carefully considering how our actions may affect others by engaging in ethical reflection and acknowledging the existence of various perspectives.

**Values:** those aspects of the environment, social or public life that each of us considers important in cities; at a collective level, these become 'public values'.

**Prototyping:** a design activity of iteratively developing and testing a method or a product.

**Visibilising:** future-oriented design methods that aim to make tangible something that was abstract and intangible before, such as potential effects of technology in the city.

## THEORIES THAT INSPIRED US

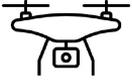


### **Interface theory and public values (Galloway, 2012; Drucker, 2011; van Dijck et al., 2018)**

Interface theory raises critical questions regarding interactions taking place in and with smart cities. These interactions are shaped by urban technologies, data, and processes of datafication, as materialised through a variety of interfaces, ranging from urban screens and data dashboards, to citizen platforms and commercial smartphone apps. Interactions in and with smart cities are never neutral. They are mediated through these interfaces with implied values, which shape the production of knowledge and politics in smart cities. Even imagining alternative smart city futures is an interface challenge: how can we see differently?

*Interface theory inspires us because it provides an interactionist and situated perspective on the smart city.*





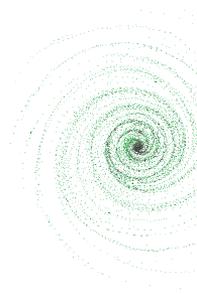
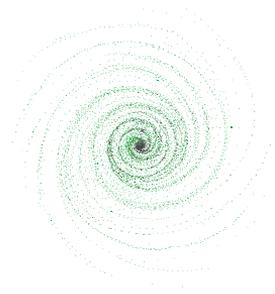
## Mediation theory (Verbeek, 2016)

The theory of technological mediation offers a framework to analyse the roles that technologies play in human existence and society. Its main premise is that technologies, when used, shape the relations between humans and the world. Rather than considering technologies as tools or as extensions of human beings, technological mediation sees them as mediators of human- world relations.

Watch this short explanatory video:



*Mediation theory inspires us because we acknowledge the impacts of technology on our cities and our city. It helps us raise questions like 'how does technology influence unexpected interactions in the streets? What can we do to preserve specific values?'*



## Speculative and critical design (Dunne and Raby, 2013)

Speculative design is a discipline of design that focuses on using design methods and approaches to generate debate and ideas, rather than focusing on the development of a product with a specific application. Speculative design encourages reflecting on 'what if?' questions about the future by creating scenarios to fabricate a possible future.

*Speculative and critical design inspire us because smart cities call for organising spaces of dialogue and reflection about the future. What is the type of smart city we would like to live in? How can we encourage reflection and include multiple voices in the development of smart cities?*



## Sensemaking (Weick, 1995)

When we face any event or we perceive a transformation in our environment (no matter how small), we undergo a 'sensemaking' process. Through sensemaking, we allocate meaning to what is going on around us. The meanings we assign depend on our previous experiences and our own interpretations of reality. And they inform the actions we will take. Sensemaking is ongoing and never stops. It is an essential process because it allows us to act when we perceive a shift in our surroundings, and it gives us something to hold on to, so we can act based on that meaning.

*Sensemaking inspires us because we seek to understand how technology influences the meaning we allocate to experiences around us, and how those meanings differ among different interest groups.*

# RECIPES

Just like cooking, there is no single step-by-step approach to work towards responsible smart cities. There are multiple ways that involve exploring what works in context.

In this cookbook, we propose a set of experimental methods based on the mindsets we have presented in the previous section: explorer, philosopher and dreamer. We have developed these methods in our own 'research kitchen' throughout the time our project has taken place.

These methods focus on:

- fostering engagement and awareness
- encouraging debate and reflection on ethical implications of technology
- kindling imagination to generate alternative smart city futures

Like a recipe, you should also add your own touch, and expertise depending on your needs (and your local knowledge).

## Engagement & Awareness

**Walk-shop:** explore the city and identify controversies on a city stroll

**Unpacking network of conflicts:** understand and explore the conflicts that make up controversies

**Agonistic workshop:** identify potential value frictions when implementing technology in the city

## Imagination & action

**Future Frictions web experience:** engage with a scenario-based tool to reflect on human-technology relations, and identify controversies that matter to you

**Futuring the smart city card game:** envision and reflect on the connection between technology, cities and values

## Reflection & debate

**Ethical dilemma scenarios:** reflect and debate ethical dilemmas to identify what matters to you (and others)

**Value-change prototyping:** debate the impact of technology in values and our cities

**Smart city dreams and nightmares:** speculate about your scenarios to reflect on those futures you would like to achieve (and avoid!)



Developed by Anne Bulten, Sophie Kooij, Eeuwe Krikke, Lara Siering, Marianne Visscher

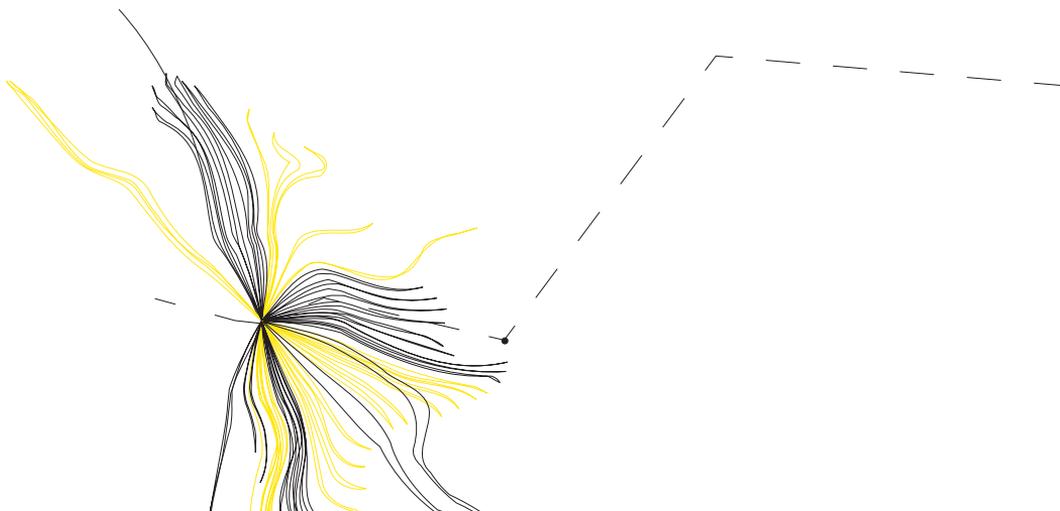
## ENGAGEMENT AND AWARENESS

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Like cooking, responsible smart cities are all about bringing people together. **Engaging** diverse groups of people in the process leads to richer results since it adds more perspectives (and flavours).

Although enriching, engaging multiple people in the process can also be challenging since it requires getting to know the perspectives of different interest groups. Raising **awareness** of these perspectives and understanding the impacts of technology is very important to navigate the ambiguity that is part of these processes.

This section offers three methods that you can use for engagement and awareness in smart cities.





## WALK-SHOP

The walk-shop is an experiential method to involve diverse participants in debates around technology and data in the smart city through direct interactions with the urban environment. The main goal is to identify potential controversies and ways of acting on them. The core idea of this method is that becoming aware of how datafication materialises in the city is a first necessary step in the process of imagining possibilities for alternative futures. The method combines individual awareness through walking, with the collective making of maps for discussion.

### 00.

**Setting the scene-** The session starts with a short talk that provides a lens for the walk so that participants focus on particular aspects of technology and data. This nudges participants to reflect and debate during the group session with a specific mindset.

### 01.

**Walk-** Divided in small groups (3-5 people), the participants walk in the city for approximately 30 minutes. Each member of the group takes a different role: note taker, photographer, navigator, map-maker, interviewer (i.e., asks the opinions of passers-by. When the group identify a technology that may be controversial). During the walk, they need to identify technologies that may be involved in datafication processes and discuss within the group the values they reflect or limit (e.g., surveillance, freedom, consumerism).

### GOAL

Experience urban datafication processes through first-hand interactions with urban space by walking, prompt collective reflection on potential controversies and discussion on how they might be addressed.

### OUTCOME

- > Enhanced individual awareness of urban datafication processes.
- > Group maps of urban datafication and experiences of the datafied city.
- > Collective discussion and reflection on potential controversies and tactics for how they might be addressed.

### MATERIALS NEEDED

Notebooks, pens, coloured markers, instant photographic cameras, glue, large sheets of paper.

Urban datafication: the combined process of data collection using smart technologies and complex algorithms, used to inform urban decision-making.

Status of the method: tested and ready to use

## 02.

**Map the walk-** In this step, the participants in each group map their walk, annotating the map with the technologies they encountered and their remarks about the values they consider to be fostered or limited. For each technology, they discuss potential tensions arising from the implementation of this technology in the city as a result of the identified values. The result of this step is an overview of various potential controversies associated to technology in the city, in the context of the urban environment where the walk was conducted.



## 03.

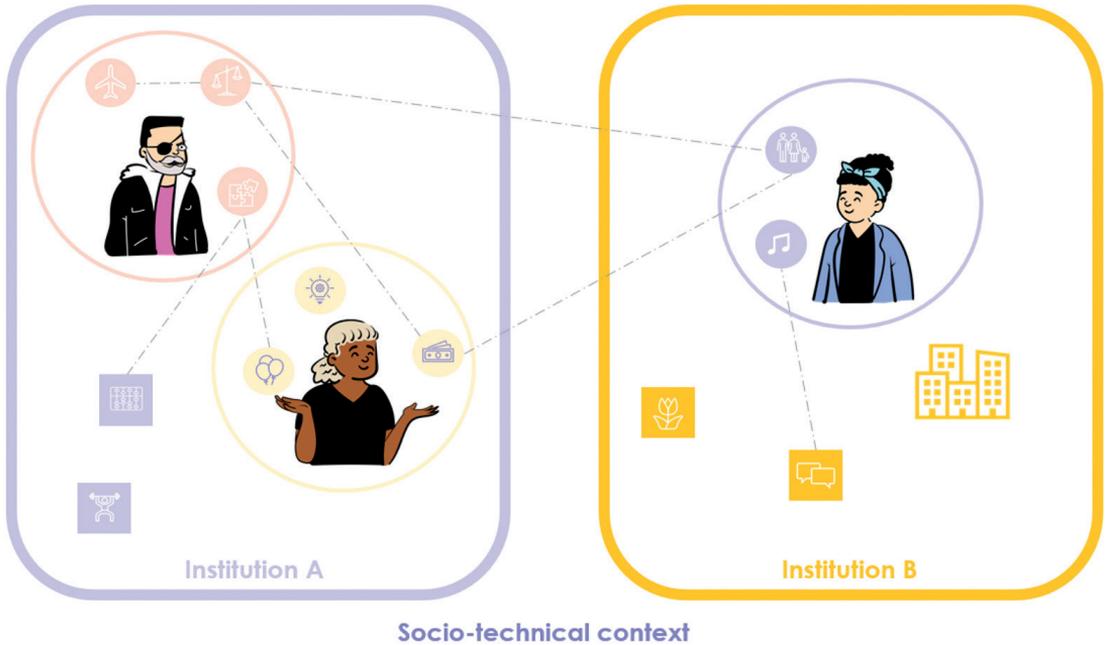
**Development of tactics-** In this step, all the groups come together to share their maps and identified controversies. Collectively, they reflect on how visible these controversies may be to the general public (e.g., a surveillance camera is more obvious than food delivery platforms represented by delivery bikes, which extract data for financial benefit of the companies rather than the city). Levels of visibility include:

- 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 debated at all.

Based on the levels of visibility of issues, the participants discuss potential ways to make controversies more visible and therefore debatable among various stakeholders.



To read some of our experiences using this method in practice, scan this QR code:



## GOAL

Understand the network of conflicts that make up controversies. This way, controversies can become more manageable and be turned into conflicts for participants to discuss and take action on.

## OUTCOME

- > Better understanding of the different perspectives and values that are part of controversies.
- > Set of conflicts to tackle and spark critical reflection and creativity.

## MATERIALS NEEDED

- > Available through QR code



## UNPACKING THE NETWORK OF CONFLICTS OF A CONTROVERSY

**This workshop method presents a conflict-inspired framework that can help to systematically analyse and unpack controversies. Controversies can help to elevate creative and critical modes of thinking. However, to realise their potential, we first need to gain a deeper understanding of the 'anatomy of a controversy'. This method combines scenario thinking and role-playing to achieve this goal.**

### 01.

**Get familiar with a future scenario and stakeholder perspectives:** Bring together a group of participants that would like to explore the constructive potential of controversies and unpack the network of conflicts.

Each participant receives materials to get acquainted with the smart city scenario of Nevertire in 2030, and to familiarise themselves with a specific stakeholder role.

As a homework exercise, participants are assigned a stakeholder, read the scenario, the description of their stakeholder, and the one-page explanation of the institution this stakeholder is associated with.

You can access the preparation materials and homework by scanning the **QR code**.

## 02.

**Mapping of individual and organizational values:** During a workshop session, participants adopt their stakeholder roles to embrace specific positions. In this first step, they introduce their stakeholder and discuss their stakeholder's goals, values and dilemmas as a group. Participants ask each other:

- What are the main goals and values of this stakeholder? What are the main goals and values of the institutions they are associated with?
- What may be potential dilemmas they experience in this specific situation?

During this step, each participant maps the values and goals of their stakeholder on a blank piece of paper. At the end of this step, participants feel immersed in the role of their stakeholders and understand each others' perspectives.

## 03.

**Unpack the network of conflicts:** After mapping the values of stakeholders, it is time to unpack the network of conflicts. In this step, participants identify three main types of conflicts:

1. Conflicts within the same individual (personal dilemmas)
2. Conflicts within a stakeholder group
3. Conflicts between different stakeholder groups

To this end, they connect with line values that they consider to cause tension among stakeholders or their institutions. At the end of the exercise, participants will have represented the network of conflicts.

## 04.

**Identify conflicts for creativity and criticality:** Once participants have represented the network of conflicts, they can reflect on and discuss these conflicts in more detail. To this end, they answer the following two questions:

1. Which conflicts inspire you and make you come up with new ideas (think creatively)?
2. Which conflicts make you think critically and reveal perspectives that you didn't consider before?

After answering these questions collaboratively, participants make a selection of those conflicts that they would like to tackle.

Some design methods and tools provide the means to actively engage various stakeholders and, by doing so, simultaneously stimulate creativity and ethical reflection.

To read some of our experiences using this method in practice, scan this QR code:





## 05.

**Brainstorming strategies for action:** In this step, participants brainstorm an intervention (i.e. product, policy, program, campaign) to address the identified conflict.

Participants think of ways to address this conflict by using the 5 How's method: thinking of actions that they could take and asking 'how?' 5 times to deepen their understanding of means to address the conflict.

## 06

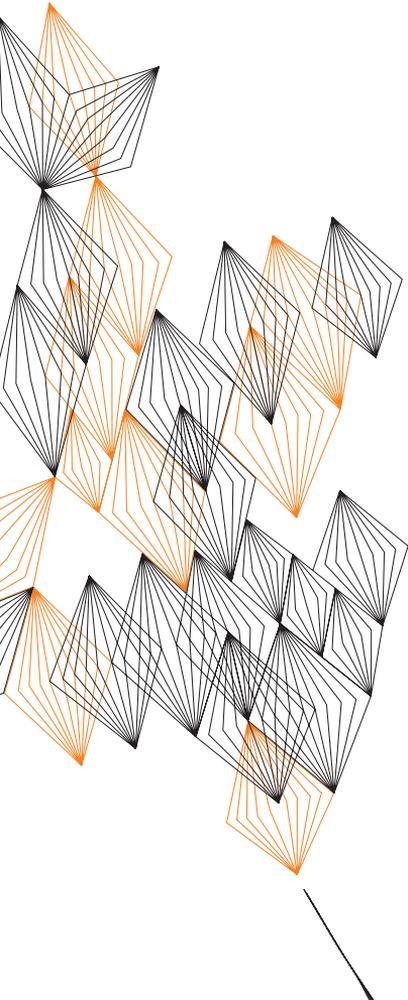
**Putting things in perspective:** Now it is time to put things back into perspective. Participants go back to the larger network of conflicts the addressed conflict is part of. How does the intervention relate to other parts of the network? Participants focus on interdependencies and associated effects. The reflection is guided by the questions:

- 1) How did the intervention address the conflict?
- 2) What elements did it not address?
- 3) Are there any other conflicts addressed by your interventions?
- 4) Do your interventions alter any conflicts and if so, how?
- 5) Do your interventions lead to new conflicts to emerge?

## 07.

**Redesign intervention:** With the reflections and insights from step 4, participants are requested to think about how they would redesign their intervention. In particular, they are encouraged to think if there is anything that they would like to change or enhance, and why?

To use the mural.co template for your own sessions, scan this QR code:





## AGONISTIC WORKSHOP

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Discussions involving the 'smart city' often bring to life diverse values, aspirations and interests. When these clash, controversies emerge; for instance, around how data is extracted, how it is processed, or how it shapes living environments and urban life. However, rather than trying to overcome smart city controversies, which is the typical standpoint, we explore how they could take a productive role in debates about smart city futures through the 'agonistic workshop'.

The workshop is inspired by the notion of 'agonism' from political theory and that of worldviews, from cultural theory. Agonism is about channelling potential conflicts arising from value differences into something positive and that can support collective action. Worldviews represent the ways in which we make sense of the world, which are typically shaped by our values and beliefs, forms of social organisation, and individual perspectives.

### 00.

---

**Setting the scene** - At the start of the session, the participants are asked to pick and define their own roles as the perspectives from which they want to explore controversies in smart cities (e.g., municipality worker, retired person, small business owner). This enables the participants to start thinking about technology from a different perspective, or someone else's 'eyes', as a way of exposing diverse values and viewpoints.

### 01.

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**Reflection on individual perspectives and imagined futures** - This step stimulates individual reflection on the chosen roles and the kinds of futures the participants imagine from these perspectives. To this end, the exercise introduces a technology, and a socio-technical challenge that could be addressed by the technology (e.g., AI and the COVID-19 pandemic). The participants are asked to imagine the city's future 10 years later and



To read some of our experiences using this method in practice, scan this QR code

reflect on the consequences of using that technology from the perspective of their character and also at the societal level.

## 02.

**Museum of Futures** - To stimulate imagination of potential futures, we use the Museum of Futures: a collection of 17 paintings, cropped as png images, that we had previously selected because of the diversity of visual prompts they provided. The participants select either a whole painting or combine elements from different paintings, which they consider to best visualise the kind of future they imagine. Being able to use images supplemented by post-it notes allows participants to use metaphors and make their imagined futures more tangible and relatable to their characters.

## 03.

**Mapping difference** - In this step, the participants map differences between their individual perspectives, as a way of creating space for constructive 'conflict'. Reflecting on the futures they imagined in the previous step, they are asked to position their views on the impact of technology along a horizontal axis (e.g., individual benefit to the left and societal benefit to the right). This is intended to raise awareness about how individual benefits can come at the expense of collective, societal benefits, and vice versa.

## 04.

**Shared imaginary** - This final step is aimed at enabling the participants to move beyond their differences in perspectives and define shared goals for the future of the city and the role of technology in it. To do this, participants create a 'painting' illustrating their shared imaginary using elements from the Museum of Futures collection. The participants have to discuss and agree on a title and brief description for their painting - their shared imaginary.

### GOAL

Explore controversies for their capacity to articulate multiple values and viewpoints (in line with agonism –see 'agonism' in the Terms section).

### OUTCOME

- > Enhanced awareness of different perspectives and values regarding the use of technology in cities.
- > Reflection on potential futures shaped by the human-technology relations implied by such values and perspectives.
- > Debate and negotiation of a desirable future that addresses the different worries and aspirations reflected in the various imagined futures.

### MATERIALS NEEDED

Personal laptops, Zoom, digital white-board (Mural.co)

Status of the method: tested and ready to use



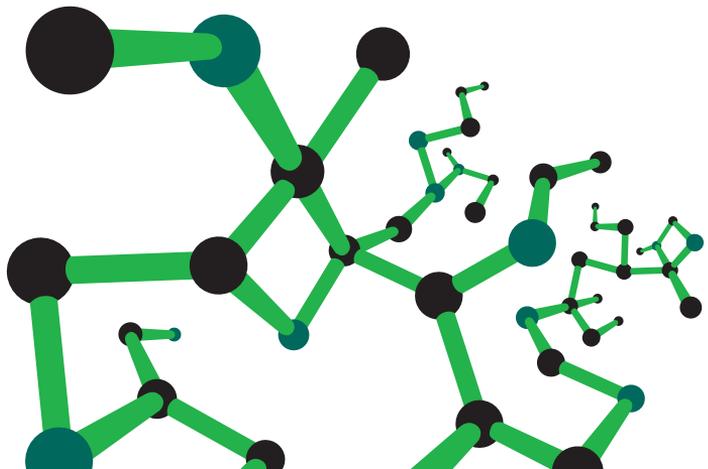
## REFLECTION AND DEBATE

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What we eat has consequences for our health and our lives. The ingredients we use, the food we cook all require preparation and careful consideration. This is the same for achieving responsible smart city futures: it requires **reflecting** on the impacts of technology at different levels and expanding our perspectives on how technology might shape our values and urban life.

Let's not forget that cooking (and eating!) with others always revolves around debating, and discussing, and building community. Reflecting on your own is stimulating. However, it is more meaningful if we share ideas, perspectives and **debate** them with others.

This section offers three methods that you can use for reflection and debate about smart city developments





## GOAL

Make smart city controversies explicit.

## OUTCOME

> List of specific smart city controversies

## MATERIALS NEEDED

Personal laptops, Zoom, Mural.co account (for the organisers)

# SMART CITY DREAMS AND NIGHTMARES

**Exploring controversies in smart cities helps to understand how technology challenges and reshapes social values. Our premise is that, to gain insights into the impact of technology on societal values, we need to understand where 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.**

## 00.

**Setting the scene** - Inspire participants by showing a visual that includes a public space, and the type of data that private and public organizations collect. Displaying this visual, ask (1) the first thing they notice, (2) the most surprising element of the visual, and (3) any other additional comments.

Status of the method: tested and ready to use

To read some of our experiences using this method in practice, scan this QR code:



## 01.

**Dream city** - In this step, participants 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 visualisations, participants receive 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.

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

Controversies are situations where actors disagree (or better, agree on their disagreement, where the issues at stake are sufficiently important to not be ignored.

## 02.

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

## 03.

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

## 04

**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.

### Wat is er meetbaar in... EEN WOONOMGEVING





## GOAL

The goal is twofold: (1) it aims at collaboratively prototyping 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 method has been based on and inspired by Forlano and Matthew (2014).

## INTENDED OUTCOME

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.

## MATERIALS NEEDED

Toolkit to develop the low-fi prototypes including lego, cardboard, glue, etc.

## 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.**

### 00.

**Setting the scene** - In this step, participants think about the neighbourhood they live in, briefly describing what it is like and how they experience it. After describing it, participants choose one of the neighbourhoods to 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 neighbourhood? Why?

## 01.

**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 levels (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 neighbourhood.

## 02.

### **Brainstorming and prototyping for values**

Participants prototype a future city scenario (10 years in the future) that incorporates the value in their neighbourhood. 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

## 03.

**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.

## 04.

**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 initiate a plenary discussion about value changes, why these occur, and what we can learn from them.



To read some of our experiences using this method in practice, scan this QR code:





## GOAL

The main goal of the scenarios is to narrate plausible stories based on the use of smart technologies that provoke public, private, and civic stakeholders to identify ethical dilemmas, and consider their priorities and actions if they were to encounter a similar dilemma in their professional lives. Different stakeholders can use these scenarios to reflect on the ethical implications of technology and have a common ground to collaboratively shape desirable smart city futures by formulating their own guiding principles in relation to the smart city projects or ethical questions at hand.

## INTENDED OUTCOME

Identified questions and/or guiding principles for smart city projects.

## MATERIALS NEEDED

Scenarios included in the next pages.

## ETHICAL DILEMMA SCENARIOS

**We developed four scenarios, or snapshots, as an ethical awareness tool and a way of controversing public values around data. Our intention is to provoke stakeholders to think about public values and stimulate debate around ethical dilemmas in the smart city. By stimulating this debate, stakeholders can reflect on, and communicate, their values and what matters to them, from their professional perspectives. The outcome of this debate can inform policies and concrete actions to work towards desirable (datafied) smart city futures or avoid undesirable ones.**

### 01.

**Setting the scene** - Participants gather a group of stakeholders and read the scenarios (one at a time). It is important to bring together different stakeholders that belong to diverse backgrounds.

## 02.

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**Reflection** - In this step, participants reflect on their own perspectives about the scenarios, as well as how other stakeholders relevant to the scenarios would perceive it, addressing the following questions:

- What are your first reactions to the scenario?
- If you were living in the context presented in the scenario:
  - a. What would you appreciate it about it? Why?
  - b. What would make you uncomfortable? Why?
  - c. Whose advantages would you appreciate? Why?
  - d. Who would you like to help? Why? How?

## 03.

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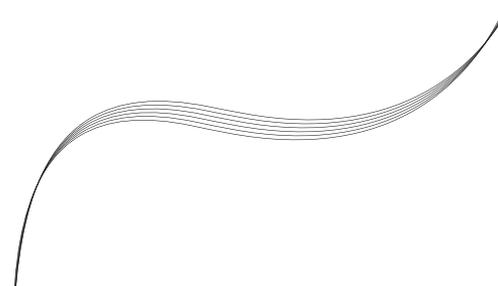
**Debate** - After reflecting on their perspectives, participants discuss the main differences and similarities among their perspectives to understand each other and build a common ground.

- Share with others your response. Debate.
- Identify the main differences you have. Discuss why you have these differences.
- Identify shared concerns, wishes and points of attention.

## 04.

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**Create** - After identifying their ethical dilemmas and core values they wish to protect, the participants can reflect on their own smart city projects and/or ethical questions. They discuss what they aim to achieve and avoid. Based on this discussion, they can draft guiding principles, using statements like: "We believe that..... Therefore, we will.....".



# SNAPSHOT 1

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## TRACKING PRIVILEGE

It's been 10 years since the pandemic. Due to increased global damage to the environment and failed attempts to address the systemic causes behind it, new viruses continue to emerge. The government is under continuous alert as it struggles to cope with the economic depression this has caused. To ensure some economic activity, every citizen over the age of 18 must wear a GPS tracker when leaving the house. Immediate penalty is issued when caught without it in the form of home arrest for 2 weeks and points taken from individual government held records. Over time, this can lead to a statelessness status. Those who abide by the tracking rules, however, can freely use the city's public spaces and services (parks, supermarkets, hairdressers, cafes, etc.) and thus contribute to the fragile economy.

Next week, Nico will turn 18 years old. Aware of the drastic changes he will experience after his birthday, Nico and his friends have joined an online group called 'The Resistance' where youngsters share tactics (and often hacks) to trick the system and avoid wearing the tracker while leaving the house. He knows the potential legal consequences of his actions, but Nico doesn't feel that the current governmental policy of deploying the GPS tracker protects his interests.

Nico's dream is to go to university to fulfil his dream of becoming a developer in one of the emergent tech companies at the moment: E-Freedom. This company, whose market value is on the rise due their increased popularity among citizens, has plans to develop an alternative to the current GPS tracker based on a technology that encourages freedom of choice. Although this alternative sounds promising, it may have unknown consequences on the non-tech sectors of the economy.



# SNAPSHOT 2

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## GUILD ELITES

The economic depression caused by the pandemic and the state's failure to cope have moved power into the hands of private companies. The state government decided to take a back role and increase the governing powers of cities. This is done by outsourcing decision-making to local companies that have money to finance data-driven public services. Aware that this can cause mass protests and overturn their new governing powers, companies decide to organise themselves into guilds. Ultimately, they all want their cities to thrive. The guilds establish their own rules and standards around data (sharing, storing, processing, use, etc.). 'Freedom of the City', which allows the guilds to trade with data for the benefit of the city, is bestowed to the guilds through local elections by a select and self-organised group of citizens. Membership to the voting group is obtained based on level of data awareness and literacy, as decided by the group.

Josephine is a 70-year-old neighbour, owner of a small café in the city. She opened this café 35 years ago. Although times have changed and many small businesses have disappeared, Josephine has a great number of loyal customers that keep coming back to enjoy her homemade muffins and cosy atmosphere.

Josephine is supportive of the initiatives that the guilds have been taking in the neighbourhood. However, she would like to propose the creation of a book club, and approving this initiative is subject to the decision of the guild. Since her small café is not one of the data-driven companies, Josephine cannot join the guild and depends on the decisions of their members.



## SNAPSHOT 3

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### PUBLIC DATA TRUSTS

Revolutionary changes to legislation, years of government campaigns, and positive results have substantially increased citizens' trust in municipalities in terms of sharing their data. This allows municipalities to regain control over private companies and steer decisions in the favour of the public good rather than commercial interests. The municipalities have established independent data trusts inside each of their departments dealing with public services (mobility, air quality, entertainment, etc.).

Data dashboards are placed around the city informing citizens about the latest progress made in improving the city based on their data and allowing them to express their opinions and ideas. However, this transparency has led to an overflow of data and ideas for improvements, increasing pressure on municipalities to show how they are addressing them.

Marc works for the department of sustainable energy at the municipality. There is no doubt that the data trusts have facilitated the use of data for the public good and there is more governmental transparency overall. However, Marc feels powerless in his job. The dashboard has created a hotline through which citizens can communicate directly with him and his colleagues, asking for the progress made on their ideas and making them accountable for those that were not taken forward. However, to transform citizens' ideas into real projects, Marc needs additional external expertise, from the private sector and knowledge institutions. These collaborations are strictly controlled by the data trusts, often limiting the implementation of citizens' ideas.



## SNAPSHOT 4

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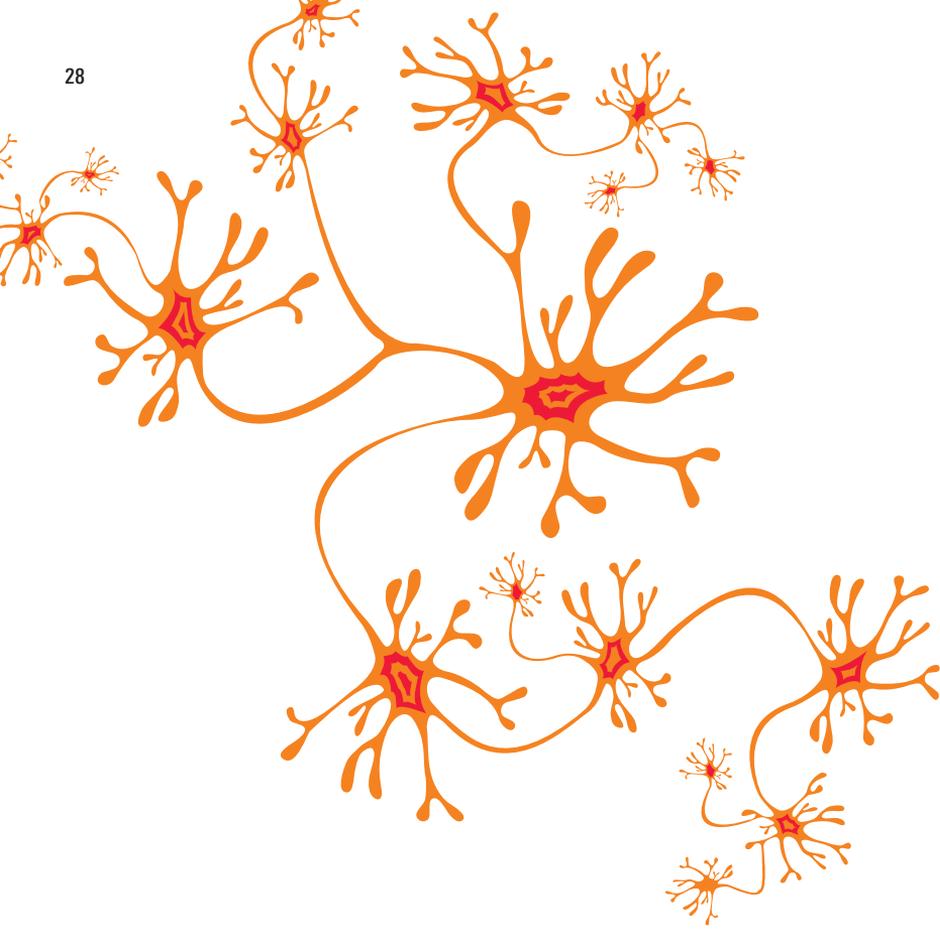
### SMART DEMOCRATIK 1.0

Past criticism and outrage caused by scandals of social media companies have pushed the public and private sectors to explore ways to -finally- use social media for the public good. Greater investment in urban labs and innovation have led to the creation of a social media platform, Smart Demokratik 1.0, that directly informs political decisions. Real-time democracy.

Companies finance the technical infrastructure to make this happen, and the government makes sure that all voices are heard. Social media has finally become the ultimate channel for public participation in the city. Daily, citizens are invited to provide their input to smart city plans in real-time. It is not mandatory, but those who respond will ensure that their opinions are incorporated in any decision the government makes.

Carla is a very active user of Smart Demokratik. It feels so empowering to have a say in the decision-making processes of your city! This morning, she would like to give her opinion about waste management. She is not very familiar with the topic, but she saw on her news stream that there are a lot of issues with garbage collection. "Why not? Let's give it a try", thinks Carla. After navigating on the page of waste management for a while, she realises that Smart Demokratik is about to close for the day. She rushes through the options and selects one of them in a hurry. "This might be nice", thinks Carla before shutting her computer down.







## IMAGINATION AND ACTION

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An important aspect of cooking (and being a good cook) is being able to discover exciting recipes and flavours. To dare to come up with new combinations and ideas that can make meals more special and memorable. **Imagination** is the faculty of forming new ideas and plays a very important role in that process.

Striving towards responsible smart city futures enables people to come up with alternative and innovative visions that incorporate multiple perspectives and dare to challenge the status quo.

This section offers two exercises to stimulate your imagination, being the first step to adopt a hands-on attitude and take **action!**



## GOAL

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.

## OUTCOME

Set of narratives that can be used during the ideation of smart city solutions and to anticipate alternative impacts of smart city technology.

## MATERIALS NEEDED

Available through QR code

You can download the deck of cards from by scanning this QR code



## STORYTELLING TO STIMULATE IMAGINATION:

Status of the method: Tested and ready to use.

## 01.

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

**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 disintegrated.
- Discipline: a future in which order is deliberately coordinated or imposed.
- Transformation: a future in which a profound historical evolution has occurred.

**Technology cards (T)** include different types of technology that could potentially be implemented in the city.

**City cards (C)** include places where urban life happens.

**Value cards (V)** include values or principles that people consider important in life at the individual and collective level (i.e., autonomy, freedom, friendship).

## 02.

**Getting started:** Participants get one card of each type (ATCV) and they reflect on 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 the 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 free up your process.

### 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.

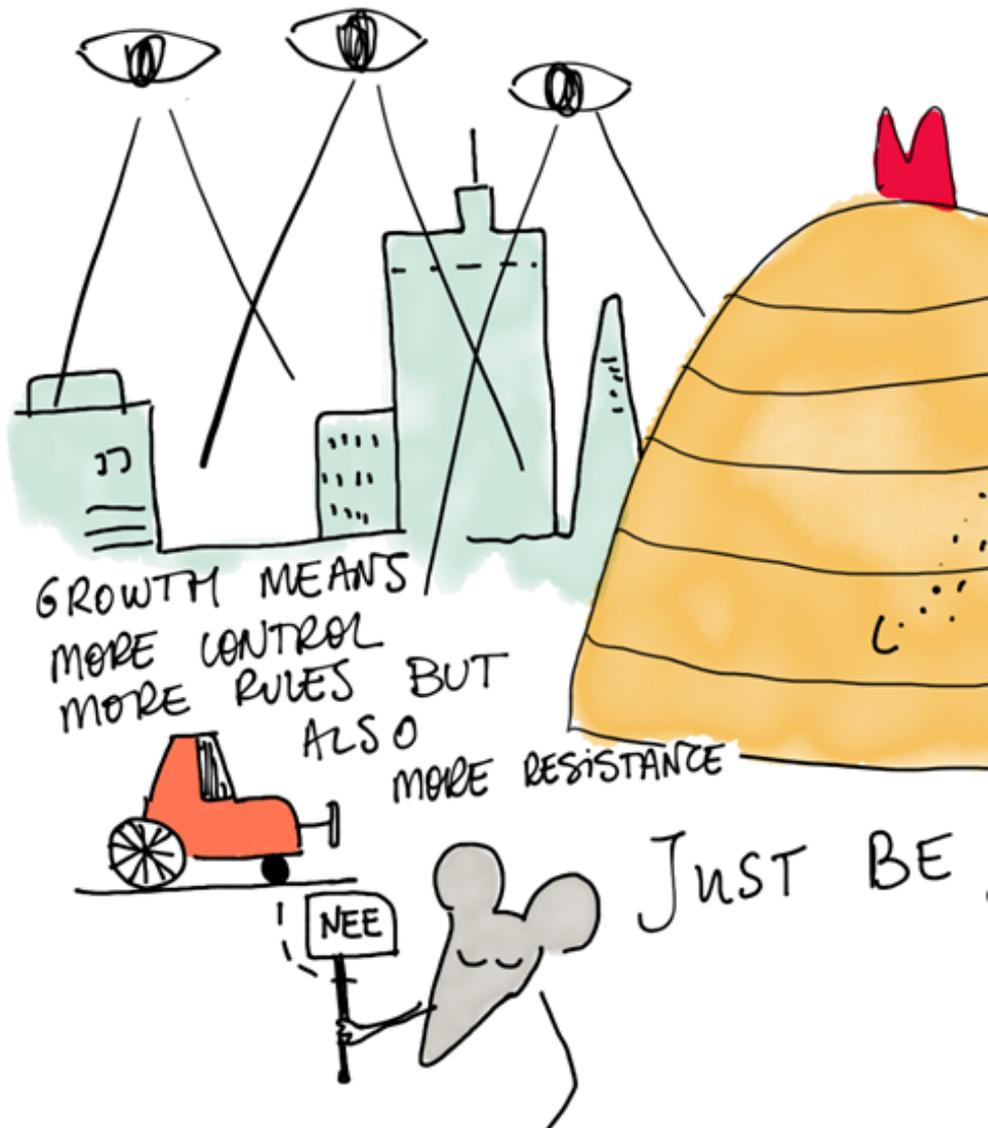
### FOR GROUP PLAY

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 competitive element since players can vote for the story that they consider most exciting, inspiring or fun.

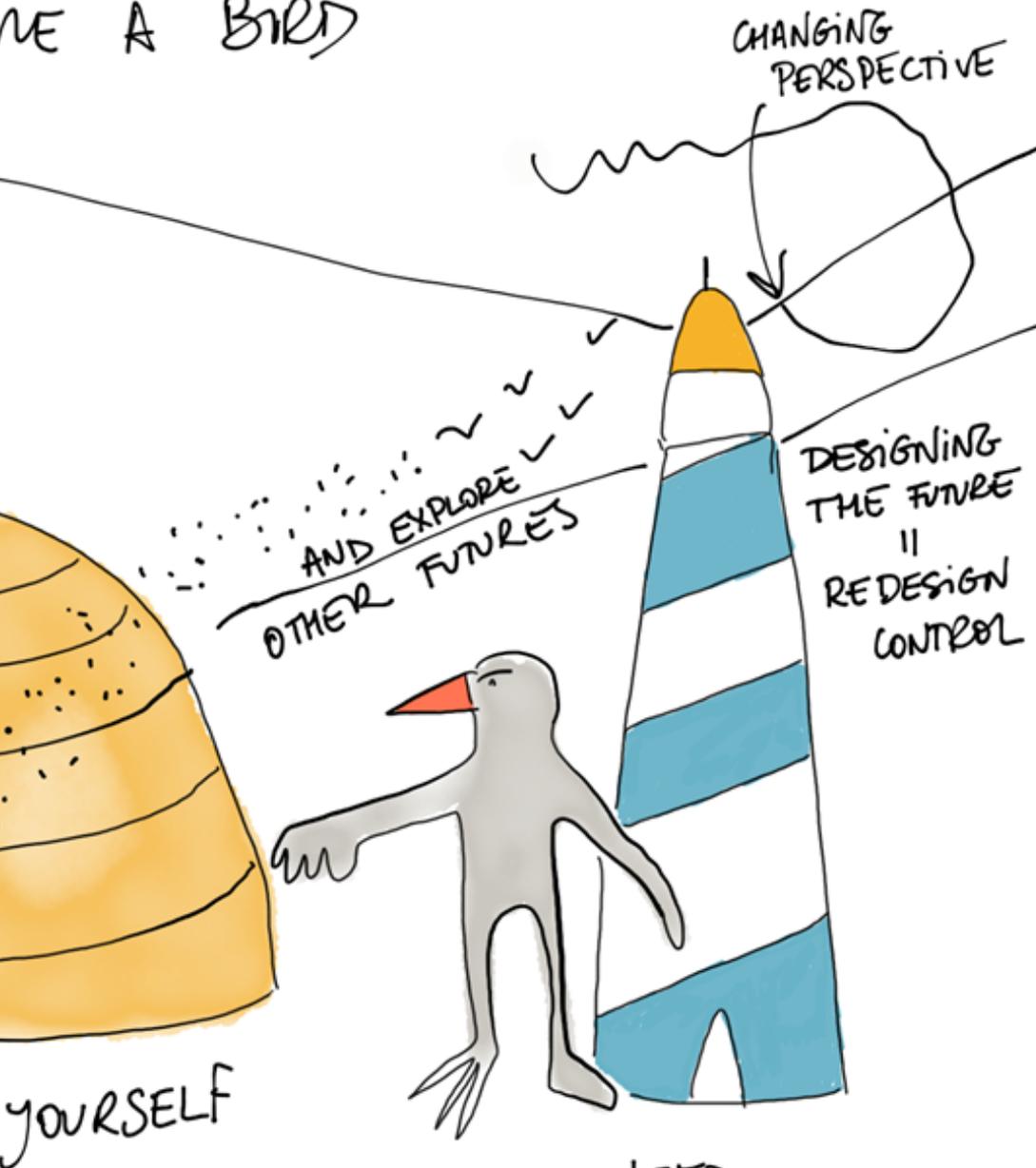
You can see a selection of 60 stories that participants of the Dutch Design Week 2019 wrote in this link.



BE YOURSELF, BECOM



ME A BIRD



WHAT WE NEED  
IS ENTHUSIASM WITH  
A FOOT ON THE GROUND



Collage developed by participants of our workshop at the Media Architecture Biennale 2020

## GOAL

Future Frictions is a web experience that stimulates participants to reflect on and debate smart city futures. In Future Frictions, you walk around a neighborhood and experience technological impacts on the city and its citizens. The main goal is to reflect on and debate smart city futures (individually or in a group).

## OUTCOME

Set of smart city controversies

## MATERIALS NEEDED

Future Frictions

To read some of our experiences using this method in practice, scan this QR code:



## FUTURE FRICTIONS WORKSHOP SESSION

### 01.

**Setting the Scene** – Participants experience Future Frictions on their own in either the 3D individual version (expected time 20 min) or the 2D app (expected time 10 min).

### 02.

**Individual reflection** - After experiencing Future Frictions, participants are asked to reflect individually on the following questions:

- Did the web experience raise any controversies for you? If so, what controversies?
- How do you think technology changed the experience of urban life?
- How did the web experience make you feel about the impacts of technology on our urban life?
- What aspects of urban life that you consider important do you think were affected?

## 03.

**Group discussion and formulation of controversies**

– Participants share the most striking thing that was brought up by Future Frictions and decide on main controversies as a group.

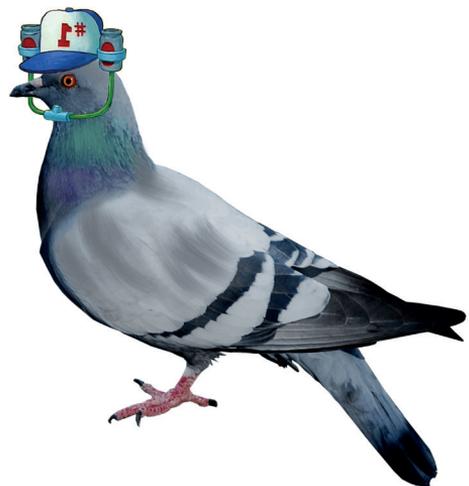
## 04.

**Make a decision** - Reflecting on the previously identified controversies, the participants have to decide whether to implement the technology presented in Future Frictions. Their debate is supported by introducing role-playing and agonistic elements. Thus, one of the participants is designated mayor, and the rest are divided into 'pro' and 'against' groups that change sides after an initial argumentation. This position switching is aimed at making the participant think about the impacts of the technology from different perspectives and bring to the surface those aspects of the city that they value most and wish to retain. The 'mayor' records the conversations using post-its and decides whether and how the technology will be implemented based on the debate and the arguments presented.

## 05.

**Vizibilising a future** – The participants create a collage of how they imagine a future city shaped by the decision taken by the mayor (despite potential disagreements) and give it a title. By making the collage together, the participants need to act on the controversies and disagreements between their values. This is followed by a presentation of the collage and group discussion, addressing the following questions:

- (1) Has the installation brought to light different potential impacts of technology in the city?
- (2) Has this process enabled you to identify and debate smart city controversies?
- (3) Has the web experience help you to collectively imagine and vizibilise desirable smart city futures?



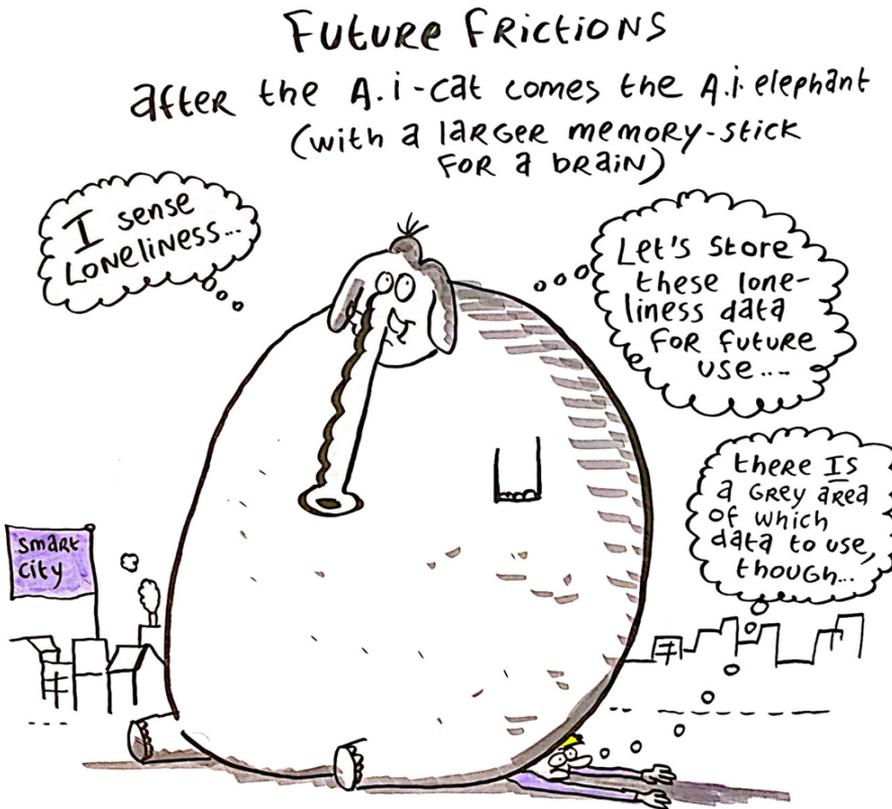
Future Frictions 3D individual experience (20 min approximately).



Future Frictions app individual/group experience (10 min approximately).







# COOKING EXPERIENCES

DURING OUR RESEARCH PROJECT, WE HAVE DEVELOPED THE METHODS WE MENTIONED ABOVE BUT, VERY IMPORTANTLY, WE HAVE TESTED THEM IN DIFFERENT SETTINGS. HERE, WE SHARE SOME TIPS AND INSIGHTS BASED ON OUR EXPERIENCES.



### SMART CITY DREAMS AND NIGHTMARES

Urban technology can have many positive and negative impacts on urban life.

Open new perspectives by looking at the negative and positive sides of technological impacts. Be open to 'flip it'!

### FUTURING THE SMART CITY- CARD GAME

Imagination requires boundaries to flourish. Something as simple as a card game with 4 cards can be enough to stimulate reflection on abstract concepts such as value changes and their influence on society. The random aspect that picking a card brings in allows for surprising combinations that support playful and speculative thinking about the urban future.

### AGONISTIC WORKSHOP

Using visual metaphors helps to debate and discuss value differences and similarities. It is also important to keep in mind that the same value (say, 'privacy') can mean different things to different people depending on their individual experiences. Sometimes, people attribute different meanings to the world around them and, with the help of images, they can represent these meanings, making it easier to share it with others and discuss.

### FUTURE FRICTIONS

Discussions around smart urban futures can benefit from engaging different stakeholders with potential controversies that originate from conflicting values, particularly when technology is involved. Through critical and speculative design, Future Frictions portrays thought-provoking yet relatable urban futures. Moreover, it offers an opportunity to see the interrelation between individual choices and collective values.

### VALUE-CHANGE PROTOTYPING:

Values and value change in particular are abstract concepts that can be daunting to discuss. Making values and value change tangible makes these abstracts concepts more concrete. Prototypes function as a boundary object that make it easier for everyone to be on the same page during a discussion. Tangibilising is a key element to create a level-playing field.

### ETHICAL DILEMMA SCENARIOS

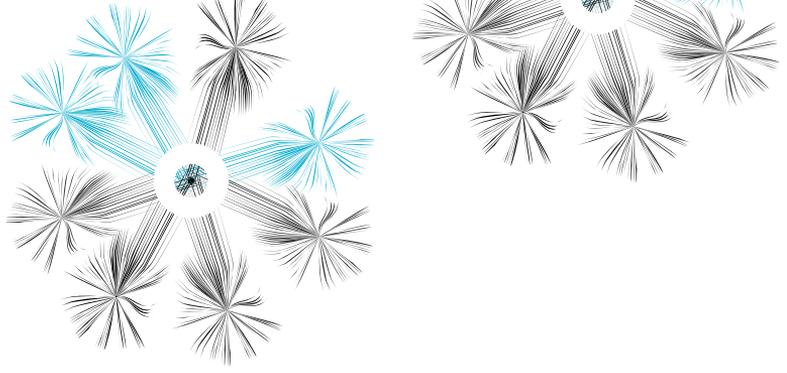
Controversies help us to think critically about issues at stake and the value tensions that accompany them. Future exploration by extrapolating ethical dilemmas from controversial scenarios allows us to dig deeper into these value tensions and their potential implications. In this process, it is key to explore the values that are at stake in these controversies and be open to coming up with new ideas.

### WALK-SHOP

Walking through the city with a specific assignment allows you to look at the urban environment with new eyes and discover elements and technology-mediated interactions that you may have never noticed before. It is important to be open to looking at things differently, to take time to discuss with others what you observe and think about potential controversies in an open manner together.

### NETWORK OF CONFLICTS

Controversies are multi-stakeholder, multi-dimensional conflicts, that can be dissected into (1) personal dilemmas (2) inter-stakeholder dilemmas (3) intra-stakeholder dilemmas. Discovering this 'network of conflicts' helps to understand the nuance and complexities of a socio-technical controversy and offers opportunities to address the conflict in a more understanding manner. Understanding how different stakeholders and their values are connected and interdependent really helps to make constructive use of controversies!



# CHEFS' PROVOCATIONS

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**A YOU KNOW, SMART CITIES CAN BE CONTROVERSIAL. READ THESE PRE-PREPARED CHEF'S STORIES TO THINK ABOUT SMART CITY FUTURES, EACH WITH A SPECIFIC CONTROVERSY. THESE ARE THOUGHT-PROVOKING STORIES THAT CAN HELP YOU THINK OF WHAT YOU WOULD DESIRE OR DISLIKE ABOUT POTENTIAL SMART CITY FUTURES. THESE STORIES ARE THE OUTCOME OF ONE OF THE SESSIONS WE ORGANISED IN OUR RESPONSIBLE SMART CITIES KITCHEN.**

## LIVING IN A GLASS CAGE



Technological advancements have made the collection and analysis of data possible to provide services that were unthinkable before. Thanks to data, criminality has decreased significantly, people in need can be helped when they require it, trackers and air quality sensors measure the health of the environment and citizens, and households consume less energy thanks to an awareness campaign facilitated by available data. These are just a few examples of everything that is possible. Governments and companies provide services with a clear goal and view the results in quantitative ways. However, the provision of these services comes at a cost: citizens live now in a "glass cage". Privacy, as we knew it, does not exist anymore. Everything they do, feel and are is visible to the rest of the world, with all the consequences that entails.

## THE BUBBLE



Big Data allows for a personalisation of experiences in the city. Citizens read the newspapers they appreciate, social media informs them about their favourite events based on their preferences, and technology helps them to avoid neighbourhoods they dislike. Everything in the city is adapted to their preferences and taste to avoid having unpleasant surprises.

Overall, citizens feel satisfied with this tailor-made urban experience: they get what they want when they want it! However, citizens are becoming hubs of individualism with increasing polarisation and segregation.

## PASSIVE SPECTATORS



In this scenario, years of research and development allow tackling global challenges such as climate change by means of technology in the cities. Thanks to sensors and smart cities, CO<sup>2</sup> emissions have dropped, several initiatives have contributed to behavioural changes in citizens, contributing to waste reduction and cleaner cities. As a result, quality of life has improved considerably and humanity is on the right track to achieve the global sustainability goals. The close collaboration between companies and governments has made this possible. Although satisfied with the increased quality of life, citizens have become mere spectators of what happens “behind the smart city scenes”, not being fully aware of the complex processes helping to achieve these goals.

## SCRIPTED CITY



In this scenario, through a strong collaboration between companies and governments, data collection allows for the provision of efficient city processes. All urban activities run smoothly, and citizens do not need to wait for processes that used to take a long time. Technology reminds citizens when they need to go to the supermarket, guides them through the city to arrive faster at their destination, recommends where to buy the products they want, and fills out their application to the university they would like to attend. Citizens appreciate the convenience and comfort of technology guiding their daily lives. However, citizens are losing autonomy, and their city experience feels like a scripted sequence of events where the goal is predetermined by an external actor. The experience in the city is a seamless synchronised series of events without room for improvisation or serendipity.

## PARTICIPATION, EVERYWHERE



In this scenario, the government has made mobile applications available, touch screens in the city, online platforms, and other technology to collect citizens’ input about all the initiatives they undertake. Moreover, they organise weekly meetings (online or face to face) to develop a sense of community. By doing this, the municipality wants to be transparent about all their initiatives, monitor citizens’ satisfaction and collect their input when needed. It is expected that citizens be involved in these initiatives and share their opinions and knowledge by using the available technology. Although citizens appreciate the municipality’ efforts to support participatory processes, they are frustrated when they feel that their opinions are not being heard. If they are investing time in providing their input, they expect something will be done about it. Furthermore, they perceive there is an overload of information that it is difficult to make sense of.

## THE DISASTER-FREE CITY



In this scenario, governments have focused on finding ways to use technology and protect their citizens from potential global disasters: from pandemics to climate catastrophes. The world is now safer but also a highly monitored place where myriad parameters are measured: from air quality to water streams, from earth vibrations to toilet seats. When something or somebody does not comply with the norm, they are separated from society and excluded from certain activities.

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