

# BECOMING A SMART SOCIETY

CONCLUSIONS

DATASTUDIO

PROGRAMME

2015-2017



A collaboration between Het Nieuwe Instituut  
and the city of Eindhoven

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# I. INTRODUCTION



Around the world, many cities aim to make themselves cleaner, safer, more efficient places through the use of data. To this end, they use digital tools to process data but also, to an increasing degree, to generate it. Cities collect and analyse this data in an effort to find solutions to a growing number of problems, social and otherwise. But things can go wrong in the monitoring and interpretation of data. And issues like loneliness and social cohesion aren't easy to capture in data form. So the first step in making society smarter isn't to collect more data or to develop better technology. Rather, making society smarter begins with identifying and understanding the demands and needs that are relevant in that society. We made this the core aim of the DATAstudio's programme in 2015. How could we identify desires and changes in society, and how could data add value to that process? Was it possible to increase citizens' awareness about how data is used? To what extent could we incite government and commercial parties to increase transparency around how they use data? And what new design questions would arise?

The DATAstudio, a joint multiyear project of Het Nieuwe Instituut and the city of Eindhoven, launched at Dutch Design Week in 2015 under the name *The State of Eindhoven*. We concluded the project during 2017's Dutch Design Week with the exhibition *Embassy of Data*, our contribution to the World Design Event. Over the course of 2016, we worked hard to develop a broad spectrum of programme components designed to involve as many people as possible in the conversation around data. We initially focused on the Eindhoven neighbourhoods of Woenselse Heide and De Tempel. We parked our DATAbus in the Henri Dunantpark and collected local residents' stories in order to identify their needs. We asked pupils from De Tempel primary school to record their experiences of the local area on a digital map. And we hosted *De macht van je muisklik* (The Power of Your Mouse Click), an accessible lecture on the impact of big data, several times. We analysed the narratives we gathered, linked them to available data, discussed the findings and formulated follow-up actions in a series of workshops and lectures with officials, designers, data specialists, researchers and citizens.

Of course, the project took time to gather momentum. The subject matter was highly topical but also extremely complex. In addition, the conversation about the smart society has been conducted primarily by experts in terms of various technological solutions. The DATAstudio's added value therefore lay partly in the way it deliberately linked regional, national and international networks and knowledge to open up discussions that had previously been conducted in a one-sided way. We also used innovative interventions to unite and mobilise local residents for the collective formulation of new design questions – because building a smarter society isn't just about making the city cleaner, safer and more efficient. It's also about making it a more inclusive place: a community whose residents are subjects, not objects, and work with government, businesses, non-profit organisations and knowledge institutions to think about how data can add value and come up with solutions for improving the city.

We're now bringing the DATAstudio project to a close with a digital book of seven essays situating it within a broader context. The introductory essay looks at the development of the DATAstudio's programme. What worked and what didn't in this unique partnership between a cultural institution and a municipality as they dealt with this highly abstract issue? Which tools were ultimately developed and deployed? The piece ends with seven specific recommendations. In a second essay, I describe the findings of the research conducted for the data panorama in the *Embassy of Data* exhibition. The panorama

presented a never-before-visualised picture of Eindhoven's efforts to become a smart city. Is the smart city a fait accompli now, or is it still largely an aspiration? The piece concludes with a number of observations and the identification of two urgent design tasks: increasing data transparency in public space and improving data legibility for citizens. In an essay on the closing conference on 24 October, *Een stad zo slim als haar bewoners* (A City as Smart as Its Citizens), Klaas Kuitenbrouwer of Het Nieuwe Instituut expands on these two design tasks, which were areas of focus at the symposium. Next, Anab Jain of Superflux describes in detail how the *MapLab* educational project came about and evolved. In *MapLab*, children between the ages of seven and ten attach pictures and drawings representing their experiences of the area around their school to an online map. Today, *MapLab* is a repeatable formula that can be used at other schools in Eindhoven and elsewhere. Dan Hill of Arup Digital Studio writes about the *Cloud Atlas* workshop, held in late 2016 to devise ways of incorporating local people's housing needs into the forthcoming transformation of the borough of Woensel-Noord. The workshop has not, as yet, led to further action. Nevertheless, the essay makes clear the necessity of finding new forms of urban development for technology-driven cities. Government and the design disciplines must counterbalance the noninclusive urban visions of commercial platform companies like Uber and Airbnb. Ekim Tan of Play the City writes about developing the serious game *Woenseltopia*, which was made for residents of Woenselse Heide and De Tempel but can be played by anyone. It brings together quantitative and qualitative data in a unique way, as players come up with ways to improve their neighbourhood on the basis of personal insights and available data. In 2016–17, Sukanya Krishnamurthy and her architecture students at Eindhoven University of Technology looked at the state of the smart society in Eindhoven. Finally, her essay reports on their findings with respect to the sense of community and the role of technology in people's lives, mainly in Woensel-Noord.

# EMBASSY

21-29 October 2017

# OF DATA

**Linda Vlassenrood**

Our journey with the DATAstudio hasn't been a simple one, but we look back with satisfaction on the project, and on its highly successful finale at the World Design Event, the *Embassy of Data*. We have managed to reach an exceptionally large and broad audience and to carry on a conversation with them about the impact of data. Given the complexity of the subject, it's an achievement we're proud of. This fine outcome would not have been possible without the efforts of all the partners and everyone else involved in the DATAstudio. We sincerely thank each of them once again.



# II. HOW TO BUILD A SMART SOCIETY ACCORDING TO THE DATASTUDIO



The DATAstudio was a multiyear joint project of the Het Nieuwe Instituut and the city of Eindhoven devoted to data and the “smart society” that took place between 2015 and 2017. It was launched as *The State of Eindhoven* at Dutch Design Week on 23 October 2015. We brought the project to a close at 2017’s DDW with the *Embassy of Data* (21–29 October 2017), our contribution to the World Design Event. The project, commissioned by alderwoman Mary-Ann Schreurs, was highly experimental in terms of both its content and its collaborative process. Its purpose was to reflect on the changing relationship between citizens and government in relation to the smart society. We envisioned it as a kind of ‘outboard motor’ that would allow us to think about what the smart society might mean in Eindhoven at a different pace and at a certain distance from government. To accomplish this, we organised a series of interventions in the borough of Woensel-Noord. The DATAstudio’s core team consisted of curator and programme manager Linda Vlassenrood, researcher Klaas Kuitenbrouwer and content producer Ellen Zoete. They received support from communications officers Chantal Defesche, Mieke Fiers, Justin Hahury and Linda Hoogsteden successively. Below, I report on the project’s activities and share our most important conclusions, which can be regarded as recommendations.

## The State of Eindhoven

Eindhoven aims to be many things: a smart, healthy, caring, innovative and, most of all, adaptive city. It’s an ambitious and, above all, a proud place, thanks to the rapid progress it has made since a disastrous period in the 1990s. Like many other Dutch cities, Eindhoven faces a number of much-discussed shifts: the welfare state is making way for the participatory society, and at the same time the power of the state is shifting to the cities, which, with more than 60 per cent of the Dutch population, are the primary sites of innovation and economic power.

These transitions call for changes in government. Essentially, what is required is a reinvention of democracy. After all, government increasingly shares its responsibilities with businesses, knowledge institutions and, most of all, citizens, and in this context it prefers to speak in terms of a horizontal organisational structure. Eindhoven is handling this shift in an extremely self-assured, positive way. The conditions required for horizontal collaboration appear firmly entrenched in the city’s current DNA. It has used the lauded triple-helix concept – a model of equal partnership between businesses, knowledge institutions and governments introduced in the early 1990s – to build a booming knowledge economy. In 2011, Eindhoven was named Intelligent Community of the Year by an independent US think tank, the Intelligent Community Forum. That’s heartening news for local citizens – in theory. As it turns out, the city’s residents are hardly connected to its “smart”, innovative side. In fact, the triple-helix strategy doesn’t include citizens, and most Eindhoven residents have never heard of it. In order to enable the smart city to function, various kinds of data are being collected in the public domain, but hardly anyone is aware of this. And though plenty of technological progress is being achieved in the city, this often occurs away from the city centre, at locations like the HighTech Campus Eindhoven, or is invisibly accomplished online with particular user groups, and is therefore insufficiently embedded in the city. In short, though Eindhoven is marketed as a technology, design and knowledge hub, it is truly experienced as such by only a limited segment of the population. Furthermore,

the respective professional fields are developing in parallel, with little cross-fertilisation. For now, we can conclude that despite impressive growth figures, strong enthusiasm and international achievements, a gap exists between ambition and reality.

The disconnect is palpable when we look at Eindhoven's goal of profiling itself as a "smart city". Since 2016, the authorities have set the bar even higher and have talked about building a "smart society". The city acknowledges that technology should not be an end in itself but should be used to solve local problems in society. This proves problematic in reality, however. How do you unite a top-down decision to create a smart society with the kind of bottom-up movement that a participatory society implies? This question is a breeding ground for conflict as well as for debates around which values matter today and will in the future. Since 2015, Het Nieuwe Instituut has been facilitating a search for these new values, asking a fundamental question that is simple in essence yet complex in practice: why, how and with whom will the citizens of Eindhoven contribute to building a smart city? Eindhoven is in a prime position to define or redefine the meaning of the smart city in its broadest sense with its citizens, businesses and knowledge institutions, and to ascribe new values to the words "smart" and "society". For Het Nieuwe Instituut, the question automatically links to various assumptions about the participatory society and to new forms of collaboration, conflictual shifts in administrative and financial authority, differing ideas about the role of technology, alternative organisational forms, and concepts like trust, transparency, exclusion and the concentration of power and the role design plays vis-à-vis these.

## Het Nieuwe Instituut's role

The added value provided by Het Nieuwe Instituut lay, first of all, in facilitating sustained reflection and posing critical questions. In order to do this, we mobilised our national and international network of contacts. We drew on a range of discursive formats to bring together the relevant parties so we could work with them to direct the conversation and research. And we looked for ways to emphasise the importance of the role of design in blending urban-planning and digital expertise. We aimed to make the project useful for Eindhoven's municipal agenda but also to use our activities to mobilise a wider group of experts and citizens and broaden their awareness. Our goal was to develop a project that would start small and expand of its own accord. We expressly wanted the project to be more than just window-dressing; the subject's relevance to society and our personal commitment to it were simply too great for that. And we are proud of the results, though we must conclude that the project has had less impact on the municipal agenda than we had initially hoped. Ultimately, there was insufficient linkage in terms of content and process, though Het Nieuwe Instituut's limited mandate, resources and available time also played a role.

The process was a complex one, given the many stakeholders with their plethora of different interests and a not-unusual resistance to criticism and interference. We stressed that the project should consist of a process that would unfold over time, on the basis of lessons learned, with outcomes that could not be concretely defined in advance. It was an experimental approach, and one in which not everyone had faith beforehand. Ultimately, a substantial part of my work had to do with building trust. Because of this and because of the complexity of the subject matter, the project took time to gather momentum.

In 2015 we appointed an advisory group of Dutch and foreign researchers, thinkers and designers with specialised knowledge of the participatory society, technology and the smart city but with no direct ties to Eindhoven. They were Dan Hill, a designer, urbanist and associate director at the London design and engineering agency Arup; Anab Jain, a designer and founder of the London design and innovation agency Superflux; Tsjalling Swierstra, a professor of the philosophy of technology at Maastricht University; Albert Jan Kruijer, cofounder of the Instituut voor Publieke Waarden; Evelien Tonkens, a professor of citizenship and humanisation of the public sector at the University of Humanistic Studies Utrecht; and Chris Sigaloff, the former director of Kennisland. We asked them to provide input on the project and to help develop some of its components. In researching the role of technology in the Eindhoven society, we also worked multiple times with students at Eindhoven University of Technology, mainly from the master's course in Urbanism and Urban Architecture, and with master's students from the Design Academy Eindhoven. In 2016 and 2017, we worked hard to develop a broad range of repeatable activities, which ranged from collecting neighbourhood residents' stories and staging accessible lectures at local venues to hosting closed design sessions.

It may seem obvious, but as the project proceeded, our added value proved to consist primarily in bringing together people from different backgrounds, especially given the fact that conversations about the smart city's role in society are usually reserved for experts. We worked hard to involve a mix of people in our activities – city officials working in different areas, everyday citizens, researchers, designers, and students. We also increasingly began to play the role of information officers, making an activity that usually takes place invisibly or behind closed doors – data collection – tangible and discussable for citizens.

## The DATAstudio

In 2016 and 2017, *The State of Eindhoven* project evolved into a concrete form: the DATAstudio. Why? Conversations about the ins and outs of the smart city generally end up being about data collection. Not only is this much too narrow an approach to the smart city, these conversations are restricted to insiders and based on data sets whose representativeness is debatable.



Woenselse Heide  
and DeTempel.  
Photo: Wieteke Vrouwe

Therefore, a central question for the DATAstudio was how to build a smart society, not just a smart city. In other words, how could data and technology be of use for citizens and neighbourhoods? In the course of 2016, we worked to develop a toolbox of methods for identifying local residents' needs. Then we collected information about real life in the neighbourhood and analysed it, linking it to available data, and discussed the findings in workshops with officials, designers, data specialists, researchers and citizens, devising specific follow-up actions. We also created a second group of tools designed to raise citizens' awareness about the impact of data on their lives – and, more importantly, their own role with respect to it. The various methods were designed for repeated use. We concentrated at first on the neighbourhoods Woenselse Heide and De Tempel, in the Eindhoven borough of Woensel-Noord.

## Woenselse Heide and De Tempel

In the 1960s and 1970s, Eindhoven expanded to the north, primarily in the form of new single-family homes built for employees of Philips, DAF and Eindhoven University of Technology. The new borough was named Woensel-Noord. By 2017, it had 64,806 residents and 28,398 dwellings. Its layout maintains a strict division between housing, work, traffic and recreation. The area has few facilities, a low density, and an infrastructure designed around the use of cars. The buildings and complexes consist of simple rectangular blocks placed in abstract arrangements in open space. Most built sites contain a mix of different dwelling types, including detached houses, terraces and apartment buildings. The tallest buildings are located at the edges, with low-rise complexes in between.

By agreement with the city, as mentioned, the DATAstudio's activities focused on the adjoining neighbourhoods of Woenselse Heide and De Tempel. This area was chosen because of its rapidly changing demographic profile. The degree of participation there also lagged significantly behind that in other parts of the borough. Meanwhile,



Woenselse Heide and De Tempel.  
Photo: Wieteke Vrouwe

its residents had not yet been bombarded with participatory projects designed to close the gap. Interestingly, Woenselse Heide and DeTempel share a somewhat generic style of urban planning and therefore show many similarities to other postwar neighbourhoods in the Netherlands. In 2017, they had a total of 10,243 inhabitants and 4,503 homes. The percentage of people aged over 65, the share of dwellings owned by housing corporations, and the number of single-parent families were proportionally unusually high.



Collecting narratives in the Henri Dunantpark, July 2016.  
Photo: Wieteke Vrouwe

Design discussion on data deserts, 26 October 2016.  
Photo: Jeroen van de Wiel

## Data deserts

We began the DATAstudio project in July 2016 by collecting narratives in Woenselse Heide and DeTempel. What were the questions, needs, ambitions and wishes of the residents of this part of Eindhoven? It is, after all, much easier to think in terms of technological solutions from the outset than it is to stop and think first about the social issues in play. The impulse to do so is common in technology-driven cities like Eindhoven. We also observed that officials tasked with identifying challenges in a neighbourhood or borough usually did so from behind a desk.

Working in partnership with Kennisland, we parked our DATAbus in the Henri Dunantpark, and our 10-person team spent a week gathering 23 stories from local residents with the aim of identifying their needs. We wrote up the stories and published them online after obtaining interviewees' consent. Every conversation began with the question: What is it like to live in this neighbourhood? As we analysed the narratives, a picture quickly emerged: one of growing gaps between original residents and newcomers, between young and old, between those with and without higher education, and between poor and rich. The impact of technology on people's lives turned out to be negligible by comparison. We linked the residents' stories to available data and then discussed our findings in a series of workshops and talks with officials, designers, data specialists, researchers and citizens, devising follow-up actions.

It quickly became apparent that little to no data existed to support issues like loneliness, social cohesion and fear of change. A woman from Woenselse Heide told us, "Lots of older people regularly drop by the shop [the chemist Kruidvat – ed.] for a chat. (...) Older people are really lonely here. I'd like to see something done about that. These people are obviously lacking something – a place where they can talk to somebody." While hard figures on the numbers of elderly residents were easily gleaned from municipal data, the opposite was true of figures relating to loneliness. We dubbed such lacunae "data deserts" and held a design discussion

about the subject based on selected quotes from the interviews on 26 October 2016, during Dutch Design Week. With Albert Jan Kruiter acting as moderator, we spoke with a highly diverse audience about what alternative information-collecting methods were needed to “irrigate” these deserts. A fairly unambiguous conclusion emerged: hard data must always be enriched with “soft” information to accurately identify issues in society, and collecting stories in a neighbourhood or borough on an annual basis would be a simple, effective means of doing so.



Pupils from Louis Buelens primary school documented the mess in the park. Photo: Fieke van Woerkom

Final presentation of the MapLab results to the mayor, a city officer tasked with overseeing Woensel, and a social designer, 26 October 2017. Photo: Fieke van Woerkom

## Data awareness

We subsequently broadened our story-gathering to include children. Though more than 30,000 children aged 14 and under live in Eindhoven, the voices of these future adult residents are heard rarely if at all. We wanted to know what the neighbourhood looked like through their eyes. How could their “soft” information enrich the existing map? The result was *MapLab*, a three-part workshop programme for primary school pupils between the ages of seven and ten. *MapLab* was developed by Anab Jain and the Eindhoven educational designers *Beam it Up* in partnership with the DATAstudio’s project team. The children mapped features of the area around their school, from the scariest alleyway to the best hiding place. We collected their findings, in the form of photographs, stories and drawings, linking them to an interactive online map (see <https://maplabkids.nl>), a new application developed by the DATAstudio. In this way, we gained a qualitative understanding of the lived experience of a commonly neglected yet interesting segment of the population. Five Eindhoven schools have taken part in *MapLab* so far. For a detailed discussion of the results, please see Anab Jain’s essay in this publication.

A unique aspect of *MapLab* is that it helped the kids to look at their surroundings through new eyes. We aimed to achieve something similar with the accessible lecture *De macht van je muisklik* (The Power of Your Mouse Click). How do you make as many people as possible aware of the impact of big data? You need to tell a compelling story, with numerous examples of situations that already exist and ones that might become possible in the future, from neighbourhood residents using their phones to control streetlamps to traffic lights that know exactly who’s driving where. Is this what people want? And what are the privacy implications? Could we use technologies like these to make the city an even better place to live? We from the DATAstudio believe change starts with awareness. And if we are to shape the world of tomorrow in appropriate ways, it’s important that we ask each

other critical questions today. The first two lectures were given by professor Tsjalling Swierstra at the De Eerdbrand care home and the 't Trefpunt community centre respectively. Pieter van Klaveren, a creative technologies lecturer at the SintLucas school in Eindhoven, and Nadine Roestenburg, a researcher and curator, then gave a series of lectures at the *Embassy of Data* and in secondary schools.

Every *De macht van je muisklik* (The Power of Your Mouse Click) lecture led to a lively discussion, and the same was true of the monthly lecture series *Een stad zo slim als haar bewoners* (A City as Smart as Its Citizens), which took place on "neutral ground" at the Eindhoven library between January and June 2017. These lectures posed the question: how do you build a smart society and not just a smart city? We invited renowned speakers from the Netherlands and abroad to share and discuss recommendations and positive examples relating to issues like privacy, data empowerment and new public-private partnerships with a diverse audience.<sup>1</sup> Klaas Kuitenbrouwer curated the lecture series and wrote several reports on the content for the online magazine *e52*. The DATAstudio worked with *e52* to investigate Eindhoven's efforts to become a smart society. How was the process going? What was happening so far? And which examples could we learn from? In 2017, 40 articles were written for the series *Naar een Smart Society* (Towards a Smart Society).

[1]

Marcel Schouwenaar (The Incredible Machine), Maurits Martijn (De Correspondent), Jaromil (Dyne.org), Linnet Taylor (Tilburg University), Dietmar Offenhuber (MIT SENSEable City Lab / Northeastern University), Priya Prakash (D4SC, Design for Social Change), Drew Hemment (FutureEverything), Maya Indira Ganesh (Tactical Technology Collective) and Usman Haque (Umbrellium) presented their work in the lecture series and closing conference on 24 October 2017.

## Data empowerment

The DATAstudio project began with two questions: how could we link data to the reality of life in the city, and how could citizens and neighbourhoods benefit from data and technology? In the course of 2017, using the local knowledge gathered and working in partnership with *Play the City*, we developed the serious game *Woenseltopia*. Playing the game allows citizens to work together to explore the possibilities data can offer for improving their neighbourhood. Its secondary purpose is to bring different populations and age groups closer together by getting them to jointly look for solutions to various spatial and social problems. The game is therefore an interesting instrument for identifying and defining needed changes as well as discussing and testing new ideas with residents. Though it can be played by laypeople alone, its value increases greatly when experts and officials play too.



*De macht van je muisklik* (The Power of Your Mouse Click) at the De Eerdbrand, 22 September 2016. Photo: Bas Berends

The game is based on an imaginary scenario: a wall is secretly built around Woenselse Heide and De Tempel overnight, making it impossible to leave the area for nine years. *Woenseltopia* generates many new insights that could be useful in the real world, as players must find ways of ensuring sufficient food, health care, and appropriate housing and public space using available data. For instance, who in the area knows how to grow vegetables? How many cows will be needed if everyone keeps eating meat, and will there be room for them? Is it a good idea to sacrifice parking spaces for vegetable gardens? Could elderly people living alone offer parts of their homes for others to use? For a detailed description of *Woenseltopia*, please see Ekim Tan's essay in this publication.



*Een stad zo slim als haar bewoners (A City as Smart as Its Citizens):* Maurits Martijn, Jaromil, 2017. Photo: Bas Berends

## The Embassy of Data

*Woenseltopia* is a modest step in the direction of much-needed data empowerment. Before it can be achieved, however, data awareness is necessary. As stated, the DATAstudio project concluded with the *Embassy of Data*, whose focus was data awareness. In a video message in the exhibition, Dorien Zandbergen raised a number of striking questions about data awareness and the necessity thereof. Is it the equivalent of environmental awareness as we understand it today – a situation in which individuals can choose to, for example,



*Een stad zo slim als haar bewoners (A City as Smart as Its Citizens):* Priya Prakash, 2017. Photo: Bas Berends

sort their rubbish, eat less meat or vote for a particular party? What choices do we currently have, individually and collectively, in a society that is not yet truly data-aware? Ultimately, raising the level of data awareness begins with asking questions like these. We explored these questions in depth at the *Embassy of Data*. In another article in this publication, I describe the content of the exhibition and take stock of Eindhoven's smart-city ambitions. Is the smart city in Eindhoven now a fait accompli or still a vision of the future?



*Een stad zo slim als haar bewoners* (A City as Smart as Its Citizens): Linnet Taylor, Dietmar Offenhuber, 2017. Photo: Bas Berends

## Recommendations

We have gleaned a number of conclusions from the DATAstudio project. Large-scale data collection yields numerous new insights and possibilities, including ways of improving efficiency and safety, yet it also constitutes the greatest imaginable threat to the democratic legal order and the way the relationship between governments, the private sector and citizens is organised. We observe a clear tendency for governments and businesses alike to take their cues from the promises held out around datafication without giving sufficient thought to the associated ethical issues and social consequences. The development of new social coalitions around the collection and use of data therefore calls for a careful and critical approach.



Test session *Woenseltopia* at Dutch Design Week, 28 October 2017. Photo: Play the City

## Our conclusions are as follows:

### Smart cities are social as well as clean, safe and efficient

Building a smarter society doesn't just mean creating a cleaner, safer and more efficient city but also a more social and inclusive one. A smarter society is one that puts a stop to the widening divide between poor and rich, between longtime residents and newcomers, between those with and without higher education, between young and old, and between the digitally literate and those who see technology as complicated.

### Identify questions first, then collect data

In an inclusive society, data collection should take citizens' needs and wants as a starting point. Building a smarter society begins with doing a better job of collecting and understanding the needs and wants that are relevant to that society – with focusing on citizens, not technology. These needs are by definition interlinked and must be identified, interpreted and acted on by multidisciplinary teams that include citizens. The task of a smarter society is thus not to collect still more data or to develop newer, faster, better technology.

### Always enrich hard data with soft information

It is evident that complex issues in society like loneliness and social cohesion cannot adequately be captured in data form. Moreover, problems often arise in the interpretation of data, and data is by definition always incomplete. Social institutions and governments must recognise that, alongside digital data-based practices, other means of collecting information about complex issues remain necessary.

### Data sense

Expanding awareness around data – and the associated rights and duties – is a social responsibility shared by government, the market, research institutions, education, and cultural organisations. Moreover, it is clear that as data plays an increasingly important role in a wider range of fields, more data literacy and data sense will be required of employees and decisionmakers in those fields.

# Data transparency

Businesses and governments must learn to provide total transparency with respect to how they handle data in order to ensure they are accountable and to facilitate critical examination of the impact of data. For example, how can they convey clearly and simply to citizens which data is being collected in public space and why?

## Hybrid networks – not bottom-up v top-down

The changing relationship between government and citizens should lead to a hybrid network made up of government, citizens, businesses, nonprofit organisations and research institutions. This situation implies a self-aware government that is capable of listening and learning rather than merely transmitting. The ideal is a fully fledged dialogue between stakeholders that will permanently anchor the value of bottom-up initiatives in society.

## The datasphere is the public sphere

Governments should better acknowledge their responsibility with respect to the public sphere – throughout which data is collected, chiefly by commercial parties – and use their influence to protect and even expand the public interest.

*On the basis of the above conclusions, the DATAstudio calls for a government that will act, more than ever, as a guardian of collective conditions, a keeper of an inclusive public sphere, and an equal conversation partner on social innovations that will prioritise the city's value to citizens. In this scenario, data is explicitly understood and administered as a public good, and citizens – individually or collectively – determine the uses to which their data will be put. It is clear that to achieve these conditions, and logically many others around datafication (including legal agreements), the relationship between government and citizens will have to change dramatically. In cities that aim to become "smart," it will therefore be necessary to accelerate and more sharply define the journey to social innovation, governmental reform and a responsible, high-quality use of data. In Het Nieuwe Instituut's view, this should be done through a series of forward-looking design projects. And soon – time is running out.*

# III. EMBASSY OF DATA



A collection of innovative projects doesn't necessarily add up to a smart city. However fervently the city's communication strategists and various articles would have us believe it, Eindhoven is still far from being a smart city.<sup>1</sup> And it certainly isn't a smart society. Yet the existing gap presents tremendous opportunities. There is still room to shape the ways in which citizens take part in the conversation around data collection and how the city designs its data policy in order to encourage critical reflection.

Drawing 63,000 visitors, the *Embassy of Data* exhibition, which took place from 21 to 29 October 2017, during the World Design Event and Dutch Design Week, brought the DATAstudio's three-year programme to a highly successful conclusion.

The "embassy's" purpose was to increase awareness around the possibilities and opportunities as well as the threats and shortcomings presented by the collection of digital data. To this end, we invited visitors to take part in a personal conversation about data – and more specifically an exhibition devoted to the data collection points located within a 400-metre radius of our location in a former V&D department store. We expressly chose an accessible, central location in order to raise awareness of this abstract yet everyday subject among the widest possible public.

In June 2017 we began making an inventory of those data sets in the research area over which the city of Eindhoven had control. Which data was being collected where, and for what purpose? And to what extent was that data accessible to the public? We also spoke with several companies that work with the city to collect data. We chose not to approach commercial parties such as Facebook and Google because of their notorious lack of transparency and our limited research time. Hacking to gain information was not an option; we explicitly wanted to do things the officially approved way. We therefore experienced first-hand the dilemmas around the availability and openness of data. Obtaining it turned out to be no simple matter, even though we were operating as a cultural institution and not as individuals. Much of the city's available data was either not public or not readily shared because of privacy concerns. The sets were unconnected, and hardly any real-time data was collected.

At the exhibition, a data panorama created by the information designer Richard Vijgen presented visitors with the beginnings of a never-before-visualised picture of Eindhoven's efforts to become a smart city. Though the panorama was unquestionably incomplete, it precisely mapped hundreds of data points within a 400-metre radius. For many people, it led to new, at times shocking insights.

[1]

Saskia Naafs, "De muren hebben sensoren", *De Groene Amsterdammer* 49 (2017), 18–23. Also see: <https://www.groene.nl/artikel/de-muren-hebben-sensoren>, retrieved on 10 February 2018.

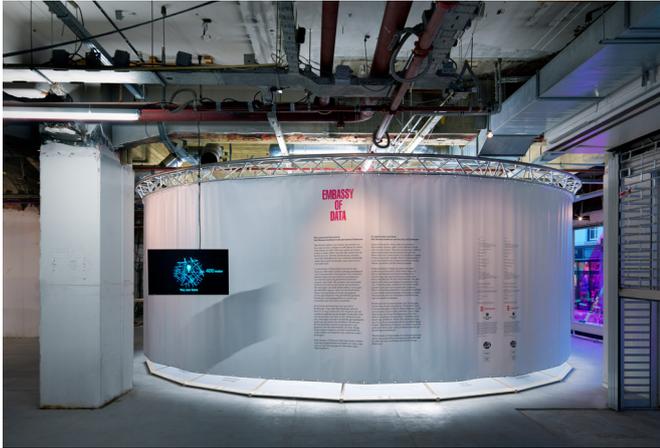


Photo: Gert Jan van Rooij

**Linda Vlassenrood**

At the data desk, we talked with visitors about the value of data. How familiar were they with the subject? Which data did they think should be collected? And under which conditions would they be willing to contribute their own? The exhibition sparked countless conversations with experts and with citizens of all ages. Their engagement with the topic was impressive.

In this article, I will specifically discuss the content of the data panorama and some related observations about the current status of Eindhoven's ambition to become a smart city. The panorama showed hundreds of data collection points representing the locations of sensors, cameras, antennas and clusters of dwellings. These were grouped in 11 categories, including waste and water management, municipal CCTV, air quality, and the Stratumseind Living Lab. An overview follows.

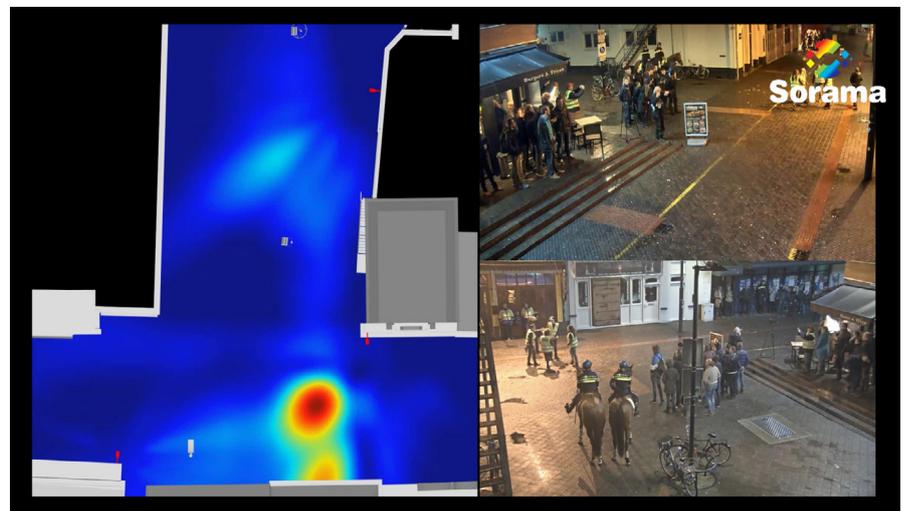


Photos: Gert Jan van Rooij

## Stratumseind Living Lab

Eindhoven's premier smart-city showpiece is the Stratumseind Living Lab. Stretching for 250 metres, Stratumseind is the Netherlands' longest nightlife strip. The four-year Living Lab – a series of experiments involving dozens of research institutions and private-sector parties – was set up here in 2014 to increase safety. The lab uses sensors, cameras and other monitoring instruments to collect data on the behaviour of mainly barging people. It also looks at the extent to which light colour and intensity influence that behaviour. The research findings are being combined to provide as much information as possible on how external influences affect people's behaviour.

With 64 tiny microphones, Sorama's "sound camera" picks up nearby sounds and vibrations and turns them into visual information. This measurement instrument works like a video camera for sound.



So what sorts of things does the Living Lab keep track of? First, equipment monitors the numbers of individuals entering and leaving the area at five locations. The ViSense camera counts the (anonymised) people who pass through its frame, within an area up to 24 metres wide. ViSense was developed by the Eindhoven company ViNotion, a maker of software for interpreting video images. Sound levels and directions are also monitored at these five locations. At one end of Stratumseind, near the Catharinakerk, equipment measures the stress levels in people's voices with the aim of detecting aggression. The "sound cameras" pick up nearby sounds and vibrations using 64 tiny microphones and turns them into visual information. Developed by the Eindhoven company Sorama, they function as video cameras for sound. Also near the Catharinakerk, cameras anonymously monitor visitors' walking movements in a further effort to detect aggression.

Multiple Wi-Fi trackers in the street can see how many individuals are congregating where – but they're currently switched off, since no satisfactory way of anonymising the data has been found. Data on where visitors come from is collected, however, in the form of an anonymised percentage overview sent to the Living Lab by Vodafone after a one-week delay. The city is not permitted to collect this data itself because of privacy laws but may obtain it from a commercial party.

Temperature, wind strength, precipitation and sunlight are also measured. Each week, the Living Lab receives an anonymised report from the police listing incidents by time, place and type. Every quarter, beer companies provide data on the amount of alcohol delivered to Stratumseind. The car park under Stadhuisplein transmits records of how many cars are inside. Eindhoven University of Technology programmes the lighting and keeps track of light levels and colours. Finally, a calendar monitors noteworthy events, such as full moons and final exams.

Visitors to Stratumseind did not know until at least late 2017 that they were walking into a laboratory, as there were no information signs to notify them that data was being collected. Only the figures on visitor numbers and sound levels can be found on the city of Eindhoven's open data portal, but unfortunately the lack of contextual information renders them meaningless to outsiders.<sup>2</sup>

[2]

See: <https://data.eindhoven.nl/explore/?q=stratumseind&sort=modified>, retrieved on 31 January 2018.

## Stadhuisplein car park

The car park under Stadhuisplein counts the number of vehicles driving in and out on the basis of the movement of the gates.



Photo: Gert Jan van Rooij

The figures are sent to the city of Eindhoven's dynamic parking management system through an API (Application Programming Interface). On big electronic signs around town, the system tells drivers how many spaces are left. The API also sends the figures to the dashboard of the Living Lab in Stratumseind, where they are stored in a database. Data collected in the car park is the property of Q Park and is not public.



Photos: Gert Jan van Rooij

## Traffic

“Traffic control installation” is the official term for a stoplight. Each installation continuously keeps track of whether or not cars, cyclists or pedestrians are present at its various detection loops and push buttons. It also constantly monitors whether each light is green, yellow or red. The raw data is used to measure traffic levels but also to calculate other figures, such as waiting times and queue lengths. All this information is logged and stored by the department of traffic and environment so the city can use it later – for instance, to process complaints about traffic lights or to assess their effectiveness. Data obtained from traffic control installations is not currently publicly accessible, but the city plans to make it available in the near future.

## Waste management

Around the world, many cities aim to make themselves cleaner, safer and more efficient through the use of data. Monitoring air quality and keeping track of waste, electricity and water streams always feature prominently on the agendas of cities seeking to become “smart”, Eindhoven included.

Since 2008, every new resident of the city has been issued with a city card. It enables them to park their cars, drop off bulky items at the waste facility, and open local rubbish containers to deposit their bin bags. Each of Eindhoven's 950 underground bins has a card reader that unlocks its barrel. It also contains a depth gauge – a sensor that measures how full the 2.6-metre-deep container is.

Data from the depth gauge is used to report fullness. No data is sent regarding how often the container is opened or closed, so no link is made between an individual's card and how much rubbish he or she deposits. Once a night, each bin's sensors send a fullness report to Cure Afvalbeheer's headquarters via a 3G link. The data is used the following day to determine the most efficient routes for the refuse lorries.

The waste disposal system is the joint responsibility of Cure Afvalbeheer and BWaste. Cure Afvalbeheer collects the rubbish;

BWaste provides the software and hardware. The system allows Cure Afvalbeheer to see the location of every container, whether it's broken, how full it is, and when it was last emptied. The system is not linked to other information sources, and its data is not shared with other organisations. While Cure Afvalbeheer is extremely transparent about its data, it is not officially public and therefore not available online.

## Air quality

[3]  
See: <https://data.eindhoven.nl/explore/?q=aireas&sort=modified>, retrieved on 31 January 2018.

AiREAS is a private initiative of Jean-Paul Close and Marco van Lochem. Their goal is to use air quality monitoring to make Eindhoven a cleaner city, working in partnership with citizens, businesses, research institutions and government. Their intelligent measuring system was installed in autumn 2013. Its 35 AirBoxes test the air for fine and ultrafine particulates and ozone. Thirty units are suspended from lampposts scattered through the city's neighbourhoods, and the other five are designated for mobile use at events and in emergencies. They show the concentration of polluting particles in each neighbourhood.

The AirBox was developed by Philips and ECN. Axians provides a software platform for reading and storing the measurement data. The Institute for Risk Assessment Sciences at Utrecht University uses the data in combination with other types of information to carry out health research. The city of Eindhoven and the province of Noord-Brabant provide support for the project. AiREAS is also active in the cities of Breda and Helmond. Real-time monitoring results from the AirBoxes are posted on the AiREAS website and the city of Eindhoven's open data portal.<sup>3</sup>

## Water management

Eindhoven's surface water, sewage system and groundwater contain hundreds of sensors that help the city to deal with constantly changing water conditions. Around town, 170 locations are equipped with up to six sensors each. They're in fountains, wastewater pumps, storm basins, rainwater pumps, drainage pumps, the river Dommel, and car, cycle and pedestrian tunnels. The sensors measure water temperature, water quality, amount of precipitation, groundwater levels and surface water levels. The eight sensors on Catharinaplein, for example, monitor groundwater; they are part of a temporary project intended to determine why newly planted trees on the square keep dying.

Eindhoven's city management department has been working with the company Inter Act since 2007 to build a fully digitised water management system to enable problems to be quickly identified and even prevented with the aid of real-time data. The vast amounts of data collected also allow the city to make better predictions about water levels and to anticipate heavy rainfall and likely outages. The system can also supply information to emergency services so they can know in advance when tunnels are flooding or flooded and therefore impassable. Data collected by the water management system is not otherwise publicly available.

## CCTV

The purposes of CCTV are to prevent crime, increase citizens' feelings of safety, and raise the number of on-the-spot arrests. Four areas in Eindhoven are currently monitored by CCTV.

**Linda Vlassenrood**

Three are in the centre: the Stratumseind nightlife area, Dommelkwartier (including Stationsplein) and the shopping district (including Markt and 18 Septemberplein). CCTV surveillance is also in operation on Baekelandplein in Woensel-West. The city has installed 30 cameras in the centre. Images are processed several times a week in the regional control room at the police station on Aalsterweg. They are monitored live on market days and weekend evenings. The images are stored for four weeks.



Photos: Gert Jan van Rooij

[4]

See: <https://www.politie.nl/themas/camera-in-beeld.html?sid=ecd77e3b-5321-42eb-bf3e-3e281850fc06>, retrieved on 14 March 2018.

In May 2016, as part of the national project Camera in Beeld,<sup>4</sup> the Oost-Brabant regional unit began mapping the locations of Eindhoven's CCTV cameras – official ones in public places but also private ones at shops, businesses and homes. The police urge every citizen and business to register every camera, so that if a crime is committed nearby they will know who might have images and how to obtain them quickly. In creating the data panorama, we had information only on the locations of municipal cameras. The number of registered private ones in the city centre currently stands at 36, and the list is far from complete.

## CityBeacon

The CityBeacon is a single object combining the functions of the cameras, information signs, signposts, antennas, advertising spaces and video screens that have proliferated in public space.



CityBeacon, Stationsplein Eindhoven. Photo: Richard Ponjee, Eindhoven247

Twenty of these multifunctional four-metre pillars are stationed around the city centre. Two companies, Eindhoven247 (responsible for providing public information in the city) and CityBeacon, launched the project in 2016. Each pillar is equipped with various sensors and cameras. Two contain cameras in the top section to monitor goings-on in public space. The second highest section of each pillar contains sensors for counting passersby and measuring air quality and sunlight. Each CityBeacon also has speakers and a screen for transmitting messages to those in the immediate vicinity or even across the city centre all at once. Each pillar also houses a Wi-Fi hotspot and 4G antennas to boost the local mobile network. Finally, embedded in a smaller screen at eye level is a camera that passersby can use to take selfies.

The sensors in the pillars are currently switched off, mainly because Wi-Fi tracking in public space is illegal. At the moment, the CityBeacons' only function is to deliver advertising.



Photos: Gert Jan van Rooij

## Reporting problems in public space

Bothered by a non-working lamppost or a loose paving stone? Spotted an abandoned bike? Got something to say about the maintenance of a local park or garden? You can report the problem to the city of Eindhoven through the BuitenBeter app, on the city's website, or by phone.

The app allows residents to report problems directly to the city's area managers by sending a brief description and, optionally, a photograph. The city will try to solve the problem as quickly as it can. Everyone who makes a report will receive a reply, sometimes with photos showing what has been done. The municipality's open data portal contains the location and subject of every report made, but not its contents or who filed it. The BuitenBeter app allows users to search a database of all reports. Problems roughly break down into complaints about rubbish, nuisances and infrastructure respectively. BuitenBeter<sup>5</sup> is an initiative of the Dutch company Yucat Mobile Business Solutions.

[5]  
See: <http://www.buitenbeter.nl/english>, retrieved on 14 March 2018.

## Mobile network

The most important sensors in town are inside our mobile phones. Though tracking in public space over Wi-Fi is legally prohibited, our phones are constantly being monitored over the 3G and 4G networks. It's not only the various service providers that do this but

also shops, companies and advertisers. Ultimately, the Dutch Data Protection Authority can only control the extent of Wi-Fi tracking to a limited degree. As a result, these private parties know a lot about where we live, how we move through the city, and where we spend our time.

The mobile communication and tracking network is made possible by a national infrastructure of masts equipped with antennas. The *Embassy of Data's* research area contains 90 GSM (2G network) and UMTS/EDGE (3G network) cellular towers, owned by providers like Vodafone and KPN. People are making increasing use of mobile data services, and telecom companies are constantly adding new masts and transmitters to handle the traffic. The network is getting denser and denser. The Dutch national antenna policy dictates that environmental permits must be obtained for antennas more than five metres high. Smaller antennas do not require permits, but providers must submit a placement plan to the city.

The Dutch national antenna register<sup>6</sup> and OpenCellID<sup>7</sup> show the locations of antenna installations in the Netherlands and around the world respectively.

## Experian household profiles

The last category in the panorama, concerning data on individual households, unsurprisingly provoked the most questions from visitors. Experian is a US company active in the Netherlands since 1986 that collects, analyses and sells citizens' personal data. It specialises in compiling profiles of households relating to their creditworthiness. Experian helps businesses to manage risks around extending credit to consumers and small businesses. The company works on the basis of data it purchases – we do not know exactly what kind.

In 2016, the city of Eindhoven bought an Experian database for the first time. Its aim was to supplement and enrich its own existing data for use in analytics at the neighbourhood, street and postcode levels. For instance, Experian's record for each address contains the residents' education levels – details the city did not have. Each household's file also lists the number of people, their ages and the type of household (e.g., a single person, a couple, a family); the residents' income, education and employment situation; details of car ownership and purchasing power; the type of dwelling and property value; and whether the home is rented or owner-occupied.

Experian also creates group profiles. Using its Mosaic household classification system, it categorises households in the Netherlands according to lifestyle, buying behaviour, and demographic characteristics. Numerous businesses use Experian's group profiles to refine their marketing strategies. Consumer households are subdivided into 50 types, grouped in 14 clusters. Eight of these household types have been identified in the *Embassy of Data's* research area: Mature Middle Class, Urban Good Life, Top-Rung Elite, Social Renters, Young Digitals, Kids and Career, Well-Earned Leisure and Senior Simplicity. Experian defines these groups as follows.<sup>8</sup>

[6]

See: [http://www.antenneregister.nl/Html5Viewer\\_Antenneregister/Index.html?viewer=antenneregister](http://www.antenneregister.nl/Html5Viewer_Antenneregister/Index.html?viewer=antenneregister), retrieved on 14 March 2018.

[7]

See: <http://opencellid.org>, retrieved on 14 March 2018.

[8]

These profiles come from Experian's 2012 booklet *Mosaic Profielen*, obtained through the city of Eindhoven.

### MATURE MIDDLE CLASS

“These seniors aged 50 and up belong to the Mature Middle Class. They’ve got their lives on track, and they’re doing their thing. They go to work or are already retired; they keep their houses in order and maintain relationships with family and friends. They shop for groceries, go on holiday once a year – and that’s it. The members of the Mature Middle Class don’t ask for more out of life than that.”

### URBAN GOOD LIFE

“The educated singles and cohabiting couples in the Urban Good Life group enjoy lives of freedom. They have nice apartments in the bigger city centres, with all the amenities a stone’s throw away – cinemas, shops, nice bars. Some are still studying, part time or full time; others are busy with their jobs. They’re hard at work building their careers or have already arrived.”

### TOP-RUNG ELITE

“The members of the Top-Rung Elite group live in the nicest houses – often detached – in expensive communities like Laren, Bloemendaal and Wassenaar. For some, wealth has been in the family for years; others have worked hard to earn it themselves. The Top-Rung Elite likes to keep up with the news, particularly financial, and to relax at the golf course, the hockey club and the marina, where they keep their sailboats. They eat out regularly and frequently take expensive holidays abroad.”

### SOCIAL RENTERS

“The Social Renters are middle-aged singles and couples who rent basic properties from housing corporations. They don’t have higher education; a large percentage is unemployed or retired, and others work part time. They don’t have much money. Their daily concerns revolve around getting by, cleaning the house, walking the dog and buying groceries. Otherwise, they don’t have a lot of obligations beyond keeping up a few social relationships.”

### YOUNG DIGITALS

“The Young Digitals are still studying, working part time or looking for a job. They all spend time online, whether they’re looking up information for essays, keeping up with social media services like Hyves and Schoolbank, or signing on to dating sites. They regularly play games and chat with friends, on computers as well as smartphones.”

### KIDS AND CAREER

“Members of the Kids and Career group shuttle back and forth between work and home. They’re busy with their careers and invest time in them, but at the same time, they’re striving to build a family life. The children go to day care or school, and in the evenings, the family

catches up around the dinner table. Weekends are times to relax, but the computer sometimes gets switched on – not only so the kids can play games but also so Mum or Dad can read that policy report.”

### WELL-EARNED LEISURE

“Life is good for the Well-Earned Leisure group. They’ve left behind the working world, fill their days with stress-free activities and have saved enough money to enjoy their leisure time. They live in nice, spacious houses, their children have left home, and they’re free to do as they please – perhaps visit a museum, relax with a book, take a long bike ride, look after their grandchildren, or go on the odd holiday somewhere sunny.”

### SENIOR SIMPLICITY

“The members of the Senior Simplicity group, as the name indicates, are over the age of 65 and live uncomplicated lives. What they lack in resources they make up for in time. In fact, they can often be heard saying, “I have more than enough free time.” They generally live in rental properties belonging to housing corporations and spend their days as many retired people do: reading, watching TV, having a drink, enjoying time with their grandchildren, shopping for groceries and staying active. They don’t ask for too much out of life.”

# Conclusion

Eindhoven, like many other cities around the world, aims to collect as much data as it can with the hope of using it to solve all manner of problems better and faster. The underlying principle is: to measure is to know. To this end, the city uses an increasing number of digital tools that process data but also, to an increasing degree, generate it. Most people, though, have no idea what kinds of data are being collected, where, by whom, and for what purposes. The data panorama was far from complete and inevitably a snapshot. Nonetheless, it made the realm of data – the so-called black box – visible and therefore discussable for the first time.

Our research into the available data sets during construction of the data panorama also led to a number of important insights. First, there is great tension between the municipal government's desire to increase openness around the data it holds and its justifiable reticence to do so in light of privacy issues. We see that the city of Eindhoven currently possesses 523 data sets but that at the time of the *Embassy of Data* just 38 were publicly available on its open data portal. The number of publicly accessible data sets will increase in the future, but most information will only be presented in a general way to safeguard residents' privacy.

Second, the smart city is a legal grey area. According to the Dutch personal data protection act, citizens must be informed in advance of which data are being collected and then be able to see how it is used. In practice, this rarely happens. So it's no surprise that people wonder: how can the city collect data on me, sometimes working with a commercial party such as Experian, and then not share it with me because of privacy concerns? The city's reticence evokes mistrust among citizens about the government's role in data gathering.

There is also tension between the municipal government's promise to make Eindhoven a smart city and its limited control over what happens in the datasphere. The vast majority of data collected in public as well as private space is the property of commercial parties such as telecom companies, Google, Facebook and data vendors. In addition, the Netherlands has no laws governing the placement of sensors in public space. Anyone can freely install them. So there are no records of which sensors are present where; what they are monitoring and for whom; or where, how and for how long the data is stored – nor how well it is protected. And we see the municipal government forced to work with parties like Vodafone to obtain certain data – usually for a fee – because privacy legislation forbids the city from collecting that data itself.

Eindhoven's smart city is highly fragmented. The municipality's data sets aren't linked or shared between departments, and very little real-time data is collected. Most of the 523 data sets are old-fashioned Excel sheets. The sets available through the online open data portal are made up of numbers presented without context, so they don't tell the whole story and are hard for outsiders to make sense of. It is therefore impossible for citizens to make use of this data, though in a truly smart society they should be able to.

In sum, Eindhoven is still a long way from being a smart city or smart society. Our research for the data panorama has revealed that two design questions are pressing at the moment. First, how will business and government implement transparency and accountability with respect to how they handle data in public space? And second, is it possible to make data truly legible and manageable for citizens? From 25 May 2018, a stricter privacy law has come into effect in the form of the EU's General Data Protection Regulation (GDPR). It gives citizens the right to even more information than before about how their data is used.

Public space belongs to us all, but nowadays it is far from clear which data is being gathered there about us and what is being done with it. The Stratumseind Living Lab is a clear example. Critical reflection on municipal and commercial parties' collection of data will benefit from greater transparency, and putting up a sign at the beginning of a street or the entrance to a train station won't suffice. Not everyone will notice a sign. And of those who do, how many will understand its implications? And will they know what to do if they don't wish to consent?

We would like to see the design disciplines work with municipal and commercial parties to come up with new ways of making the system of data gathering in public places visible and transparent. This will increase awareness among the population and, with it, the ability to decide whether or not to take part or to critically reflect on the activity in some other way. It will represent a small step in data empowerment, which must also be addressed in terms of data legibility. How can municipal governments make sure that when they provide data to the public, its meaning has truly been made clear and it can empower them to act? The Stratumseind Living Lab and the city of Eindhoven's open data portal are ideal places to start.



IV. A CITY AS  
SMART AS ITS  
CITIZENS: DATA  
EMPOWERMENT  
AND LEGIBILITY



On 24 October, during Dutch Design Week, as part of the World Design Event, the DATAstudio held the international conference *Een stad zo slim als haar bewoners* (A City as Smart as Its Citizens). Its purpose was to highlight the conclusions drawn from the DATAstudio's programme and take a realistic look ahead at the development of "the smart society". Alderwoman Mary-Ann Schreurs set the tone in her engaging opening statement, presented by DATAstudio programme manager Linda Vlassenrood: "First we talked about building a smart city, and then we talked about building a smart society. Perhaps it's time we dropped the word 'smart'. Let's start instead with the question of what society needs to develop and then look at the role data can play."

## Cities' data balancing act

Vlassenrood then briefly introduced the topics addressed in the *Embassy of Data* exhibition, which informed those discussed at the conference. The *Embassy of Data* showed that cities are forced to perform a balancing act with respect to data policy. Eindhoven is a good example, but many other cities face the same problem. On one hand, there are now broadly supported efforts to open up as many data sets as possible to public access and sharing. On the other hand, cities recognise the importance of protecting citizens' privacy. And this is a reason not to make many data sets public. Cities like to tell residents that they're becoming "smart cities". In fact, however, their influence on the urban datasphere is limited. Local authorities have little say over the data generated in a city. Private companies (starting with the usual suspects – Facebook, Google/Alphabet, Uber, Airbnb) have access to much more data than governments, and they use it to serve their own agendas and profit motives. While these don't by definition clash with the interests of cities and citizens, they certainly don't automatically coincide with them. In short, cities have less control over the datasphere than business does. And individual citizens have even less.

To facilitate healthy democratic debate in society around how we handle data, we need to reduce this asymmetry. At the conference, we focused first of all on the role of citizens. They need to be data-empowered. What would that look like, and how can we accomplish it? This was the subject of the first half of the conference. The second half dealt with data legibility and usability in public space, which are preconditions of data empowerment. Michiel de Lange, a new-media studies lecturer at Utrecht University, served as an alert, entertaining moderator for the day.

## Data empowerment

The keynote address on data empowerment was given by Maya Indira Ganesh, a researcher and programme developer at the TacticalTechnology Collective,<sup>1</sup> a global non-profit based in Berlin. TacticalTech is made up of engaged citizens, researchers, programmers and activists concerned about civil rights, privacy and security in the digital sphere. Ganesh described herself as "interested in the way power works" in the context of technological development and the datafication of society.<sup>2</sup>

## Step 1: Data awareness

Data empowerment starts with data awareness. And that begins – and continues – with asking questions. Why is this data being collected?

[1]

See: <http://www.tacticaltech.org>, retrieved on 8 February 2018.

[2]

See: <https://e52.nl/datastudio-maya-indira-ganesh-data-empowerment/>, retrieved on 8 February 2018. In an earlier article in *e52*, Klaas Kuitenbrouwer interviewed Maya Indira Ganesh about the concept of data empowerment in advance of her talk at the conference.

What purposes might it serve? How does datafication affect your life? Is your data as unique as you are? Would you recognise your own data?

A persistent misconception about data is that it is 'neutral'. Any data collected is collected for a reason. And that reason is built into the structure of the data-gathering technology.

As the conference in Eindhoven was taking place, The Glass Room<sup>3</sup> opened in London. A major joint project of TacticalTech and Mozilla, it was billed as "a disruptive tech store with nothing for sale" – in fact, it was a data awareness shop. Visitors could pick up a Data Detox Kit<sup>4</sup> – an eight-day cure consisting of simple steps taking no more than half an hour a day with which anyone can gain more control over the data he or she gives away every day for free. Getting a handle on your own data footprint so you can plug the leaks is an important condition for data empowerment. Only then can you be selective about who can do what with your data.

[3]

See: <https://theglassroom.org>, retrieved on 8 February 2018.

[4]

See: <https://datadetox.myshadow.org/detox>, retrieved on 8 February 2018.



Usman Haque, lead designer at Umbrellium. Photo: Fieke van Berkom

## Step 2: Data use

The next step in empowerment is using and applying data yourself. One approach can be seen in Graph Commons,<sup>5</sup> a project of the Turkish media artist and activist Burak Arıkan. This online toolkit allows anyone to map and publish patterns in data sets of their choosing. The process brings new questions to light. How can these patterns be used? And – again – by whom?

Ganesh showed various visualisations of publicly available data. A map of Europe was marked with refugee flows in a manner that resembled the way germs infecting a body are often visualised. Perhaps obviously, data mapping doesn't automatically have an emancipatory effect. Visible data can be deployed against people, depending on who's using the images.

The art of using data is to choose your data, then analyse it, and finally present it in a way that can spur purposeful action. In his talk later in the day, Usman Haque covered some of the considerations that come into play. TacticalTech applies data with the purpose to hold powerful and influential people and organisations accountable. One project that does this is LittleSis,<sup>6</sup> whose database illuminates connections between lobbyists, politicians, CEOs and other decisionmakers, making clear how financial power is organised and revealing entangled interests. The US non-profit organisation Media Matters for America<sup>7</sup> analyses and publicises disinformation (most of it Republican). France's La Fabrique de la loi<sup>8</sup> tracks changes and proposed changes to legislation and places them in a searchable database.

Each talk at the conference was followed by a discussion period designed to help attendees identify concrete ways to act. Audience members were divided into groups for discussions led by

[5]

See: <https://graphcommons.com>, retrieved on 8 February 2018.

[6]

See: <https://littlesis.org>, retrieved on 8 February 2018.

[7]

See: <https://www.mediamatters.org>, retrieved on 8 February 2018.

[8]

See: <https://www.lafabrique.delaloi.fr/>, retrieved on 8 February 2018.

members of a panel. Along with Ganesh and Haque, panellists were Saskia Beer, a developer with the urban development organisation ZO!City;<sup>9</sup> Merel Noorman, a smart-city researcher at Maastricht University; and Chris Sigaloff, the former director of Kennisland and a member of the DATAstudio's advisory team.

## Discussion

### DISEMPOWERMENT

The discussion began with the observation that citizens experience their relationship to data primarily as disempowering. When people realise their behaviour, preference or presence has left a data trace for one reason or another, it often feels like a violation of privacy, particularly if they haven't been notified in advance. Another common disempowering experience occurs when citizens are supposed to collaborate with data professionals around a (datafied) urban issue, but are excluded from the discussion through the professionals' highly abstracted language.

### PUTTING DATA IN ITS PLACE

Data itself shouldn't be the problem, and it can't be the entire solution. Data needs to be used in the right places and in the right ways. Where can data be useful and where can't it? It can help us to find new stories and to tell them. It can help to break down misconceptions, reveal wrongs, and articulate complex matters in nuanced ways. Data about health, land use, air quality, mobility, cultural differences and so on can be of value for communities and should be made available for uses that serve the public interest.

### CONSCIOUS INTENTION

How can citizens get control over what their data is used for? How can more data power be placed in the hands of the people? Is it a matter of designing the right interfaces, as seen in Saskia Beer's work? Should we create a kind of clean slate – perhaps using a Data Detox Kit – after which no one will unwittingly give away data any longer? How could a data detox benefit people at the individual level, at the community level, at the city level? Finding answers to these questions can't just be viewed as a citizens' problem. Citizens must pressure their public institutions to act to empower them to manage their own data.

[9]

See: <http://www.zocity.nl>,  
retrieved on 8 February 2018.

Panellists (from left to right):  
Merel Noorman (smart-city  
researcher at Maastricht  
University), Chris Sigaloff  
(former director of Kennisland),  
Saskia Beer (developer with  
the urban development  
organisation ZO!City) and Maya  
Indira Ganesh (researcher and  
programme developer at the  
Tactical Technology Collective).  
Photo: Fieke van Berkom



## CO-CREATING RULES FOR DATA USE

In fact, however, not everyone feels the need to manage their own data. Perhaps it's more important to make sure citizens' data can be used for community purposes and not just commercial ones. Citizens could join forces with local government to work with businesses to develop collective rules for data use with the aim of getting businesses to share ownership of data much more than they do now.

## SAVING CITIES FROM THE BALANCING ACT

One interesting observation that came up in the discussions was the idea that citizen data empowerment might finally free cities from the balancing act. Following a detox, citizens could choose which data they wanted to make available to the city or other organisations. They could do this to help address clearly defined questions or problems. If a city develops its data policy with an explicit mandate from citizens, it will clearly be acting legitimately. It will also be in a much stronger position when negotiating with private parties seeking to use data to develop new services.

This is a current approach to handling issues around data. It lies at the heart of recent ideas about how to design cities and what role technology should play. These can be seen in the manifesto "Tada!";<sup>10</sup> published on 3 November 2017 in Amsterdam, and in the work of Nesta, a leading UK think tank concerned with social issues and technology (see "Understanding how people interact with their data" and "Three lessons for innovation with data in the public sector").<sup>11</sup> Amsterdam and Barcelona are working together on the development of the DECODE<sup>12</sup> project, whose purpose is ultimately to give citizens control over their data and to make much of the urban datasphere available for communal use. In short, it's time to move from talk to action, in Eindhoven and elsewhere. Wouldn't the 20 CityBeacons<sup>13</sup> in the city centre be a great place to start?

[10]

See: <https://tada.city>, retrieved on 8 February 2018.

[11]

See: <https://www.nesta.org.uk/blog/understanding-how-people-interact-their-data>; <https://www.nesta.org.uk/blog/three-lessons-innovating-data-public-sector>, retrieved on 8 February 2018.

[12]

See: <https://www.decodeproject.eu/>, retrieved on 8 February 2018.

[13]

See: <https://e52.nl/data-experimenten-25-stadsbakens/>, retrieved on 8 February 2018.

[14]

See: <http://umbrellium.co.uk/>, retrieved on 8 February 2018.

[15]

A variation on *The Society of the Spectacle*, the title of French situationist Guy Debord's famous book of 1967.

## Data legibility

The second half of the conference addressed the question of how to promote data legibility in public space – a precondition for citizens' data emancipation. The keynote speaker was Usman Haque, lead designer at Umbrellium,<sup>14</sup> an award-winning UK agency specialising in urban design and data platform development.

To adequately address the design question around making data legible, Haque said, certain misconceptions about so-called smart citizens must first be cleared up. A society – he deliberately omitted the adjective "smart" – doesn't need smart citizens so much as it needs involved ones – informed, engaged people who participate in decisionmaking around small and large collective questions. Data can play a crucial role here, but only if they are put in their proper place, as Maya Indira Ganesh put it, and handled in the right way.

## How it shouldn't be done

Today we live in the "society of the data spectacle"<sup>15</sup>; we ascribe far too much power to data itself and tend to view data gathering as a solution to any number of possible problems. As an example of a misleading data practice, Haque cited the example of "citizen science" projects monitoring air quality, in which members of the public use various types of sensors to collect data on air composition. Why is it misleading? First of all, this type of data

collection rarely sheds any new light. Air quality meters near busy junctions will register worse air than ones in the middle of a big city park, and it's also known that air quality correlates strongly with noise levels. An intersection's busyness, proximity and noise levels can be directly observed by human beings without the need for sensors. Finally, it's not unusual for governments and other parties to use data gathering as a kind of delaying tactic. Where a controversial issue arises, even a fairly straightforward one, they often decide data "needs to" be collected before anything can be done.

Furthermore, it is already clear without supplementary data what kind of decision can be made about, for example, a busy urban intersection. Measures to reduce traffic density can either be taken or not taken. Air quality data adds nothing to the nature of the decision. In such cases, collecting such data gives citizens neither any new knowledge nor any new capacity to take significant decisions.

Even in cases where data collection does generate new knowledge, it doesn't per se expand citizens' decisionmaking power. If, for example, measurements show that air quality in certain streets is much worse than expected, that information will immediately become the subject of power struggles. Local homeowners won't want the data made public out of the fear that property values will drop. Activists who favour limiting traffic density will change their tack. In short, even when data bring new truths to light, decisions are made not on the basis of data but on the basis of political processes.

## So how should it be done?

The first questions that should be asked are: how will data help us – individually or collectively – to make a decision? Is data necessary for making that decision? And how should that data be presented to make choices possible? Haque develops design tactics to translate these questions into tangible form. For example, Thingful,<sup>16</sup> an open data platform and search engine for the data flows produced by the connected objects that comprise the Internet-of-Things, responds directly to the demand for data legibility. Thingful allows users to look up real-time data, access it, organise it, and react to it without the intervention of a central agent. The providers of the sensor data decide how it will be findable. Thingful increases the legibility, accessibility and usability of data flows that would not otherwise be discoverable or usable.

[16]

See: <https://www.thingful.net/>,  
retrieved on 8 February 2018.

## Taking users' choices as a starting point

While Thingful democratizes the availability of data, it doesn't answer the question of whether data can help people to make decisions. Two interesting examples that do are Cinder,<sup>17</sup> a mixed-reality interface for a building management system, and Starling Crossing,<sup>18</sup> a responsive pedestrian crossing that changes its configuration according to the types of road users present. Cinder takes the form of a virtual cat whose well-being is linked to climate control and sustainability systems at Trumpington Community College in Cambridge, England. Part interactive mascot, part avatar for the building, Cinder reacts in real time to sensors in the environment and to the humans around it. Students play with Cinder in the building's atrium, where she appears in a large augmented-reality mirror. When the solar cells on the roof produce plenty of electricity, she's more playful than on cloudy days.

[17]

See: <http://umbrellium.co.uk/initiatives/cinder/>,  
retrieved on 8 February 2018.

[18]

See: <http://umbrellium.co.uk/initiatives/starling-crossing/>,  
retrieved on 8 February 2018.

If too many doors and windows are open, causing excess energy loss, she behaves differently than when energy flows are in balance. Cinder creates significant feelings of shared ownership and responsibility among students at the college. Cinder's behaviour directly shows the students the impact of their actions.

Starling Crossing monitors use of an intersection with cameras and alters the lines and markings on the road surface accordingly; these are made up of numerous embedded LED bulbs. The system gives pedestrian and cyclist safety a higher priority than the rights of drivers. When there are large numbers of pedestrians, a wide zebra crossing is projected at the safest spot. If a pedestrian suddenly crosses in a car's blind spot, the bulbs light up in a pattern that warns drivers. When there is rain or fog, a buffer zone is projected around the crossing. The system is designed to learn pedestrians' preferences over time – do they always cross diagonally at a particular metro exit? – and gets better and better at optimising conditions for them. It doesn't tell them what to do; quite the opposite: it takes their decisions, analyses the data, and then uses the information to intervene directly in traffic conditions. The system makes traffic-safety relations immediately legible and thus leads road users to engage in safer behaviour.

## Discussion

### THE URBAN INNOVATION TOOLKIT

To arrive at designs like those discussed here, Umbrellium uses its Urban Innovation Toolkit,<sup>19</sup> a methodology for developing approaches to urban technology projects by working with groups of users. Umbrellium created it after identifying a number of recurring issues that come up during development of technology projects. These issues will be familiar to followers of the DATAstudio's activities.

Urban technology projects often arise out of the presence of technological possibilities or the requirements of research funding applications, and rarely from questions and problems existing in the city. Often, the organisers of such projects neglect to involve key stakeholders, identify a specific desired impact in advance, or evaluate the results afterward. Umbrellium developed its toolkit with the aim of learning how to prevent such issues. The toolkit amounts to a structure for a series of discussions designed to precede data collection. The central questions are:

- What's the problem?
- What effect do we want to achieve?
- How will we measure that effect?
- Which decisions can be made, and who can make them?

### INVOLVING ALL STAKEHOLDERS

A conversation is organised around each question, including as many stakeholders as possible. Each meeting concludes with the question of which stakeholders have not yet been represented and how they can be invited to take part in the next discussion.

### ENOUGH ITERATIONS, BUT NOT TOO MANY

Sufficient iteration turns out to be of crucial importance. A series of five discussion rounds tends to yield the best results. Each conversation takes the results of the previous one as its starting point. Each iteration amounts to a reassessment: what's the question beneath the answer we formulated last time? Through this process, new stakeholders may emerge. Iteration stops at the point when the initial goal converges with the potential to convert ideas into action.

### DATA COLLECTION IS ALWAYS POLITICAL

The question of impact comes down to a collective exercise

[19]  
See: <http://umbrellium.co.uk/initiatives/urban-innovation-toolkit/>, retrieved on 8 February 2018.

in sense making. Which impact determines whether a project is effective and successful? How do you measure that impact? Empirical data derived from stakeholders' experience matter more here than objective data. While sensor data may support narratives about experiences, it is essential that all parties involved understand that a project's impact is ultimately determined by stakeholders' experience, whatever the sensors say.

In other words, data collection is always essentially a political process. Politics comes before the gathering of data and plays a significant role in its presentation. Data collection can be useful and improve a project's quality provided that it treats stakeholders as subjects or observers and not merely as readable objects. If stakeholders better understand the relationship between data and politics, they will gain a better focus on what a project should accomplish. Citizens should therefore take an active role in the collection and presentation of data in the awareness that all these processes are political and not "purely scientific".

#### MODERATION AND THE "SWEET SPOT"

This political dimension and the meticulousness required to develop potential concrete actions using the toolkit requires that discussions be moderated properly and by a non-stakeholder. One of his or her primary jobs is to steer toward the "sweet spot": the optimal relation between the problem's underlying questions and the kinds of action that can be designed into the project. This "sweet spot" is always highly situated: it belongs to this place, this time, these stakeholders. In principle, the toolkit can function on any scale, from the level of the city (with major parties including local government, construction and tech firms, and of course residents) to that of the intersection or neighbourhood garden (with mainly local stakeholders, of course including residents).

## What's next?

The day's many explanations and discussions of democratic principles, examples and analyses of applications, and discussions of specific instruments and methods delivered a layered but clear picture of how a smart urban society can use data in a democratic way to address local issues without being overly steered by it.

The DATAstudio and Het Nieuwe Instituut look forward to continuing to put into practice the many lessons learned.



Discussion with audience.  
Photo: Fieke van Berkom

V. CARTOGRAPHIES  
OF IMAGINATION



## Anab Jain

Anab Jain is a designer, filmmaker and co-founder of *Superflux* – a critically acclaimed foresight, design and technology innovation company. She is also a professor of industrial design at the University of Applied Arts in Vienna. Jain joined the DATAstudio advisory board in 2015. Part of her contribution resulted in the *MapLab* project, developed in close collaboration with Robbert Storm (Beam it Up), Liselotte de Groot (Beam it Up), Sophie Rijswijk, Ellen Zoete (DATAstudio) and Linda Vlassenrood (DATAstudio).

“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody”<sup>1</sup> (Jane Jacobs, US-Canadian journalist, author, and activist)

“Cartographies of Imagination” is an essay recording the progress of the *MapLab* project, conducted by the DATAstudio in collaboration with Superflux, *Beam it Up*, and Sophie Rijswijk with schoolchildren in Eindhoven.

## Introduction

Eindhoven has been called “the Philips City” ever since Philips decided to set up its headquarters there in 1914. More recently, the city has experienced a resurrection after a major downturn in the 1980s and 1990s, spurred by the residence of several innovative technology companies. So when the drive to create “smart cities” spread across many parts of the world, it seemed like an obvious fit for Eindhoven. With its “living labs”, start-up companies, thriving technology university, and infrastructure largely created by Philips, Eindhoven was able to embrace the smart-city philosophy fairly smoothly.

However, about three years ago, Eindhoven’s mayor and city council began to raise critical questions about what it means for a city to be “smart”. The city council’s policy framework published on 23 April 2015 speaks of a paradigm shift in its own role – from deciding to facilitating, from control to trust, and from competition to cooperation. Meanwhile, at the invitation of alderwoman Mary-Ann Schreurs, Het Nieuwe Instituut curated a critical cultural programme centred on the ideas of the participatory society and the smart city. Though two separate trajectories, the council and the institute began to articulate a vision of the city that would be “participatory”, implying the need for it to generate a constant and sustained dialogue with its citizens. In 2015, I was invited by Het Nieuwe Instituut to be part of an advisory group to help steer and kick-start activities in this direction.

As the DATAstudio began to develop activities to facilitate realising this ambition, I was keen to draw attention to a group of citizens who are often not considered as participants and decision makers in our cities: children. Most of the time, children are not considered citizens but rather future citizens. Of a population of 226,921 people in Eindhoven, 15 percent are children under 14 years.<sup>2</sup> In what ways could the DATAstudio encourage children to take part in shaping their neighbourhoods? We decided to explore a project recognising children as key fellow citizens, shifting the focus from the idea of a child coming into the world to a child being in the world.

## Context

Alfred Korzybski’s oft-quoted maxim “A map is not the territory” remains one of the most important statements about the difference between perceptions of reality and reality itself – and particularly for those working on maps. Korzybski went on to argue that “an ideal map would contain the map of the map, the map of the map of the map, etc., endlessly”<sup>3</sup>; Korzybski and some of his contemporaries termed this idea “characteristic self-reflexiveness”. Scholars over the years have inferred that, whilst mapping is a method of gathering, ordering and recording knowledge, all maps are to some extent products of the imagination. No map is ever truly the objective description of a place that it purports to be. Every map is shaped and coloured by political, cultural and social conditions,

[1] Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961).

[2] See: <https://eindhoven.buurtmonitor.nl>, retrieved on 30 January 2018.

[3] Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Lancaster: Penn., 1941).

and by the personal experiences and imaginative projections of its maker. Maps can be enhanced by imaginative embellishments; they can show imaginary places and present collective aspirations and hopes for the future.

However, today, with the rise of big data, we are seeing a renewed attempt to conflate the map and the territory. Endlessly aggregating flows of people and their locations, things and activities are continuously mapped into ever-larger undifferentiated masses. As Lindsay Caplan writes in her *e-flux* editorial, "Big data oscillates in the space between a map and a territory. It is a seductive mode of representation and is therefore often confused to be both. It is important to recognise this confusion, because data representations are critical. What data means – how it is interpreted, and to what ends – has implications not only for privacy and security but also for how we exist and understand our position as humans in the world."<sup>4</sup>

This is now becoming more important than ever before. The constant stockpiling of data collected on everything from our most intimate activities to the flows of human and non-human currents across our cities is intrinsically linked to the idea of the "smart city", where every activity, movement, interaction and relationship becomes an abstracted, measurable, quantifiable asset, flattened onto a two-dimensional map. This ideology becomes the foundation on which the smart city (or a future smart city) and its use are configured and regulated. Whilst they are invariably "smart" in their ability to use data sets and maps as "evidence" or facts about the status quo and then build upon these assumptions, ultimately this is problematic. These are not simple facts but rather facts represented through a specific technology that does not allow for "thick data"<sup>5</sup> – the stories and social imaginaries of the people who collectively make cities what they are.

This seductive contemporary vision of the city is not entirely different from historical ones. Though the contemporary genre of urban techno-fantasy seen in visions of the smart city is new, city planners (and city officials) have often approached cities from a top-down perspective, resulting in the social wars over urban justice fought by people like Jane Jacobs, Jan Gehl, Ellen Dunham-Jones and so many others. Besides being designed and built in ways that were top-down and ignorant of life on the ground, our cities have also been created for specific segments of adults. Children very rarely play a role in the design of future cities. Yet they access and constantly use the shared resources of cities, such as streets, parks, town centres, playgrounds and transport systems.

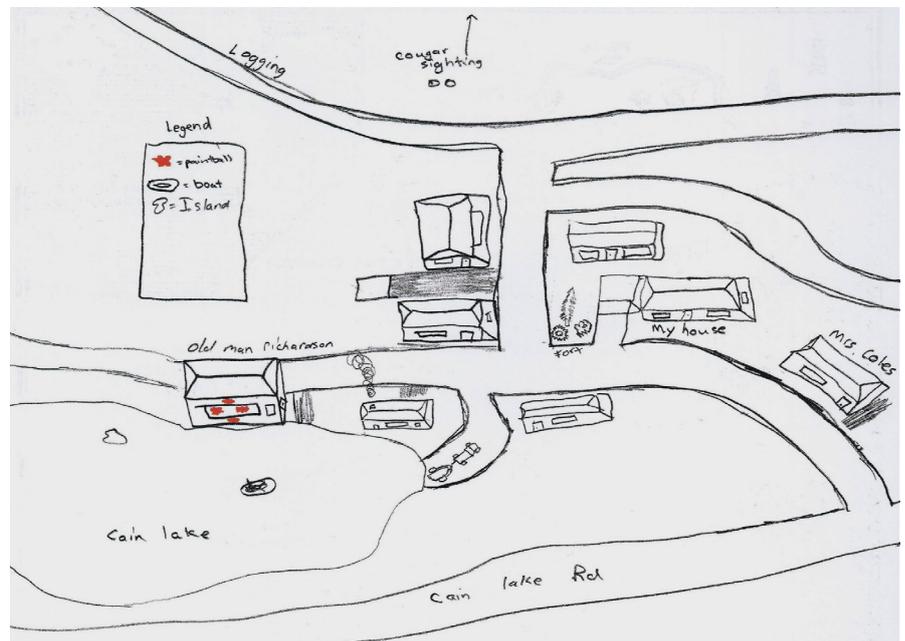
[4]

Lindsay Caplan, "Method without Methodology: Data and the Digital Humanities," *e-flux journal* (2016). See: <http://www.e-flux.com/journal/72/60492/method-without-methodology-data-and-the-digital-humanities/>, retrieved on 30 January 2018.

[5]

Tricia Wang, "Big Data Needs Thick Data," *Ethnography Matters* (2013). See: <http://ethnographymatters.net/blog/2013/05/13/big-data-needs-thick-data/>, retrieved on 30 January 2018.

Michael Jensen, *Untitled (Revenge Map)*, 2003. Whenever Michael takes his inflatable boat out onto the lake, Old Man Richardson gets out his BB gun – or so Michael claims. The 12-year-old artist has made a fantasy map of a paintball payback.



[6]

Greg Halseth and Joanne Doddridge, "Children's cognitive mapping: A potential tool for neighbourhood planning," *Environment and Planning B: Planning and Design*, vol. 27, 565–582.

[7]

Sam Sturgis, "Kids in India Are Sparking Urban Planning Changes By Mapping Slums," *City Lab*. See: <https://www.citylab.com/life/2015/02/kids-are-sparking-urban-planning-changes-by-mapping-their-slums/385636/>, retrieved on 30 January 2018.

[8]

Katherine Harmon, *You Are Here: Personal Geographies and Other Maps of the Imagination* (New York: Princeton Architectural Press, 2003).

[9]

Shahana Rajani, 'Urban Narratives of Children', *Cities Plus* (2014). See: <http://www.citiesplus.org/post/98326282691/urban-narratives-of-children>, retrieved on 30 January 2018.

[10]

"In pictures: Kids in space – children draw their visions of the future for Nasa", *The Telegraph* (2017). See: <http://www.telegraph.co.uk/news/science/space/10851583/In-pictures-Kids-in-space-children-draw-their-visions-of-the-future-for-Nasa.html?frame=2920205>, retrieved on 30 January 2018. Rashiq Fataar, "Children draw their visions for Future Cities", *Future CapeTown* (2012). See: <http://futurecapetown.com/2012/10/children-draw-their-visions-for-future-cities/#.WnA0s2Zx-8U>, retrieved on 30 January 2018.

How can urbanists, city planners, technologists and all those in local government responsible for creating and building cities be inspired to develop inclusive, liveable smart cities that respond to and accommodate children? Designing, planning and building truly inclusive cities requires vision, foresight, knowledge, cultural sensitivity and a desire to create long-term legacies. Showing the world through the eyes of a young child can create powerful leverage with city planners and decision makers formulating future visions of cities. Bringing this perspective to urban planning through mapping, drawing and storytelling with children is not new. Let me describe a few inspiring examples.

A Canadian cognitive-mapping project, KIDSMAP<sup>6</sup>, asked children in British Columbia to draw mental maps of their neighbourhoods. Whilst the study recognises the inherent limitations of cognitive-map work with children, the value here lies in the act of physically locating and representing places of importance – vocalising the interests and values of invisible and overlooked constituents.

Across India, an initiative<sup>7</sup> facilitated through local "child clubs" in slums from Mumbai to New Delhi and Hyderabad and championed by the organisation Humara Bachpan encourages kids to draw the changes they want to see in their neighbourhoods.

The work makes underserved areas visible and gives meaning to density and shape to disconnection; magnifying needs often overlooked by adults. Maps are fed back to local councillors, who have the power to enact change. The value of child-led mapping isn't only about pinpointing local pleasures and pains but more about activating these latent citizens.

In Karachi, Pakistan, the educator and artist-led initiative Bachon se Tabdili (Change Through Children) aims to re-envision public space by empowering its most marginalised, but active, agents. Working with 11 government schools to develop visual languages to enable the expression and sharing of children's experiences of negotiating a dense urban space, Bachon se Tabdili has helped to make visible the plots, streets and rooftops that act as de facto play spaces in the absence of any dedicated by the city. Their mapmaking forces us to confront the plurality of a city, the "impossibility of totalising fixed representations"<sup>9</sup>.

Children are important social and urban agents – citizens, not future citizens. Their imaginings of their future<sup>10</sup> aren't blurry. Suspend any aesthetic inhibitions and you may divine their concerns, hopes, disparities, possibilities for their future world.

## MapLab: Intent

Inspired by this work, we at Superflux developed *MapLab* within the DATAstudio programme, working with Robbert Storm and Liselotte de Groot from local studio Beam it Up and later joined

In her book *You Are Here: Personal Geographies and Other Maps of the Imagination*<sup>8</sup>, Katherine Harmon shares a wide-ranging collection of superbly inventive maps, including the work of Italian artist and illustrator Sara Fanelli, who charts various facets of a child's world and inspires kids to create their own maps.



by Sophie Rijswijk, a student in urban planning at the Eindhoven University of Technology. Our aim was to develop a programme of activities with schoolchildren in Eindhoven aged 7 to 12 that would engage them in deconstructing the map and bringing to the surface the thick layers of imagination and alternate uses for the spaces they spend so much time in. The intention of *MapLab* was twofold:

1. To bring to life that distinctively imaginative layer that is not about data sets but about stories – where a house can be a castle, a sidewalk the home of dragons; where the lines between fantasy and reality blur. We were interested in giving form to the imaginative conceptual maps that bring meaning to the territory of social life.
2. To understand how to truly become open to seeing the city from the point of view of children, in order to be able to revise, modify, edit and design cities that work for all. And, in doing so, to reflect the children’s individual and collective perceptions and hopes for the neighbourhood they call home.

## Pilot: a cartography of imagination

We developed a pilot project to explore how we could collaborate with schoolchildren to generate new and alternate maps of their neighbourhood. We were thrilled when the elementary school De Tempel, located in the De Tempel neighbourhood in Woensel-Noord, said it was happy for us to work with its pupils (aged 7 to 10) to roll it out in late 2016.

For the *MapLab* pilot, we conducted four workshops over the course of a month in the school with the children. In an iterative process, we developed the strategies and tools for each workshop based on the children’s feedback and responses.

We started off by reading a paper version of the local map with the children and inviting them to identify places they knew and were familiar with. We specifically chose to *start* with an existing map rather than *creating one as the outcome* of the workshop to make explicit the limitations of any such map.

Additionally, we encouraged the children to annotate and colour-code areas and locations of significance: places they spent a lot of time in, ones they were scared to walk past, places that were



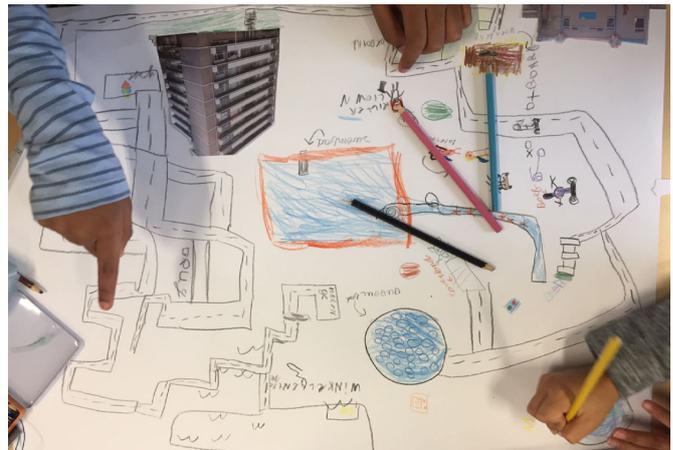
Kites provide wind and sun energy to the city; small power stations sit on top of buildings. Photo: Superflux

haunted, areas which were “full of secrets”. Then we embarked on an intentional *dérive*<sup>11</sup> of sorts – intentional because our ambitions for the activity were made clear – but at the same time, we stayed open and exploratory towards the possibilities that might open up if we walked around a familiar territory with new questions. The children had diaries, pens and cameras as documentary tools, and their memories, shared rapport and intimacy as conceptual tools, for recording their discoveries, stories, fantasies and ideas.

In the sessions that followed, we worked with the children to make drawings of their discoveries and begin to consider the futures of their neighbourhood and their spaces for play and social congregation. As they began to work in smaller groups, they moved away from a locational planning map to generating “drawing maps”, layering locations and geographies with the fantastical but also the practical, combining technological utopias with social inclusivity and geographical freedom with environmental responsibility, and so on.

[11]

Guy Debord, “Théorie de la dérive”, *Internationale Situationniste #1* (Paris, June 1958); translated and published by Ken Knabb as “Theory of the Dérive” in *Situationist International Anthology* (Berkeley: Bureau of Public Secrets, 1981 and 1989).



A shop selling the famous Dutch stroopwafels sits on top of a home for the elderly so shoppers can visit residents and share cookies. Photo: Superflux

Children from De Tempel primary school designed a zoo for a spot where there used to be a supermarket. Pedestrians can easily cross the motorway thanks to a new zebra crossing. Photo: Team MapLab

The children’s drawings also offer us a means of describing and understanding the intangible: everything from air routes and constellations to states of mind. And here I want to share snippets of their ideas, as described by them: “urban wildlife sanctuaries”, “cookie shop on top of elderly homes so people shopping for waffles can visit old people and share a cookie”, “vertical farms”, “teleportation to the moon”, “dome over the school with easy weather control. Want snow? You got it”, “an underground archaeology museum”, “a hotel where the rumbling stomach of a turtle wakes you up in the morning”, “more tunnels, bridges and caves in the city”, “kites that provide wind and sun energy to the city, with small power stations on top of buildings”, “retirement homes for old robots running on fossil fuels”, “random houses in streets where people can just enter and play games together”, “collapse of the Netherlands and its merger with Morocco”, and finally “some ‘alone-time’ spaces when everything becomes overwhelming”.

It might be easy to judge and even dismiss these ideas and drawings from an adult perspective, but that’s not the point of the activity. If anything, it’s the opposite – it’s a matter of reframing and translating children’s ideas into an easily digestible format for adults, so that nothing remains hidden. Let us take a moment to see how the adult world is affecting young people; to reflect on their interpretation of this modern world we have created for them.

The pilot showed how the concept of the map is actually much broader and expansive than its current use suggests. Our intention was to work with tools used to navigate spaces today, then relocate the children into new perspectives, both spatially and imaginatively. The physicality involved in this act of cartography was equally important – getting the children outside and walking around, something

they don't do whilst in school. We wanted to constantly oscillate between the imaginative and the practical, not so much drawing connections between locations and the practical, but zooming inside a space, opening it up and giving that dot on the map some weight, depth and dimension.

The biggest success of the pilot was the children's sustained engagement, stimulation and enthusiasm throughout the process. The project also met with much openness and appreciation by their teachers, and by a local social worker, who was visibly surprised by the depth, spirit and nuance of the kids' ideas. This became an incentive for us to keep going.

Based on our experience with the pilot, we realised that *MapLab* had the potential to emerge as a field guide to the visions, ideas and voices of the children of Eindhoven. If we could present this to the local planners, developers and councillors as an additional layer to the existing map of Eindhoven, where would that take us? We wanted to find out. So we decided to further develop and scale the *MapLab* workshops to a few more schools.

## Scaling MapLab

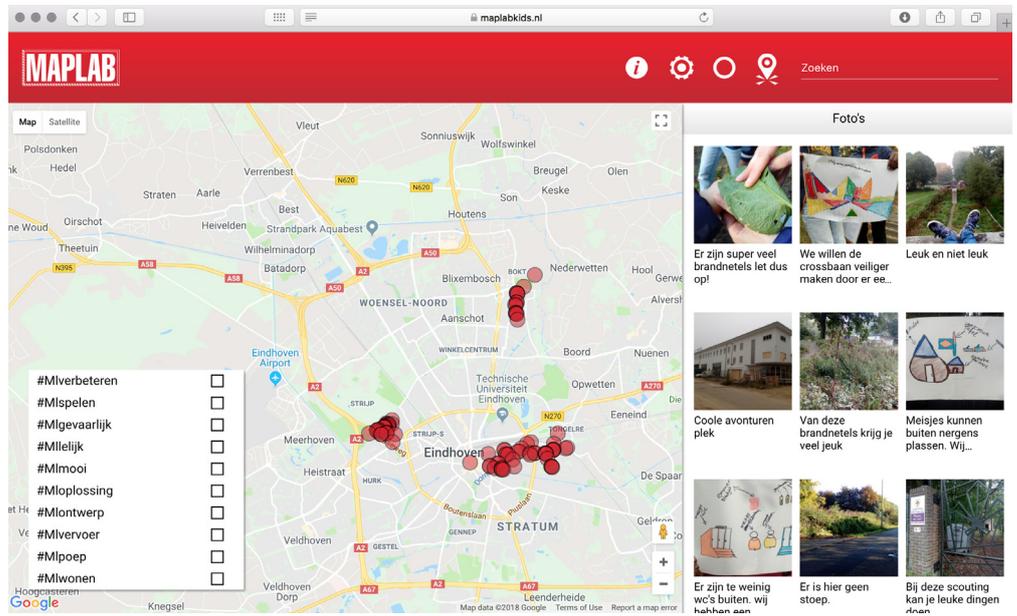
As we reflected on the pilot, it became apparent that we needed to narrow the scope of the activity and project area so children could explore the entire territory. We also needed to create a methodology and toolkit that would be easy to use and scale across different schools, develop a better way of documenting the stories as they emerged, and share all outcomes digitally. The educators were keen for the workshops to be grounded in the physically plausible, real and believable.

So Beam it Up designed [maplabkids.nl](http://maplabkids.nl), a brand new website tool and living archive that would become central to the workshops, alongside methods gleaned from the pilot. Between September and November 2017, Beam it Up and Sophie conducted *MapLab* workshops in four schools across Eindhoven.

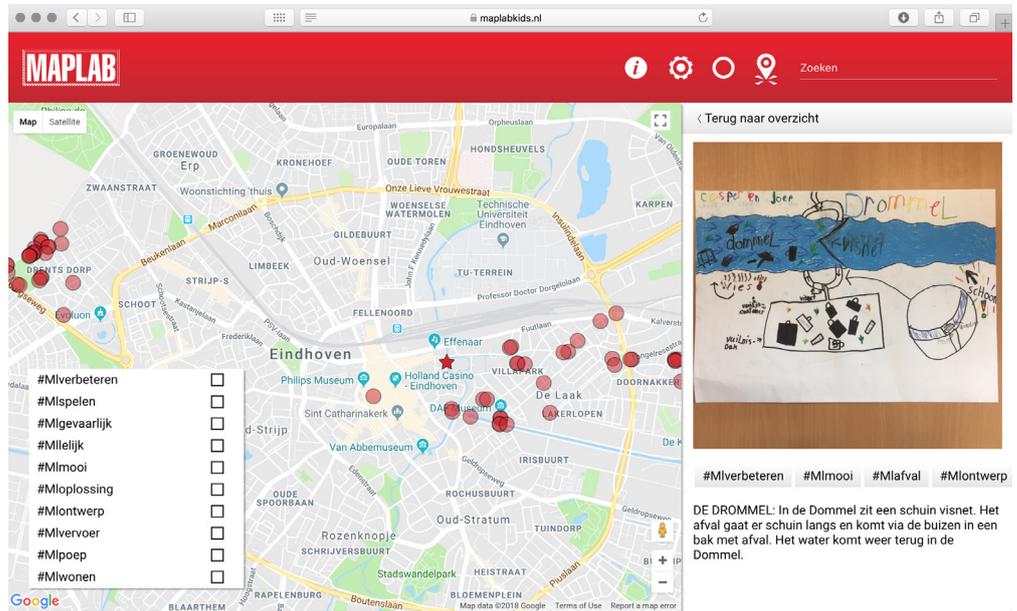
Each workshop kicked off with locating the school on the *MapLab* website in the classroom. Beam it Up introduced the digital map to the children, who then examined it collectively and circled their chosen research territory around their school up to 250 meters in diameter. After discussing the area in greater detail – secret spaces, haunted spaces, spaces where they felt comfortable and spaces where they didn't – the children annotated their spaces on the map with four different colour codes.



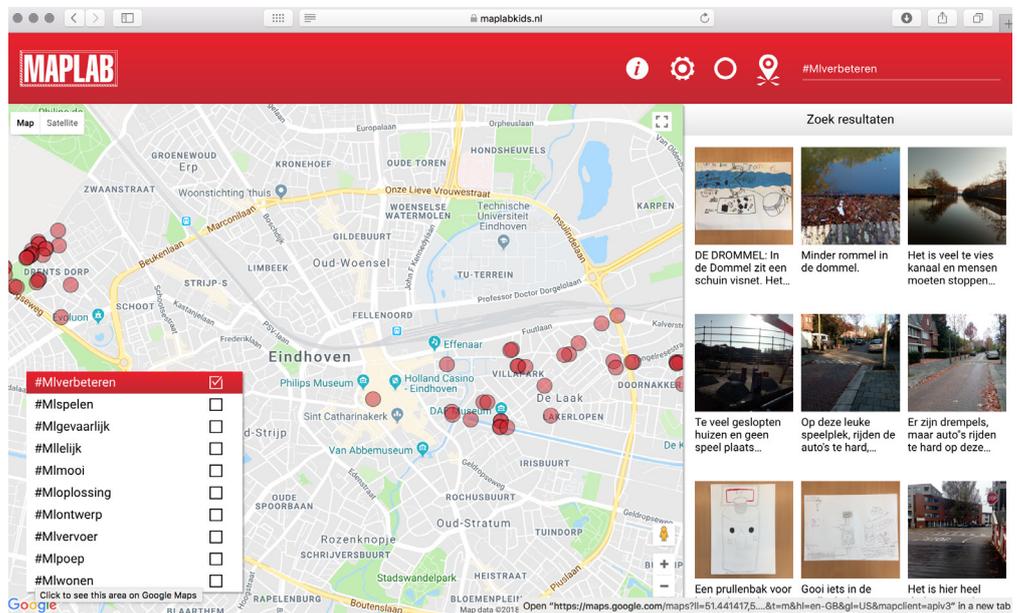
Pupils from Louis Buelens primary school documented the mess in the park. Young people, in particular, leave behind a lot of rubbish and food. Photo: Fieke van Berkom



This screenshot from the app maplabkids.nl, zoomed in on Eindhoven, shows the locations the kids explored along with the photos they took there.



A screenshot from the app maplabkids.nl, zoomed in on the topic of the river De Dommel. A star on the map indicates the solution addresses.



A screenshot from the app maplabkids.nl, zoomed in on the "improvement" category (#Mlverbeteren). All photos relating to this tag are shown on the right-hand side of the screen.

Each child had his or her unique memories of the space, and that tacit knowledge was brought into the discussion about how they felt about the space, where they felt uncomfortable, what they loved and so on. On the basis of the discussions, they took pictures at each spot, and the facilitators helped them upload the selected images to the *MapLab* website with hashtags and descriptions.

In the next workshop, the children gathered around the *MapLab* website to share observations from the previous session. Through guided discussion about the unpleasant spaces that had emerged in the first workshop, they got an opportunity to edit the map, removing or adding spaces marked for improvement. After the map was completed, the children went into the field again to analyse these spaces more carefully. What would they like to see different? What did they want to change, improve, alter, modify? Was it a spatial or a functional improvement they wanted or a behavioural change? Was it about feeling a sense of shared ownership to the space or a sense of mutual respect among all those who use public spaces?

Then the children worked in pairs to create alternate versions of the spaces they'd visited by writing short texts and making drawings. In the third and final workshop, the children finished their drawings and presented their ideas, which were added to the *MapLab* website in the form of a picture with a short description and hashtags.



After noticing there were no convenient loos they could use while playing outside, two girls from Strijp Dorp primary school proposed building compost toilets for boys and girls. Photo: Fieke van Berkom

Kids from Strijp Dorp primary school show their design at the location it's intended for. Photo: Fieke van Berkom

## Examples of ideas that emerged

### DOG BIN WITH BENEFITS

While Kees Bolplantsoen is one of the few green spaces in the neighbourhood, the overwhelming amount of dog faeces there makes it unconducive to play. The duo behind this design – a dedicated bin that offers free poo bags and exchanges dog biscuits for poo – proposed behavioural nudges to encourage good behaviour.

### ACCESSIBLE COMPOSTTOILET

The neighbourhood around Strijp Dorp school, like many across the globe, has a sanitary issue: the absence of safe toilet facilities for girls. While biology allows boys to urinate in bushes with little disruption to play, it's harder for girls. This solution considered equal access for all genders, other human factors, and the environmental impact of human waste. The girls designed a compost toilet whose base is composed of green waste. When it's full, the compost is given to farmers.

### DE DROMMEL

The duo behind this design – a personal favourite of mine – concentrated on developing a construction system that would conserve the water stream, including its delicate ecosystem. To accommodate fish traffic negotiating a construction site, they devised a system of nets to filter shoals from litter and ferry them away from it. If a scanner detects life within a ferry net, the fish and other creatures are safely deposited back into the stream; if the object is litter, it is filtered into a trash can. This project is aptly named *de Drommel* (*de Dommel*: the river; *rommel*: trash).

### PLAYGROUND

Tackling boredom was the driving factor behind this design. Inadequate drainage has made a soccer pitch useless, driving children indoors and into the company of video games – a temporary solution (they recognise that this too will soon become boring). More importantly, discussions identified the link between boredom and anti-social behaviour – older youths terrorising younger children and vandalising the playground. A duo from De Driesprong school designed a system that addressed the need for a sense of security and sustained engagement to combat the affliction of a fear of young people: cameras are installed in conjunction with designated areas where graffiti and the demolishing of “stuff” are encouraged.

## Where can MapLab go from here?

It has become evident through our work with *MapLab* that children are highly enthusiastic and energised about the activities. The participants presented their ideas at Dutch Design Week to the mayor, a city officer tasked with overseeing Woensel, and a social designer. The mayor was clearly moved and surprised by their presentations, specifically proposals that creatively employed wit to inspire behavioural change, and suggested that perhaps the city government should institute a young people’s panel so their voices and perspectives could be heard. This was heartening to hear, and the DATAstudio will follow up with local councillors to see how *MapLab* can be further implemented.



Two girls from Strijp Dorp primary school worked on an idea for reducing the number of stinging nettles on a playground. They proposed building better and more attractive footpaths. Photo: Fieke van Berkom

We are keen to see if the *MapLab* methodology and tools can become part of schools' curricula across the city. There are a few popular school subjects in the Netherlands into which *MapLab* fits in very well. One is research and design learning ("OOL" in Dutch), in which students conduct research on the basis of their own research questions or design solutions for problems or needs they have identified. It is an educational learning strategy that draws on 21<sup>st</sup> century learning skills. The project also fits into the mandatory subject of citizenship education. An important aspect of this is that students learn about their own living environment by contributing to and taking responsibility for it. Plugging our programme into these activities could become one way of extending education outwards into the community and the city, enabling kids to develop a sense of shared civic responsibility and ownership from a young age.

## Emerging insights

As Het Nieuwe Instituut plan's the next phase of *MapLab*, this record serves as a useful means of reflection on the activity, and here I want to share some of our emerging insights.

The children were excited about coming up with ideas and "solutions" to what they considered "problems" in their neighbourhood. Younger children felt that their sense of ownership of the playground was compromised by the presence of older youths, while older youths felt excluded and without a sense of place. This is a complex social challenge, and the absence of safe shared spaces is a problem in many cities.

Whilst the children endeavoured to find meaningful solutions, the challenge of solving the real underlying problems remained. What quickly emerged was an understanding that complex problems aren't accompanied by easy solutions and that the solution to one problem often births another problem. What are the implications of planting consequential thinking into education?

In this project, critical thinking amplified children's awareness of their neighbourhoods, and they learned to look at their direct environment topographically, working with a map to navigate their neighbourhood, understanding that a map is not synonymous with territory. This practice also demonstrated how the digital tools used to navigate and photograph are exactly the same tools that can be used to alter the story – to make visible the plurality and messiness underneath the flat overviews that are used to make decisions.

Kids from Striip Dorp primary school designed improvements to a BMX track. It hangs in the air, creating a steep drop. The kids proposed placing a fence around it. Their colourful solution brightens up the track and makes it safer. Photo: Fieke van Berkom



Connecting the dots from issues to problematic behaviours to spaces to facilities was often overwhelming. Though the kids didn't manage to *solve* all their neighbourhood problems, they were challenged to find different paths towards a solution. They were activated as social agents.

Along with being independently activated, the children discovered the challenges of collaborative work: the need for attention and dialogue; the perils of attachment to one's own ideas and the importance of recognising different perspectives; the need to understand when to work together and when to work alone. These discoveries were both important and unnerving and allowed them, in an abstract way, to acknowledge that plurality is critical to communities.

## Conclusion

The *MapLab* experiment is neither new nor unique in this genre of practice. But for the children and collaborators who were involved, it was new and exciting. DATAstudio hopes to continue developing this work and essentially to create a vast archive of thick data generated from the perspective of the children of Eindhoven. We hope this data will be viewed as a rich source of inspiration for the design, planning and creation of more participatory, inclusive, accessible, playful cities.

As we have learnt, for children, the local neighbourhood is often the only space where there is a sense of familiarity; it is a space which shapes their worldview and one where civic learning begins. What to us appears as a small geographical area can to a child be a continent of imagination, rich with stories and fantasies interwoven into seemingly mundane things and places. We hope experiments like *MapLab* can give life to the rich stories, imaginations and creative aspirations of a group of citizens who are normally not involved in shaping our cities.

I would like to thank the DATAstudio for inviting me, my team at Superflux for their work on this project, and Nicola Ferrao for her help with editing and proofreading.

VI. A CLOUD ATLAS  
FOR EINDHOVEN.  
SUPER-LOCAL  
WOENSEL-NOORD,  
AND BELIEVING  
IN SOCIETY OVER  
UNICORNS



# The smart city hasn't happened – except where it has

Dan Hill is a designer, urbanist and Associate Director at Arup, the global design and engineering firm. He is Head of Arup Digital Studio, a multidisciplinary team that helps clients design, build and deploy transformative digital technology across cities, spaces, infrastructure and organisations. Hill joined the DATastudio advisory board in 2015. Part of his contribution resulted in the *Cloud Atlas* workshop.

A decade in, the idea of smart cities continues to be endorsed and promulgated by urban, national and transnational governments and of course technology companies, for perhaps obvious reasons. Living labs, trials, demonstrators, pilots and, increasingly, actual projects abound. Whether they have had any true impact is another matter. Paraphrasing the famous aphorism of British architect Cedric Price, if smart cities demonstrators are the answer, what was the question?

Even now, in this apparently technology-driven age, and half a century after Price uttered his original phrase, we rarely address how technology truly shapes our cities, seldom explore carefully enough the impact of technology on our urbanism, on our urban economies, on the way we live, work and play in cities. Partly this may be due to a form of prejudice about the lenses through which we view urban development. Asked by the European Commission about smart cities, Rem Koolhaas grumbled, "The city used to be the domain of the architect."<sup>1</sup>



Photos of housing types from our bike rides around Woensel-Noord. Photos: Dan Hill

Sort of, Rem. Architects and planners have helped direct and shape cities, of course, but apart from a few obvious exceptions, can we really say that the city has been "their domain" any more than it has been that of technologists, engineers and inventors? Technology fundamentally shapes cities and always has – whether that's the lift-safety mechanism and the flush toilet adding up to skyscrapers or air conditioning and the automobile encouraging urban sprawl – despite planning and architecture, which tend to respond to such inventions by draping new forms of building around them rather than creating them in the first place.

As an aside, it might be far more beneficial for cities, and more importantly their citizens, if architecture did lead rather more of this invention; if indeed it had sufficient gumption to reinvent its business model to buy time for proper research and development, for prototyping, for absorbing the genuinely user-led design and development practices of other design disciplines. Then at least there would be a chance that the broader ethical dimension of architecture – a unique capability compared to most of those other design disciplines, and certainly the tech sector – might ensure that new technologies are framed with the idea of the city as a public good.

Yet most architects generally still tend to look at technology as they would items in a product catalogue, while absent-mindedly browsing Architizer, perhaps. They fail to stand back and see how the collective impact of some of those items has entirely transformed the ways in which we live together.

[1]

See: [http://ec.europa.eu/archives/commission\\_2010-2014/kroes/en/content/my-thoughts-smart-city-rem-koolhaas.html](http://ec.europa.eu/archives/commission_2010-2014/kroes/en/content/my-thoughts-smart-city-rem-koolhaas.html), retrieved on 29 March 2018.

Being more sympathetic to Koolhaas, however – to some extent, OMA’s 2014 Venice Biennale show, *Elements*, could be seen as an attempt to engage with some of these building technologies, at least – we could see his comment about the city being the architect’s domain in a broader light, alongside an earlier comment of his noting that the city was the domain of architects specifically working to government ideals: “The times in which architects were carrying out the good intentions of governments are long gone. There are no more ideals within governments; increased deregulation has strengthened the market economy to a fatal degree. The Universe is empty now or filled with companies. Progress is fragmented, completely scattered.”<sup>2</sup>

Indeed, despite the vestiges of 20<sup>th</sup> century oil-based infrastructures still present in our cities, the corporate inheritors of the deregulated landscape that Koolhaas described are now in the tech sector, led by the world’s most valuable companies. At time of writing, the US-based corporations Alphabet, Amazon, Apple, Facebook and Microsoft are five of the six most valuable companies in the world<sup>3</sup> (at least until their Chinese counterparts Alibaba, Baidu and Tencent expand their footprint). They are collectively worth nearly \$3.3 trillion, up from a combined valuation of about \$2.2 trillion just two years ago, and are all based on the West Coast of the USA.<sup>4</sup>

Just as importantly, though, if not more so, these companies are arguably our greatest cultural influences, capable of causing hegemonic shifts in the political terrain and its emblematic social, and thus spatial, organisations. And so, of course, they now shape the way contemporary cities happen too, not least via the associated second wave of Airbnb and Uber (again, also informed solely by that culturally narrow strip of coastline). These companies are markedly different to the mildly fevered, covetous smart-city dreams of the last decade, with its 1980s “information technology”-led visions of control rooms and command centres. They are not IT companies in the sense that IBM, Cisco and Siemens were or are. Instead, they exploit an astonishingly widespread distribution of mobile phones, which in turn enable vast social media networks, so-called sharing-economy services, and rapidly emerging arrays of unsecured, flaky but intriguing Internet-of-Things devices, whether cars or washing machines or in-home speakers, lacing together their layered “skills” via algorithms increasingly informed by machine-learning capabilities.

[2]  
See: <https://medium.com/@pleij/i-hate-being-an-architect-7c42abbc6d>, retrieved on 29 March 2018.

[3]  
See: <https://www.statista.com/statistics/263264/top-companies-in-the-world-by-market-value/>, retrieved on 29 March 2018.

[4]  
See: <http://money.cnn.com/2015/10/30/investing/tech-stocks-apple-amazon-alphabet-google-facebook-microsoft/index.html>, retrieved on 29 March 2018.

Photo of housing types from our bike rides around Woensel-Noord. Photo: Dan Hill



This is where the real smart city is, and it is on the streets of Eindhoven as much as it is in Ensenada, Edmonton or Edinburgh. And though it contrasts with that more technocratic view of control, we can argue that this uneven distribution is shaping cities nonetheless, via a decentralised pattern of devices and services aimed at the entry-level price points of everyday consumers. As a result, a different form of smart city has taken root – again, utterly different to the control-room metaphor or the large infrastructure roll-out. Its potential for surveillance, exploitation and control is still present, just, to Rem’s point, “fragmented, completely scattered” and nimbly sidestepping governments. For all their immediate allure, these new digital services harbour many aspects that are uncomfortable and opaque, and potentially damaging in their reinforcement of broader cultural patterns of individualism, inequality and intolerance.



Photos of housing types from our bike rides around Woensel-Noord. Photos: Dan Hill

## The problem of “people like us”

For example, as George Packer memorably put it in *The New Yorker*, Uber appears to be largely concerned with “solving all the problems of being 20 years old, with cash in hand.”<sup>5</sup> In other words, the people who make Uber are making it for people like the people who make Uber, in a phenomenon sometimes known as “elite projection”; see also Elon Musk.<sup>6</sup> This despite Uber’s market valuation being based on a trajectory of global domination, which must necessarily include people entirely unlike them.

Though detailed aspects of Uber – the interface, the interactions – certainly provide a sketch of the way many of us might want to interact with urban mobility, the service also exemplifies the received wisdom that you make such things for people like you and only pay on your own terms, avoiding wider responsibility for your impact on the city.

Indeed, it is comparatively easy to imagine creating an urban car-sharing service for these conditions of “people like us” as opposed to, say, creating a new form of public transport that serves all citizens equally, irrespective of their economic or social status.

[5] See: <https://www.newyorker.com/magazine/2013/05/27/change-the-world>, retrieved on 29 March 2018.

[6] See: <https://www.citylab.com/transportation/2017/12/what-elon-musk-doesnt-get-about-urban-transit/548843/>, retrieved on 29 March 2018.

Yet the latter is exactly the kind of design goal a city council in Eindhoven might have to set.

The private sector, after all, tends to cherry-pick the easy bits, the low-hanging fruit. Why wouldn't they? They don't really do difficult. That is "left to" the public sector to pick up, or to drive. It's easy to do Uber, a denuded form of shared transit that simply will not scale. It's far more impressive, more challenging, to do genuinely public transport.

Yet the success of each subsequent "unicorn" venture reinforces a hegemonic view that such technologies are the thrilling answer, and that the state's role is largely to get out of the way.

This not only downplays the profoundly generative role of state-led innovation in creating the conditions for these technologies, and sometimes the technologies themselves, as Mariana Mazzucato has thoroughly described in *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*.<sup>7</sup> It also makes it easier to further dismantle the apparatus of city government and civic society, leaving ever more fallow ground for start-ups to move into, portraying themselves as the answer to all Price's unasked questions.

Margaret Thatcher famously said that she did not believe in society – yet we are now asked to believe in unicorns instead? The sheer lack of diversity in this thinking and practice is breathtaking.

However, the paradox here is that such technologies also contain great promise, in terms of resource efficiency, say, or of forming and reinforcing social fabric. And intriguingly, while most of them currently simply overlay physical space, increasing numbers indicate entirely new spatial implications.

How might Airbnb's ability to reprogramme space change apartment design? How might vehicle-sharing change the form and volume of parking space? How might autonomous vehicles slowly dissolve the artefacts of the age of traffic engineering, enabling a complete rethinking of the streetscape as a form of shared space that Hans Monderman could only have dreamt of? How might retail spaces change form, or diversify, on the basis of anticipatory logistics, digital fabrication, autonomous delivery and local currencies? How might super-local energy generation and storage change district design and ownership models?

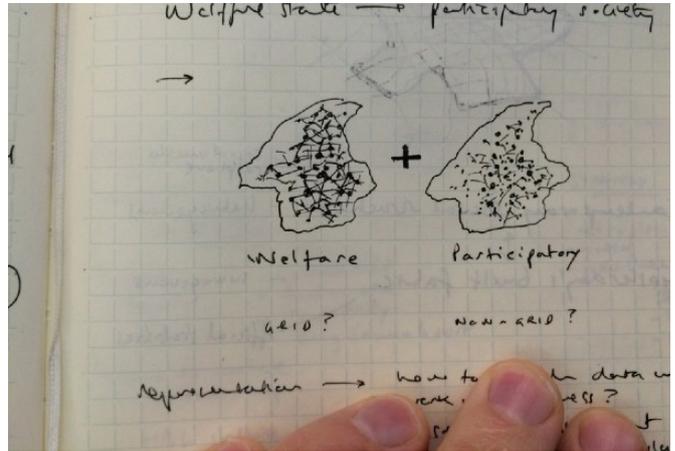
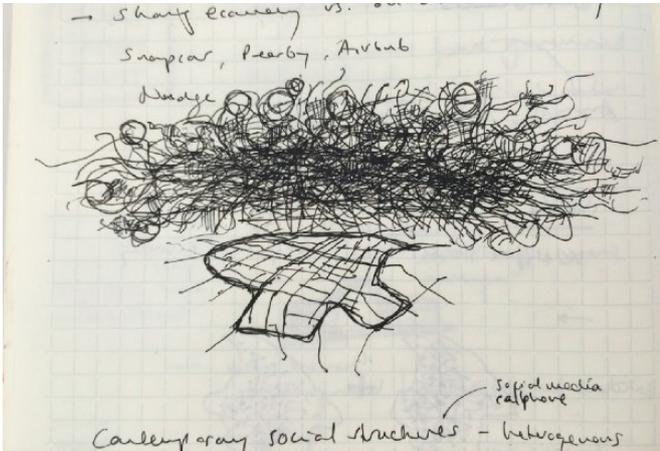
Perhaps these are the kind of questions we should ask of these technologies as they begin to directly affect the spatial as well as the social, cultural, political and economic. And perhaps architects and planners, working alongside others, should be challenged to pose or address these questions too.

[7] Mariana Mazzucato, *The Entrepreneurial State: Debunking Public vs. Private Sector Myths* (Anthem Press, 2013).



Photo of housing types from our bike rides around Woensel-Noord. Photo: Dan Hill

In Eindhoven we see two very different interpretations of how a city might begin to generate answers to these questions in two very different places: one of the newly regenerated local “innovation districts”, Strijp-S, and an older neighbourhood, Woensel-Noord. Although both might be woven together to create an Eindhoven which takes advantage of such technologies within a broader idea of the city as a public good, we will concentrate here on Woensel-Noord.



Scruffy initial sketches from my notebook indicating a messy cloud of data over the planned Woensel-Noord (below) and the interplay between capturing data about the formalised welfare society and the informal participatory society. Photos: Dan Hill

## Bottom-up Woensel-Noord

Our workshops for the DATAstudio programme largely focused on the Woensel-Noord district of Eindhoven, and in particular its essentially residential Woenselse Heide and De Tempel neighbourhoods. The housing was built largely after the postwar period for the families of workers at local industrial concerns. It is frequently referred to by locals as “breadwinner housing”, standardised on a mid-20<sup>th</sup> century model of terraces of houses for notional families of approximately four, with a father who works for Philips, DAF or the equivalent and a mother who stays at home and looks after the 2.2 children: small garden in the front, larger one at the back, shared green space between the blocks, community services (medical and neighbourhood centres, etc.) dotted throughout.



Setting the scene of the *Cloud Atlas* workshop on day one. Photo: Hanneke Wetzter

Nothing bad in itself at all, yet a little too car-dominated, like the prevailing urban planning at the time, with an emphasis on private space over public, perhaps, and obviously built around a very clear idea of how 20<sup>th</sup> century nuclear families working within an industrial context might live, work, play and move around.

And yet our investigations in Woensel-Noord – essentially a form of light-touch field research led by the DATAstudio and involving observations, interviews, workshops and various site visits – rapidly revealed that today’s households are often of quite different composition to the “breadwinner” model that the housing was built for. Woensel-Noord now is a very diverse place, simultaneously featuring gentrification and food banks, freshly arrived economic migrants, second- and third-generation migrants, and some representatives of families of the first generation of “breadwinners” the place was built for. In this set of neighbourhoods, there were clearly many movements and activities that would appear informal in nature compared to those common in the communities of the mid-to-late 20th century. Yet the building stock was unchanged, formally inert, still frozen in the mould designed for those original tenants. This tension was immediately fascinating, and through discussion it nurtured the germ of an idea we ended up calling *Cloud Atlas*.



Work in progress. Photos: Hanneke Wetzter (above), Arup Digital Studio (below)

## Cloud Atlas

The municipality of Eindhoven was taking part in a national urban retrofit programme based around a platform called Woonconnect, essentially focused on introducing sustainable elements into existing urban fabric. Work began in the Eckart Vaartbroek neighbourhood and was slated to be introduced across other areas of Woensel-Noord. As far as we could tell, it focused solely on the built elements of individual houses rather than on the community of users of such elements, i.e., local people, or on streets, public spaces, neighbourhoods, services and the other elements of cities that bind people together. Perhaps we could usefully augment this programme using some detail about Woensel-Noord? In doing so, would we be able to demonstrate new ways of working with data, foregrounding its limitations in order to decri the control-room model of smart cities, with its false pretences to completeness and accuracy,

in favour of something that recognised the essentially ephemeral and ambiguous nature of data, with the goal of making something actually more interesting and perhaps useful as a result?

This would necessarily involve counterpointing the data with qualitative research as well as taking advantage of the various local literacy-building interventions led by our colleagues in the DATAstudio’s advisory group (particularly Anab Jain and local design firm Beam it Up’s MapLab work, Tsjalling Swierstra’s local salons, and the discussion led by Albert Jan Kruiter around the numerous “data deserts” that exist, based on insights from the many local stories collected by the DATAstudio with Kennisland’s Chris Sigaloff).

We took these local elements – the retrofit opportunity and our observations and insights about the community and its interplay with the existing buildings and spaces – and put them together with an interest in design practices that make possible a user-centred, research-based, data-enabled fine-tuning of place.

We wondered how we could better understand the diversity of community in Woensel-Noord in order to better retrofit the architecture and infrastructure.

We noted that the official statistics about the area were somewhat static and unrepresentative of what we were seeing on the streets. It was almost as if the official data was as inert and anachronistic as the buildings themselves, the two structures locked together in a bureaucratic embrace. As Albert Jan Kruiter put it: “The existing systems are in fact unsuited for the transformations that are taking place in the social domain: they do not fit the logic of the neighbourhood.”<sup>8</sup>

So, faced with arguably overly simplistic census data that no longer seemed to capture the essence, or “logic”, of the place – if it ever had – we knew a different form of urban data would be required. Perhaps informal data would better capture the more “informal” living patterns?<sup>9</sup> By informal data here, we mean data captured from sharing-economy or social media platforms, used as a proxy for activity, for fluid, networked interaction. If we could gather data about, say, the journey of a power drill moving through the neighbourhood via the resource-sharing platform Peerby, would that tell us something about embedded social relationships in Woensel-Noord and surrounds? Could we also grab ride-sharing data, Airbnb data, food delivery app data, any geolocated social media activity (such as Instagram pics, Twitter tweets or Facebook check-ins), volunteer groups’ or sports clubs’ use of Facebook to coordinate gatherings or events, and so on? Could we grab big

[8]

See: <https://destaatvan.eindhoven.hetnieuweinstituut.nl/en/data-deserts>, retrieved on 29 March 2019.

[9]

I use the term “informal” here in the sense that it is informal compared to existing definitions of “formal”. These are subjective terms, clearly.



Work in progress.  
Photo: Arup Digital Studio

chunks of mobile phone data from operators in order to understand high-level movement patterns? Could we work with IKEA to understand how members of the local community were using its canteen as a meeting place? Could we locate all the vacant spaces in a neighbourhood, no matter how transient the vacancy? Could we grab environmental data from real-time sensors and correlate it with health data from local doctors' surgeries? Could we see the vapour trails of platforms like Nudge and Nextdoor, or local ones like [040GoedBezig](#) and [Gebiedonline](#)? Could we stir these points and vectors together into a big 'minestrone' of data in order to conjure up a richer sense of movement, human interaction and networking in the area? Might this kind of informal data neatly counterpoint the qualitative insights from ethnographic research, user research and other ways of engaging directly with people? Might that informal data be more in tune with the qualitative data, in fact – and simply more useful – than the simplistic formal quantitative data usually gathered by institutions? And might the three types of data – formal, informal and qualitative – combine to provide genuine insight?

Clearly, this approach was immediately fraught with concerns – most obviously and problematically, how to gather such data without impinging on privacy. Dutch cities, including Eindhoven, were already under scrutiny for this, generally quite rightly.<sup>10</sup> Yet if we could make the civic value of the data-gathering clear – and the act of it tangible, approachable and participative – indicating what it was for and why, perhaps we might still work with such data. There are clearly technical and intellectual-property issues involved in scraping data from public-facing websites, and even issues around gathering data from platforms like Uber, Airbnb and Facebook in the first place, given that they generally show little willingness to share detailed analytics. Equally, these platforms are no more wholly representative than the "top-down" record-collecting of [Buurtmonitor](#) et al. – but they do create a very different comparative counterpoint.

As a design research exercise, these concerns were flagged early, but crucially, they were not allowed to derail the process of developing ideas. Embedding and documenting these concerns at the core of the project was fundamental; however they need not be enough to prevent the initial development of a concept. Equally, the workshop would directly address issues of ownership of recombined data and its platform. In short, ideas centred on making the data and its ownership as local as possible, with the idea of small data rather than big data to the fore, as well as transformed practice around transparency, seamfulness, clear statements of public value, and the idea that the data might fade, have a way of being forgotten or a use-by date, or be thrown away or become opaque once it has left the streets from which it was generated.<sup>11</sup>

In order to develop concepts, we sketched out the idea of a platform, dubbed *Cloud Atlas*, the name (borrowed from David Mitchell's book) implying some mapping of this messy, cloudy, uneven and opaque cloud-based data. It would be a kind of mixing chamber that would enable stakeholders to collate and contrast numerous types of data – say, pitching the ad hoc patterns of Uber drivers against the more regular timetabled public-transport patterns or plotting the formal land ownership/tenure patterns against actual space-use patterns from Airbnb. We envisaged Eindhoven as a far more complex terrain of data as a result: synaptic flashes of temporary interactions, fibrous nerve centres of consolidated connection.

Understanding and describing this mixing chamber in high-level terms was enough for us to pursue the idea into design-driven workshops in order to figure out what to do with a new kind of understanding, where one was possible. Crucially, the goal of the workshops was to go beyond data. Data in itself does little. Its value is often overplayed through careless statements such as "data is

[10]

See: <https://www.theguardian.com/cities/2018/mar/01/smart-cities-data-privacy-eindhoven-utrecht>, retrieved on 29 March 2018.

[11]

See: <https://medium.com/a-chair-in-a-room/architecture-and-interaction-design-via-adaptation-and-hackability-a51204564a1d>, retrieved on 29 March 2018.

the new oil” (as if Big Oil was a value proposition worth emulating in the 21<sup>st</sup> century anyway). Only when it is transformed into something – a service, an intervention, a policy – does data become genuinely productive. This means a shift of emphasis as regards data, from record-keeping to service-creating.

The workshops were design-led in essence, then, focusing on synthesis over analysis, effectively. A diverse group of participants, albeit without local citizens in this instance, comprised representatives of the municipality and local housing operators, academics, and various local “cultural intermediaries” as well as people from the DATAstudio and Arup project teams. Each workshop group presented positions on the local context through a variety of different lenses – opportunities, issues, development schemes, ongoing research, and so on – before splitting into mixed subgroups to develop potential projects on the basis of the notion that a *Cloud Atlas* platform could exist.

Numerous ideas emerged, suggesting that a) *Cloud Atlas* could be a generative platform worth pursuing and also that b) the focus on creating local interventions locally, as opposed to merely building databases or outsourcing to pre-existing solutions, was fundamentally important and useful. The workshops were partly an exercise in getting these particular stakeholders used to the idea of “making” in order to prepare the ground for real making subsequently.

Making these systems locally is important not merely in terms of increasing the likelihood of producing more grounded, appropriate and self-determined solutions (which are likely to be more used and engaged with as well as more focused in the first place) but also in terms of investigating a key question: can we co-opt the dynamics of BigTech without inheriting the broadly unrepresentative ideologies and cultures within which they are produced, and create solutions that take advantage of their techniques but are honed for European cities and communities? Rather than go through all the ideas generated, let’s look at one in particular that demonstrated this sense of possibility, twisting some of the capabilities of Airbnb-like systems to local needs.

## Roomsel Noord

The Roomsel Noord project idea emerged from a story from the field research: elderly residents, often women, were living alone in their former family homes in Woensel-Noord. We heard about one, Edith (not her real name), whose situation was typical: she could now barely afford to pay the rent on the house she’d been living in for years yet did not want to have to leave the home she had brought up her family in. The house itself, still stuck in “breadwinner mode” due to the intransigence of built fabric, cannot flex to her



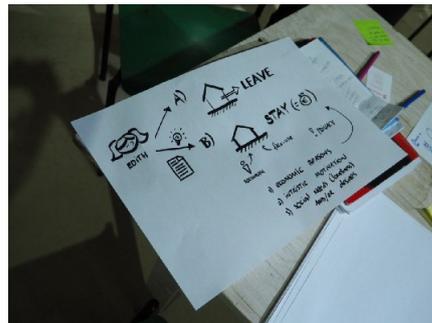
My quick sketch of Roomsel Noord: co-working space on Wednesday, grandchildren’s playroom on Saturday.  
Photo: Dan Hill

## Dan Hill

[12]

See: <https://www.theguardian.com/society/2017/dec/10/loneliness-is-a-giant-evil-of-our-time-says-jo-cox-commission>, retrieved on 29 March 2018.

current conditions: she lives alone, with decreasing mobility and increasing loneliness, which we know directly affects mental and physical health, with terrible outcomes for people as well as increased costs for the welfare state.<sup>12</sup> Edith's social conditions had changed, and were doing so increasingly fundamentally. Yet her physical environment had not.



Sketching Roomsels Noord.  
Photos: Arup Digital Studio

Other social changes in the neighbourhood, however, meant that other potential uses existed for the now-superfluous space in Edith's house. Data appeared to show increasing numbers of people working from home or not in an office, and an according increase in the demand for flexible spaces, usually catered for by co-working spaces or serviced offices in the commercial centres of Eindhoven.

What if we could begin to use some of the spare space in the neighbourhood along with consolidating the position of people who already live there rather than undertaking the usual gentrifying process of expunging them? Could Edith remain in her house yet offer up some of its now-vacant spaces, entirely on her terms? What kind of retrofit would that imply? Would that, in turn, begin to create, or simply reveal, a more vibrant, diverse and mixed-use Woensel-Noord?

To cut a story of a long workshop short, Roomsels Noord was envisaged as a platform and service, built locally and operated locally – ideally by the city in combination with the Woonbedrijf housing corporation and local cooperatives – that would enable Edith to use her house's spare capacity to make money to help cover her rent without giving up the spaces she needs. It would imply a physical retrofit of the ground floors of these houses, which could be easily converted into temporary workspaces or community spaces, along with securing the rooms Edith needs upstairs.

My quick sketches of where an interventions service might start, made using our use-cases template. Photo: Dan Hill

**Cloud Atlas Sketch 1** Group: 2

**Use cases:**  
Describe some notional use cases or useful scenarios for such a platform

**Key questions:**  
At this stage, what questions and discussions are emerging?

WEDNESDAY CO-WORKING

SATURDAY PLAY ROOM

UNDERSTANDING SERVICE

BUS

SHARED EXERCISE

KIOSK

SHARED FOOD CARE BOTS

INTERVENTION SERVICE

SUGGESTIVE SPACES

SPACE MAKER

1) DATA

2) INTERVENTION SUGGESTIONS

Do we understand how people are communicating?

Do we understand how people are using spaces?

Do we understand shared resources/abilities?

Do we have prioritised set of 'interventions' / 'suggestive spaces'?

Do we understand skills/resources in neighbourhood?

Do we know the interconnectivity in the neighbourhood?

Do we understand how to customize?

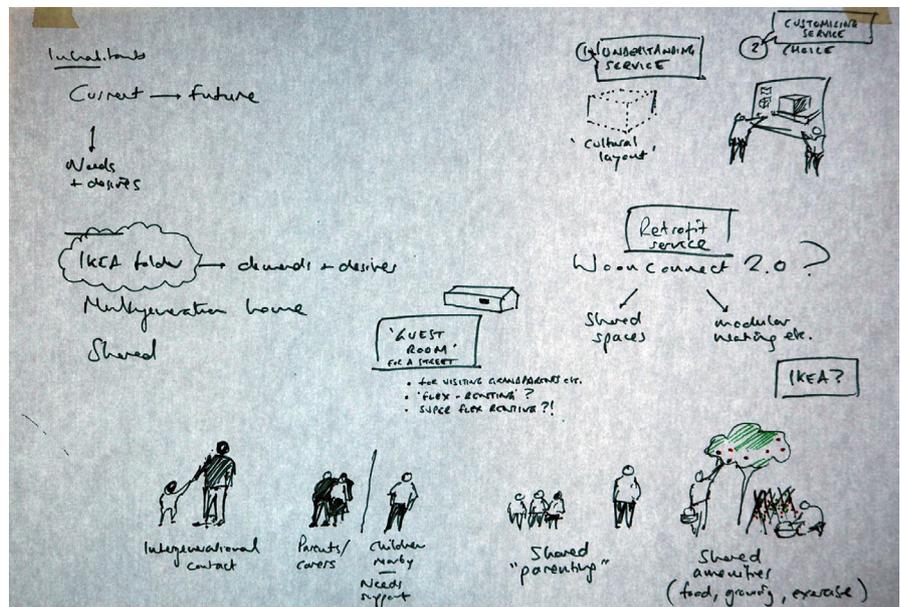
The ground-floor spaces could also be used by Edith whenever she wants – for instance, when her extended family comes to visit at weekends. It would be a form of Airbnb, in a sense, but built on Edith’s terms. Roomsel Noord would be a digital platform accompanied by a programme of physical retrofits addressing existing building stock that would enable Edith and others to use their space more flexibly, to their benefit, whilst retaining ownership. This retrofit aspect could be an extension of Woonconnect.

Edith could adapt her family home to continue to respond to her and her family’s needs whilst also sharing aspects of it with her neighbourhood. The value generated in that sharing would be financial – enabling her to stay in her home – but also social: by dissolving the walls between houses, and between houses and the street, the community would be able to connect in new ways.

So a street of individual houses, built in a terrace but with little connection any more, becomes a more fluid consideration, with increasingly shared front-of-house areas and a lateral, horizontal relationship across the ground plane, yet with atomic private spaces still retained upstairs and at the back.

Again, this would be managed on Edith’s own terms: a platform, yet with true local ownership and decision-making. She need only open up the ground floor for rent when she wants to – but those in the workshop from Woonbedrijf, whose staff have intimate knowledge of the community from everyday interactions around maintenance, community services, rent and, informally, well-being, felt that the idea was viable enough to be pursued. It could even mean greater social connectivity, with folks like Edith coming into contact with people from different communities. That small-scale data need only be owned, and relevant, at a super-local level. Again, it would be complex, but perhaps less complex than we might think if approached bottom-up rather than top-down, or if started with the sense that this only needs to work for a few streets in Woensel-Noord, at least initially, as opposed to scaling to the entire Western world – i.e., avoiding the typical tech start-up dynamic. The European Commission-funded DECODE project is developing useful toolkits around data sovereignty and super-local ownership that could underpin such a platform, and philosophy.

Determining what those ground-floor activities would be, of course, needs further research, and *Cloud Atlas* could be a way of beginning to assess the likely demand there, through learning about increasingly informal and fluid working practices by scraping public adverts or announcements around workspaces, event spaces and community spaces. This would be *Cloud Atlas*



My quick sketches beginning to suggest various informally shared activities in Woensel-Noord. Photo: Dan Hill

in demand-assessment mode, not giving definitive answers but conveying the sense that something might “be there” and warrant further investigation and engagement on the ground, face to face. *Cloud Atlas* would generate leads, as per a detective story, rather than conclusions.

In particular, we focused on the delicate balance to be struck in not modifying spaces so much that they no longer feel like home, or so as to add unmanageable complexity. Issues of security, privacy and identity would be fundamental here – but then they are anyway, with any smart-city project; it’s just that most projects don’t acknowledge that. In a sense, the fact that the Roomsel Noord idea immediately foregrounds these psychological and sociological complexities means it is a promising project: it feels high-stakes because its subject matter matters. Strong, ethnographically led design research informed by architecture, as opposed to traditional architectural practice, would help with this.

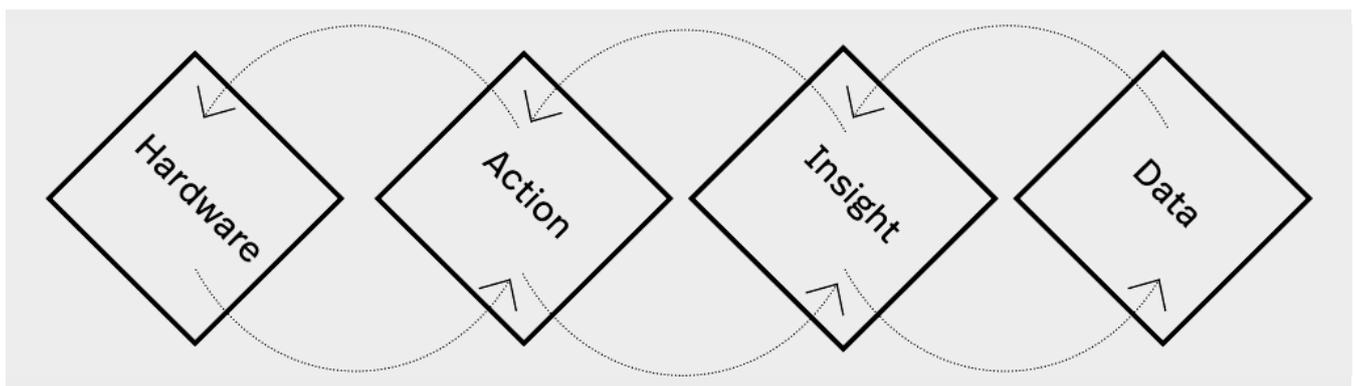
This is quite unlike classical go-to smart-city projects, such as smart street lighting and smart meters, which simply do not matter in the same way, yet clearly could also have issues of privacy and identity attached. Somehow, they embody the worst of both worlds: they are carelessly rolled out, largely to little interest from the community, and largely benefit people elsewhere.

The *Cloud Atlas* platform could help as a kind of analytical back end, gathering informal data to be interrogated and developed by what we called an “understanding service”: essentially the same team carrying out the ethnographic research mentioned above. Thus we have quantitative and qualitative data worked together into a ‘stew’, providing, on the one hand, insight into what services could be built, and on the other, a database back end to build those services around. We envisaged these services being designed, built and operated by something we dubbed the “interventions service”. While these names may need a bit of work, both services were key to the workshop outcomes, which were as much about shifting the discussion within the municipality and among associated key stakeholders as it was about actually creating a platform.

The workshop participants began to get a sense of *Cloud Atlas*, as they explored how rich data might be able to help us to better understand contemporary social dynamics so that we can, in turn, better understand how to transform the physical environment via digital and other means. And crucially, they began to develop a sketch of what one of those user-facing services might look like, as well as a more holistic view of the organisational and legislative “dark matter” required to counterpoint and challenge the databased view of the world and thus provide leads for engaging with the “matter” of the place.

As well as the core flows around such a platform and some of the organisational support requirements, we sketched out other local services that might benefit from this informal data engine, such as an autonomous local shuttle owned and run by the community. An on-demand shuttle running in the gaps

A model by Laurens Tait from Arup emerging from the *Cloud Atlas* workshop.



between trams and buses is something we could imagine working at a community scale, as a form of social transport ferrying folk like Edith to and from shops, station, bingo hall, garden, dance hall and so on. Its routes would be generated around non-grid patterns of movement<sup>13</sup> and so provide a counterpoint to the public transport grid. Equally, other forms of infrastructure might be increasingly viable for local ownership, including energy and other infrastructures of everyday life.<sup>14</sup>

Within this we can see roles for the private sector, the public sector, the third sector and others. A sketch of a network-urbanism<sup>15</sup> model emerged as one of the ideas in the workshop, primed by our inputs, yet the workshop focused on Roomsel Noord as a more obvious place to start, which would nonetheless begin to build a shared public infrastructure.

## Public institutions and public life

Given the way the workshop was framed and facilitated, our “design probe” immediately put on the table the question of new forms of institution and organisation, ranging from cooperative ownership models through to the role of the municipality itself. Suffice to say, these could not be resolved in a two-day workshop. Yet it was clear that there was an essential publicness to all the models discussed, as opposed to the usual rhetoric around start-ups. The municipality could be seen as an ideal location for *Cloud Atlas*, in a sense, as it is the only entity with long-term responsibility for the city of Eindhoven and the legitimate arbiter of the use of public data. And one could imagine cooperative forms would work well at a neighbourhood level around infrastructures like shuttles and energy systems as well as potential interventions like Roomsel Noord. Either way, these questions would require a truly on-the-ground analysis of what is going on in Woensel-Noord, as per the programmes that Het Nieuwe Instituut initiated under the DATAstudio, and a recognition of the value of what, and who, is already there.

How should we rebuild and reconceive public policy and public services, learning from the streets and communities and retaining a core local ownership yet also finding a role for private-sector innovation? In the broader public policy within which smart cities are framed, what lessons should we draw from the failure of privatisation in the UK to address the domain of the public sector even when massively incentivised to do so? And how do we face the growing sense that the tech sector won’t actually be able to sustainably scale once it hits the complex terrain of public life and public services?<sup>16</sup>

[13]

See: <https://medium.com/butwhatwasthequestion/grid-non-grid-da2267e86abf>, retrieved on 29 March 2018.

[14]

See: <https://medium.com/butwhatwasthequestion/the-battle-for-the-infrastructure-of-everyday-life-6c9b0572e57f>, retrieved on 29 March 2018.

[15]

See: <https://medium.com/butwhatwasthequestion/network-urbanism-b6337ea715f>, retrieved on 29 March 2018.

[16]

<https://www.forbes.com/sites/lensherman/2017/12/14/why-cant-uber-make-money/#434c3d4610ec>, retrieved on 29 March 2018.

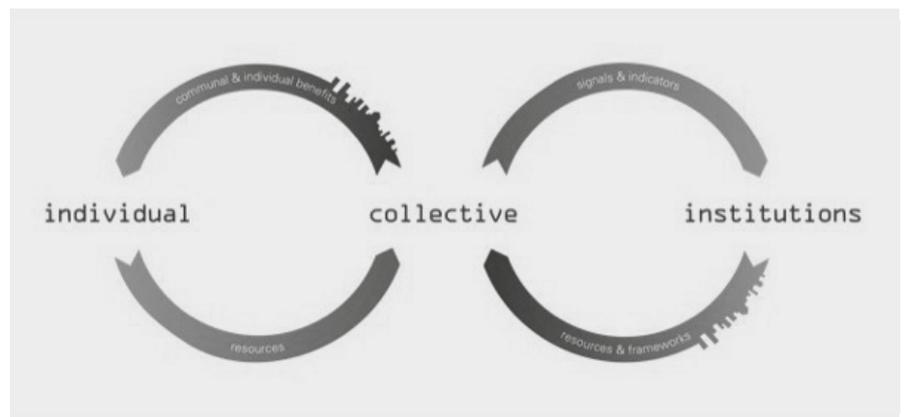


Diagram of flows from *The Hackable City*, edited by Martijn de Waal.

In both cases, many are facing the dawning realisation that we cannot get the private sector to do public-sector jobs. It's a simple enough thought, yet still counter to the training of a generation of policymakers across Europe. Yet the Netherlands still has the potential to take a more balanced approach to this than many, as captured in Martijn deWaal's deceptively simple diagram indicating the interplay between three components around which a smarter smart city – what he calls a hackable city – might be built.<sup>17</sup>

Yet we still need to make an active choice, and most smart-city policies and strategies within Europe are mystifyingly silent on these matters, perhaps inadvertently reflecting that previous generation's legacy thinking. Few of the EC's smart-city demonstrator programmes are directly addressing these broader political, cultural and societal issues, with the potential exceptions of the Sharing Cities<sup>18</sup> and Organicity<sup>19</sup> projects. Yet the stakes are high. To put it bluntly, who would you rather see thrive in Eindhoven: Uber or Edith?

## Uber or Edith? Unicorns or society?

Well outside Cloud Atlases, Eindhoven, and urban development generally, the relative success of the UK's Government Digital Service (GDS)<sup>20</sup> initiative could also exemplify such a European response to these technologies.

It too borrows the productive techniques of Internet-based software – agile software methodologies, user-centred design, iterative prototyping – and uses them to bind together an effective, meaningful and reliable array of government services. These are much the same toolkits that the products of the neoliberal Californian ideology use in an attempt to negate the need for government, yet here they are deployed to reinforce government rather than diminish it. The value of GDS does not lie simply in the billion pounds per year that it saves the UK taxpayer by not outsourcing but largely in the improved services themselves.<sup>21</sup>

GDS was not envisaged as an austerity-era cost-saving measure – in fact, it refused to estimate a likely cost saving when asked to do so by the UK Cabinet Office – but as a better digital service for citizens. And it turns out that it was better, in almost every sense of that slippery word, as a result of being delivered by the public sector as opposed to being outside and outsourced. This gives credence to the idea of *Cloud Atlas* and its “understanding and interventions services” being run by either the municipality or some other locally and publicly owned entity.

Russell Davies, ex-head of strategy at GDS, has described how we need to frame a British or broader European response to the hegemonic stand-off of “start-ups versus government”. Optimistically, he sees huge potential for a distinctly home-grown approach, given what he called “the blind spots of Silicon Valley”. These he described as an overriding obsession with venture capital (VC) as the only possible “fuel” and, in turn, VC's obsession with “unicorns”. Davies suggested that other blind spots include the “super-serving of a San Francisco user”, who is entirely atypical in a broader global context (and possibly even a broader American context) yet whose archetype is “forced via market power into other places”, another form of elite projection. The blind spots further include an assumption that “regulation, government and wider society can just be ignored”.<sup>22</sup> This is simply not true, never mind undesirable.

The success of GDS more broadly indicates a role for technology in the public sector, but one that absorbs, reframes

[17]

Martijn deWaal (ed.), *The Hackable City: A Research Manifesto* (Amsterdam: Knowledge Mile Publications, 2015).

[18]

See: <http://www.sharingcities.eu/>, retrieved on 29 March 2018.

[19]

See: <http://organicity.eu/>, retrieved on 29 March 2018.

[20]

See: <https://gds.blog.gov.uk/about/>, retrieved on 29 March 2018.

[21]

Equally, when it did outsource, GDS shifted the balance from a few multinationals based around London to a national network of thousands of UK SMEs.

[22]

See: <https://a16z.com/2015/11/30/a16z-podcast-london-calling-for-tech-done-in-a-u-k-way/>, retrieved on 29 March 2018.

and deploys the values and game plans of the private sector where applicable. This active curation of public and private to forge a hybrid – rather than making the lazy assumption that the private sector is necessarily always the most effective delivery mechanism – could mean that, in Davies’s view, “a more diverse vision of technology will out-compete a white, male rich version of technology.”<sup>23</sup>

Could we draw from this example of active curation of contemporary technology’s dynamics to improve our European cities – through adoption, yes, but also adaptation? Through working with diversity rather than monocultures? Through developing local solutions that generate and retain value in local urban economies rather than feathering the nests of venture capitalists elsewhere?

Given the array of highly capitalised services that is beginning to reshape global cities, generally underpinned by ideologies quite different to those that have tended to form European urbanity – those of a “super-served” San Francisco dweller rather than a citizen of Eindhoven – it behoves us to find a way to forge a new network urbanism.

The promise of places like Eindhoven’s Strijp-S and Woensel-Noord, when taken together, is that they show us a way forward by building on our past and present, and through making the case for diversity. They demonstrate approaches to layering an array of new spaces, activities and cultures over the “good bones” of an inert physical structure; it works in the gaps left by history and generates new possibilities as a result. These places indicate the value of wrestling with the true complexity of public life, public space and public services in a way that the private sector generally finds too difficult. They demonstrate the value of the super-local, as opposed to the allegedly global, for solutions found and invented on our own streets, as Gautam Bhan has described in his article on the city of Bangalore.<sup>24</sup>

Though the smart strategy of a place like Strijp-S is nascent, its scope means it is well placed to add further layers of activity. And though retrofits of places like Woensel-Noord are also nascent, ideas like *Cloud Atlas* demonstrate how everyday technology might be co-opted and put to use for the benefit of the city as a public good, to generate a wide range of shared values on Eindhoven’s own terms rather than being complicit in a leaching of local value to elsewhere. This could be highly productive, a genuine creative challenge as well as a core public good.

This emphasis on diversity of approach, and a fusion of top-down and bottom-up dynamics within a super-local public context, can be taken into this new infrastructure of everyday life, flourishing in the gap between cellphones and cities.

For here are people, networks, organisations, structures, vehicles, spaces, surfaces, objects, infrastructure, flora, and fauna. And here are technologies. We need new tools, perspectives and processes to understand these shifting layers of activity in order to shape the urban outcomes we might desire for European cities. Locating them will require directly engaging with technology and recognising its role as a key driver of urbanism, yet framing it holistically, via a new synthesis of disciplines, contexts and experiences, an entirely new form of network urbanism.

Could this more diverse, super-local approach blindside the blind spots of Silicon Valley and forge an appropriately European approach to a civic urban technology better suited to places like 21<sup>st</sup> century Eindhoven? Perhaps that is the question.

[23]

Ibid.

[24]

See: <https://www.indiatoday.in/magazine/cover-story/story/20180122-india-2017-smart-city-swachh-bharat-demonetisation-delhi-pollution-mumbai-elphinstone-stampede-bengaluru-lake-froth-1131375-2018-01-12>, retrieved on 28 March 2018.

VII. THE SMART  
CITIZEN GAME:  
WOENSELTOPIA



## Ekim Tan

Ekim Tan is founder of Play the City. Play the City uses gaming to engage multiple stakeholders in resolving complex urban challenges in contexts of urban development and organisational realignment. Play the City designs physical games as methods of collaborative decisionmaking and conflict resolution, changing ways of engaging stakeholders. Play the City has developed games for common city challenges such as urban transformation, social change, circularity, affordable housing, collaborative design and creating "smart citizens". These games have been used in cities across the world, including Amsterdam, Istanbul, Cape Town, Shenzhen, Brussels and Dublin. *Woenseltopia* was developed by the Play the City team for the DATAstudio programme in close collaboration with Klaas Kuitenbrouwer (DATAstudio) and Linda Vlassenrood (DATAstudio).

Cities increasingly use IT and Internet-of-Things technology to manage their assets. New policies rely more and more on the digital output gained through these channels. New technologies open up all sorts of opportunities to provide more precise and effective local health and safety services. However, for a majority of citizens they represent a very distant, if not totally inaccessible, form of interaction with local government. Can we open up digital data-based policymaking and make it smarter by sourcing qualitative data using input from people outside city hall? How can we bring these complicated data systems closer to all those involved in city-making? Why not use games to make complex digital data sets more accessible and tangible to citizens and policymakers?

We believe city games, with their simple language and joyful, inclusive nature, can play an important role in engaging citizens in "smart city" debates. The Smart Citizen Game is a new format that sources data from online platforms as well as from the in-person narratives of people from communities that may not be represented on these platforms due to their limited access to digital infrastructures. The Smart Citizen Game, played in person around a table, was created for the purpose of generating, interpreting and managing quantitative and qualitative data that can be used to help create, maintain and manage our cities.

Its secondary purpose is to bring local residents' hidden qualities to light in order to bring population groups and age groups closer together. While offering residents an open, accessible framework for interacting in person, the game draws out their knowledge and experiences by eliciting their comments, opinions, stories, and ideas for solving various local spatial and social problems – which are then put to the test.

*Woenseltopia*, the first version of the game, was developed as part of the DATAstudio programme in Eindhoven in partnership with the local government of Eindhoven, which wished to facilitate conversations between local residents about the future of their living environments. We hope the game, which uses data as a basis for informed discussions and storytelling, will inspire the city to use this new tool to create awareness about citizen data among residents.

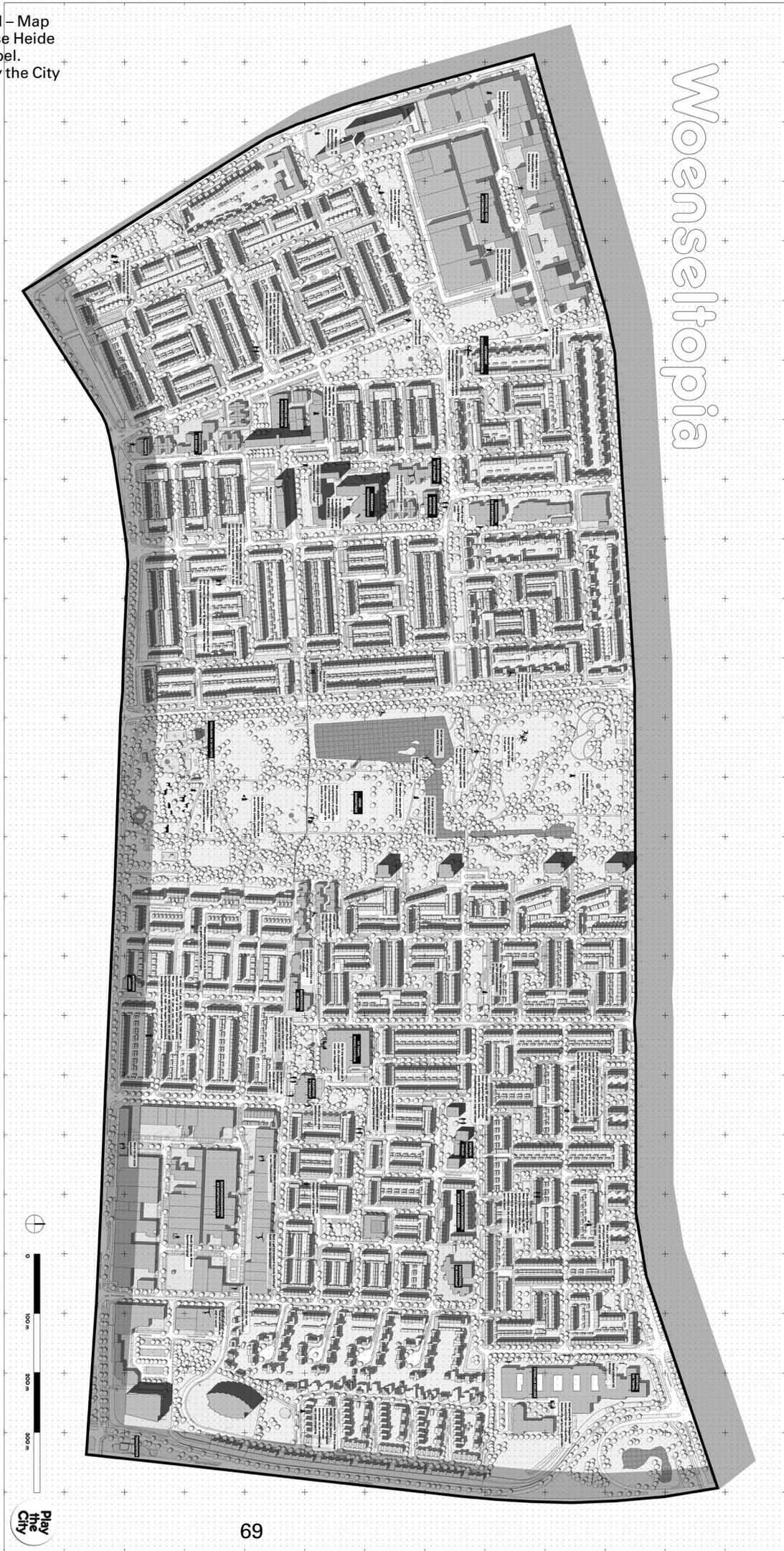
## What is Woenseltopia?

As they play, players generate scenarios for making Woenselse Heide and De Tempel – the neighbourhoods for which this first version has been designed – more autonomous. About 10,000 people live in the two areas, which are part of the borough of Woensel-Noord.

A fictional narrative about Woenselse Heide and De Tempel helps players think about locally available resources and start seeking solutions to daily challenges in precisely the place where they experience them. Imagine you wake up in Woensel-Noord one day to find that a wall has secretly been built around Woenselse Heide and De Tempel. Nobody can leave for the next nine years. How would you alter the area? Working with 19 other players at a big table and led by a game master, you'll devise ways of getting enough food, housing, public space and health care using available data. For instance, who in the neighbourhood knows how to grow vegetables? How can that knowledge be shared? How many cows will be needed if everyone keeps eating meat, and will there be enough room? Can parking spaces be sacrificed to make way for vegetable gardens? Could elderly people living alone offer space in their homes to visitors unable to leave because of the wall?

Game board – Map  
of Woenselse Heide  
and De Tempel.  
Source: Play the City

# Woenseltopia



Players explore local data in order to better understand contemporary social dynamics and how to transform the physical environment via digital and other means. Players are offered accessible data that they interpret collectively and use to create new meanings for their living environment. *Woenseltopia* is a multiplayer strategy game designed for regular citizens as well as representatives of local governments and housing associations.

The game, which usually takes half a day, allows participants to step outside their normal environment and think freely about how data can help them to imagine a desirable future for the local area. *Woenseltopia* is fast-paced and competitive. It encourages players to think on their feet, make informed choices, work through entrenched problems and test future scenarios.

A range of game materials provides players with additional knowledge, structures play, and helps them to visualise their ideas on the game board. The board is an isometric area map; one unit in the superimposed grid represents one hectare of land. Land use is indicated on the board. Data are introduced by the game master using attractive, easy-to-understand cards. Local data cards contain spatial, social and economic information and quantitative insights relating to things like food, health care, housing and public space. Global data cards show players best practices from abroad and offer inspiration for how spaces can be improved. Players take turns adopting territories and negotiating for colour-coded stickers representing diverse set of land use and activities.

## Structure of the game

*Woenseltopia* takes place over a series of rounds in which players propose and debate a range of different strategies. First, the game master introduces the game narrative. Players then form groups based on four subjects and data sets: food, health care, housing and public space. Each group proposes strategies for the future of the neighbourhood based on all the available data. The four groups play together, negotiating overlaps and conflicts between their specialised visions. Ultimately, they create one shared vision. The game master concludes the game and reflects with the teams on the question: Did the data provided help them to design a better future?

## Data sets

The themes – food, health care, housing and public space – best sum up the challenges the two neighbourhoods are dealing with, or would face if confronted with having to be more autonomous. In case of sudden isolation from the outside world, the first obvious question would be: How would local residents feed themselves? Given the abundance of large underused green spaces in *Woenseltopia*, data that help to repurpose green areas is explored in this layer. Providing care for an ageing population and young people would be the next immediate need if the community had to become autonomous. Today, changing social structures already mean living spaces will require adaptation; in *Woenseltopia*, being suddenly cut off from the outside world demands a thorough rethinking of the housing stock and typologies. Last but not least, reconsidering public space networks and alternative mobility scenarios is important as it relates closely to spatial demands around food, health care and housing. Below, we discuss each category in detail and list the questions that guided the team in collecting and organising relevant data.

FOOD

The main question related to food is: How can *Woenseltopia* feed itself given the scenario of ultimate decentralisation described in the narrative? And more specifically: Where can we produce food? What kind of dairy products, vegetables, fruit, meat and insects do we want to produce, and at which locations? What kind of technology will we use to do so? Which pieces of land will we give up for this purpose? How many inhabitants can we feed this way? How will their eating habits change? Where will they store, share, process and cook the food? Players are asked to think about using existing green areas, creating glasshouses, demolishing buildings to create more agricultural space, and producing food on top of buildings.

Data cards. Source: Play the City

**MEAT, EGGS AND DAIRY**

**FOOD**



**Come up with a clever way to let your livestock graze in Woenseltopia.**

**MEAT, EGGS AND DAIRY**

■ Number of hectares needed to feed 10.000 people for a year  
 □ Number of hectares in Woenseltopia: 200

<p><b>Vegetables and fruits</b> 40 ha</p> 	<p><b>Grains and potatoes</b> 115 ha</p> 	<p><b>Sugars and fats</b> 30 ha</p> 	<p><b>Legumes and other meat substitutes</b> 160 ha</p> 
<p><b>Meat (pork)</b> 700 ha</p> 	<p><b>Chicken and eggs</b> 4 ha</p> 	<p><b>Fish</b> 4 ha</p> 	<p><b>Dairy (cattle)</b> 15 ha</p> 

**Increase in productivity:**  
 x2,5 Aquaponics    x1,5 Aeroponics  
 x1,3 Hydroponics    x2 Greenhouses

If the citizens of Woenseltopia don't change their diet, the neighbourhood will need five times its current surface area to produce enough food. Meat, in particular, takes up a lot of space. Yet not everyone is willing to eat less or no meat in the coming years. Come up with a clever way to let your livestock graze in Woenseltopia.

HEALTH CARE

The primary question in regard to health care is: How can we take care of our population if connections to the official health care system are cut off? Since the wall has appeared, it's up to us to look after each other. Collected data show that 2,400 people in Woenselse Heide and DeTempel are suffering from long-term illness, and 750 are living with disabilities. Around 1,900 people suffer from poor health. In addition, there are 1,700 children needing education, and it is estimated that 63 infants will be born in the coming year.<sup>1</sup> We'll need people to provide nursing and education. Which existing organisations can do so? Which ones will we need to start?

Data cards. Source: Play the City

**LIMITED MOBILITY**

# HEALTH CARE



**How can you make sure people with limitations are taken into account in the new Woenseltopia?**

**LIMITED MOBILITY**

People with difficulty walking: **1.200**  
 Number of people in Woenseltopia: **10.000**



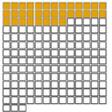
**Companionship**



**Massage**



**Poppy tea**  
40 ha



Number of hectares in Woenseltopia: 200  
 Number of hectares needed to provide Woenseltopia with poppy tea for a year. Poppy tea has pain-relieving and calming effects.

**Research shows that one in 10 people in Woenseltopia can't walk or has difficulty doing so. Of these people, 700 are ill and/or limited in their activities at home.**  
  
**How can you make sure people with limitations are taken into account in the new Woenseltopia?**

HOUSING

Meanwhile, if housing, retail and office spaces are in demand due to others' decisions relating to food, health care and public space, players will need to think of smart sharing schemes that can support intensive changes to land use. The existing housing stock will be affected by the increasing numbers of people searching for homes, meeting places, working spaces and repair shops. We need to know: Which new activities will we need in *Woenseltopia*? How many households will allow these activities to take place within their private boundaries? How will homes be reorganised once this happens? Which building elements will need reinvention? We collected data that would challenge players to think about enabling mixed and intensified use through, for example, building and demolishing walls, adding access doors, giving up gardens for agricultural use, and converting floors of homes into co-working spaces.

Data cards. Source: Play the City

**SHARED HOUSING**

**LIVING AND WORKING**



**How would you repurpose these homes for food, health care or public space?**

**SHARED HOUSING**

<p><b>Family dwellings: 3.774</b></p> <p>Average size: 60 m<sup>2</sup></p>  <p>x 100</p> <p>Average size: 120 m<sup>2</sup></p>     <p>x 100</p>	<p><b>Apartments: 729</b></p> <p>Average size: 60 m<sup>2</sup></p>  <p>x 100</p> <p>Average size: 120 m<sup>2</sup></p>  <p>x 100</p>
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**Number of 120 m<sup>2</sup> dwellings lived in by single people without children: 1.412**

**Total number of dwellings: 4.503**

According to the Buurtmonitor, Woenseltopia has 4.503 dwellings. One-quarter of these are larger than necessary for the number of occupants.

Another 100 homes are vacant. How would you repurpose these spaces to provide food, health care or public space?

PUBLIC SPACE

Last but not least, public space will become scarce in *Woenseltopia* due to others' demands relating to food, health care and housing. How can we negotiate and plan the use of public space in order to adapt it to new needs? Where will we meet, and with whom? How can we defend the dedication of the maximum possible hectares to public space? How do we design new forms of mobility now that we no longer need so many cars? Will cycling or some other mode of transport prevail? What will the city transport network look like? Will new hubs appear, or is every location now a potential hub? How will recreation, the arts and cultural traditions play out in public space now that jobs have changed and office buildings and industry will take on new meanings in this fully autonomous city? How will we think about energy, water, material and other public resource flows, and how will our new relationship to nature take shape?

Data cards. Source: Play the City

**MEETING PLACES**

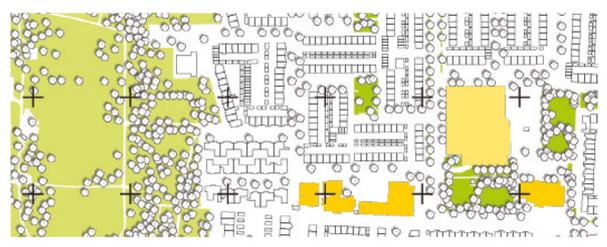
**PUBLIC SPACE**



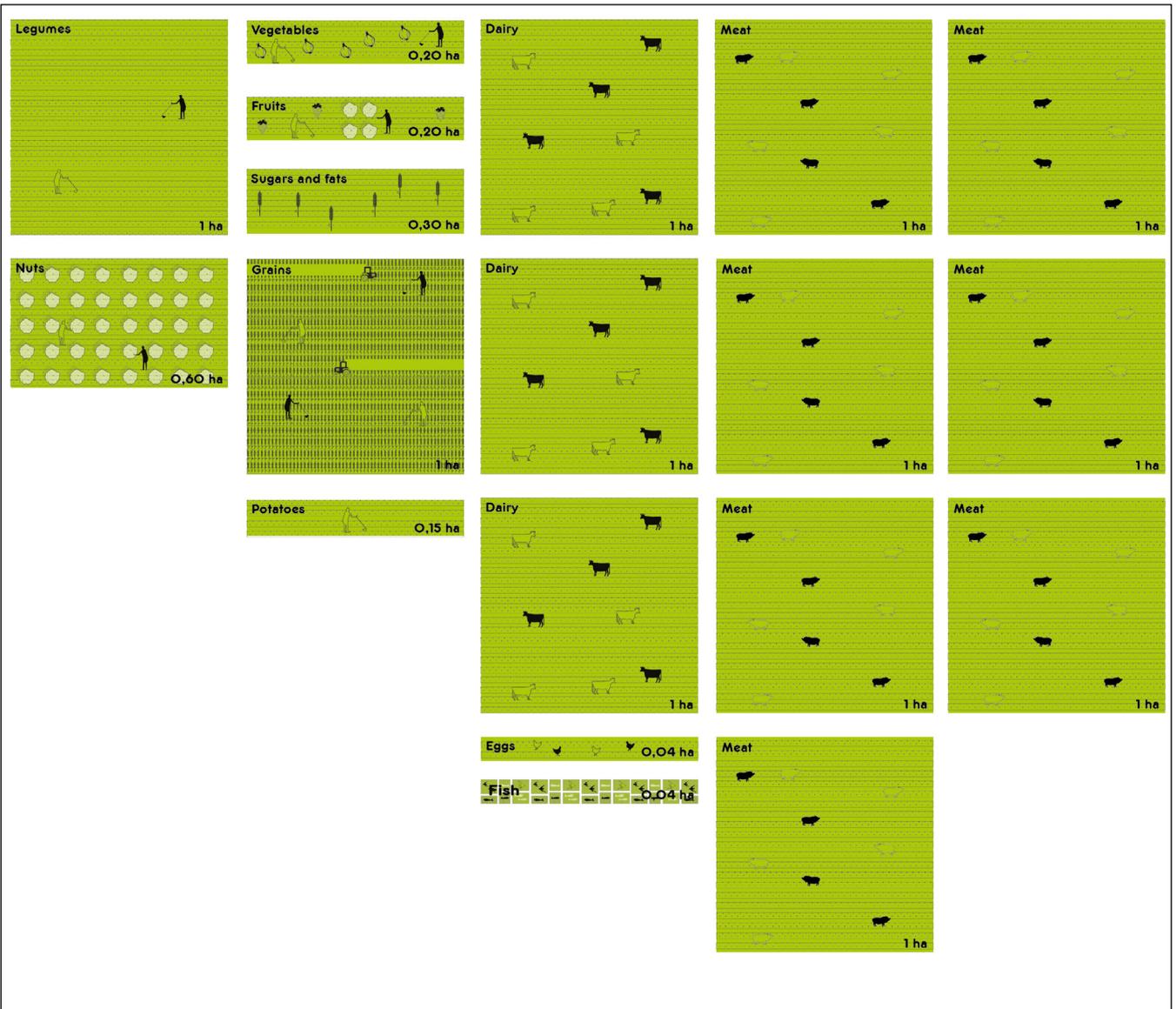
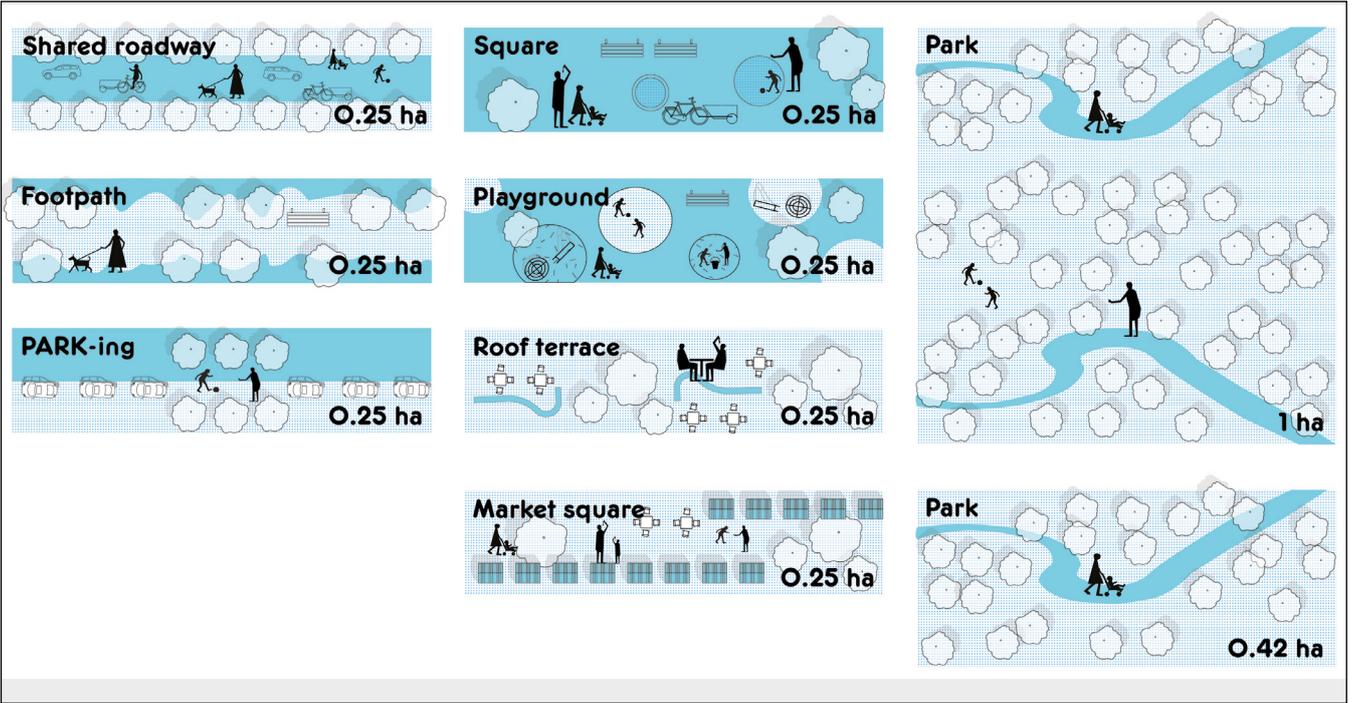
**Where and for which activities will residents of the new Woenseltopia meet each other?**

**MEETING PLACES**

 <b>Trees</b> 5.500	 <b>Bike racks</b> 97	 <b>Public buildings</b> 4 ha
 <b>Cars</b> 4.935	 <b>Lamp posts</b> 2.019	 <b>Parks</b> 23 ha
 <b>Benches</b> 132	 <b>Playgrounds</b> 23	 <b>Rubbish bins</b> 129
 <b>Waste containers</b> 33	 <b>Football pitches</b> 3	
 <b>Works of art</b> 7		



The surface area currently comprises 4 hectares of public buildings (such as schools and community centres) and 23 hectares of parks. Some of these places will likely disappear with the reorganisation of Woenseltopia. Where can you create new places for people to meet? Reuse existing elements and buildings for this purpose.



# Test sessions at Dutch Design Week and follow-up

During Dutch Design Week, we ran two test sessions at the *Embassy of Data* in which we harvested a first round of reflections and ideas from participants who played the prototype game. Early outcomes indicate that players are interested in home-sharing schemes even though they've never thought about them before. Professionals who observed the test sessions were impressed by how the players envisioned their communities – for instance, how they categorised older adults, young people and newcomers and how they grouped them in new proposals. The most rewarding moment for the team was when some players commented that they'd actually like to live in the new urban community they'd just created. We realised the power of the game to introduce extraordinary ideas to regular residents who wouldn't normally consider scenarios like extreme sharing and mixed land use for their future neighbourhood. We are confident that the game will become an informative data-based tool for generating collective future scenarios for urban areas.

After the first iterations at Dutch Design Week, the next challenge is to play the game in the place it was actually created for. We believe residents of Woenselse Heide and DeTempel will profit from a series of game sessions, since they will gain awareness about how they might play a role in shaping the city themselves and be encouraged to imagine futures for the place they live in and to take initiative themselves. We therefore believe that getting people to play the game in person and generate future scenarios by working with their neighbours will provide smart, fresh perspectives in the current Smart City debate.



Test session *Woenseltopia* at the *Embassy of Data*, 28 October 2017. Photo: Play the City

# VIII. LEARNING

## FROM EINDHOVEN: INNOVATION, EXPERIMENTATION AND REALITY



## Sukanya Krishnamurthy

Sukanya Krishnamurthy is an assistant professor of urbanism and urban architecture in the Faculty of the Built Environment at Eindhoven University of Technology. She and her students participated in the DATAstudio programme with two seminars and one course in 2016 and 2017.

Debates surrounding the future of urban development are increasingly being shaped by rhetoric on technology, innovation and experimentation. There is a growing body of work on the intent, focus and ideology of these debates, and research (and debate) is also still growing on the impact of innovations on places and communities. Focusing on the question of how everyday activities can yield learning and knowledge, this essay positions community concerns and everyday dynamics in the push towards innovation using the Dutch city of Eindhoven as a case study. This article will show that deeper explorations on the role of society in the urban use of technology and on inclusive digital and social experimentation are important. It will question ways in which citizens can, need to, and want to have a say in the future of innovation, leading to more creative and open-ended urban futures.

## Introduction

Cities' adoption of the motto "innovate or die" has led to a wave of responses harnessing science, technology and innovation to address social, political, economic and ecological challenges. Amid new waves of technological innovations, urban experimentation and the role of the neo-liberal state are closely intertwined. Within the current neo-liberal governance context, urban planning acts more as a facilitator, guiding and shaping the policies and activities of other key actors (private companies, developers, the public, etc.) rather than directly effecting change at the local level. In this context, the makeup of local strategies, collaborations, and urban technologies tends to become more important. Attracting significant attention in the last few years has been experimentation using "smart paradigms". This is seen as a response to stagnation in conventional policy approaches and as part of the broader trend of the fragmentation of vested authority, which creates spaces for new sources of authority and legitimacy and action by new social actors.<sup>1</sup> Examples can be seen in placemaking projects,<sup>2</sup> co-creative approaches to planning and design, and technological responses such as living labs in more recent years.

Over the last two years, by partnering with Het Nieuwe Instituut on its DATAstudio project, students urbanism and urban

[1]

M.J. Hoffman, *Climate Governance at the Crossroads: Experimenting with a Global Response After Kyoto* (Oxford: Oxford University Press, 2011).

[2]

See: [www.pps.org](http://www.pps.org), retrieved on 10 January 2016.



Presentation of results of initial empirical findings to Het Nieuwe Instituut and the municipality of Eindhoven in 2016. Photo: Sukanya Krishnamurthy

architecture in the Faculty of the Built Environment at Eindhoven University of Technology have been gathering and analysing empirical data through interviews, surveys and observations within the city of Eindhoven, particularly focusing on the two neighbourhoods Woenselse Heide and DeTempel, in the borough of Woensel-Noord, in 2016. By participating in various workshops through 2016 and 2017 with a group of graduate students in architecture and urbanism from Eindhoven University of Technology, we have aimed to contextualise the impacts of the shift towards what the municipality has termed a “smart society”. Neighbourhood walk-alongs, semi-structured interviews and open-ended questions provided valuable feedback on the impact of technology on place and society. The research was carried out at various stages. We first aimed at getting an overview of how existing “smart” initiatives in the city addressed society’s needs, and the resident population’s impression of ongoing activities. Following this process and subsequent data collection, we conducted desk-based studies of literature and policy documents on these initiatives.

To conclude the research activities and contextualise the impact of technology on public space in Woenselse Heide and DeTempel, in mid-2017 we expanded our data collection to four more areas in Eindhoven: Strijp-S, Woensel-West, the city centre and Stratumseind. We aimed to quantify the social and physical dynamics of technology in these areas and developed scenarios for putting people back at the centre of the debate. By exploring a number of daily practices and ongoing projects within these neighbourhoods, we showed that investigating local challenges could inform a more successful implementation of projects involving smart lighting, street sensors, augmented reality, co-creative projects, living labs, and so on. These examples highlight the intersection of municipal desires for experimental urban futures and how they can be aligned with the realities of everyday living. Through this work, we aim to open up the discussion on innovation and to plead for a much greater diversity of ideas and approaches to become visible in urban discourses and future experimentation. Finally, projects and scenarios developed by students during the research show how people, design and the use of technology can merge.

Impact of technology and public space was discussed during Dutch Design Week at the *Embassy of Data*, 26 October 2017. Photo: Sukanya Krishnamurthy



# Eindhoven: the norm, or questioning the norm?

If urban experimentation can be linked to the likelihood of engaging in smart city policies, Eindhoven would seem a promising breeding ground for alternate futures. Branded as innovative and sometimes alleged to be the “smartest region in the world”, the area around Eindhoven in the southern Netherlands is now recognised for its design characteristics and its technological expertise, reflected in start-up clusters and patents. Within the current push to create a smart-city/-society narrative in Eindhoven, we see a shift from references to the triple-helix model of university-industry-government relationships towards a more comprehensive model promoted as the quadruple helix, where the citizen or user is the fourth dimension.<sup>3</sup> The city has been quick to embrace this concept by developing living labs along user-centric lines, where citizens are seen as users of digitally enabled services.<sup>4</sup> Rob van Gijssel, the mayor of Eindhoven from 2008 to 2016, for example, has made a clear statement over the years when it comes to merging participation and technology. His mantra is that there are “no smart cities, only smart people.”<sup>5</sup> Therefore, he argues, systems must be more efficient, more effective, cheaper, be open source- and open data-related, and they must be inclusive. He also states that technology has to be humanised and that a co-creative approach must be taken throughout the process (not only for end users), supporting multilevel, multidisciplinary, multistakeholder integration.

Though the local government is taking action in this direction, it has stated that it is not entirely sure how best to achieve this result.<sup>6</sup> The city released a smart-society document in 2016 that aimed to move away from a purely technocratic perspective to align better with social issues.<sup>7</sup> But not only does it show an apparent gap between reality and policy (as is often the case), the direct link between a socially inclusive approach and the desired smart approach also appears to need time to develop further. Though the document pushes for better collaboration between various stakeholders, encourages experimentation through citizen collaboration, and puts the community at the centre of the discourse, the results of this shift have yet to be determined and quantified.

## Place-based dynamics: experimentation in Woensel-Noord

Woensel-Noord, a borough in the north of the city with a population of nearly 65,000, is predominantly residential. With large tracts of its housing stock owned by housing corporations, it is attractive for its affordability, dwelling structure, public space, and community activities. But it is also undergoing rapid demographic and spatial transitions. The neighbourhood is home to a high percentage of people over the age of 60 (knowledge workers once attracted by Philips, DAF and the university) and a high percentage of immigrants (knowledge workers, service workers, refugees). Against this backdrop, the municipality has identified Woensel-Noord as an experimentation zone. Projects funded through large-scale EU Horizon 2020 grants such as Triangulum, smart-city initiatives related to smart lighting (through Philips Lighting,

[3]

T. Wilson, *A Review of Business-Industry Collaboration* (London: Department for Business, Innovation and Skills, 2012).

[4]

J. Eskelinen, A.G. Robles, I. Lindy, J. Marsh and A. Muenste-Kunigami, *Citizen-Driven Innovation: A Guidebook for City Mayors and Public Administrators* (World Bank and ENoLL, 2015). Online. See: <https://openknowledge.worldbank.org/handle/10986/21984>, retrieved on 1 March 2017.

[5]

R. van Gijssel (2016), *No Smart Cities, Only Smart People*. Online. See: <https://twitter.com/rvangijssel/status/735006271645061120>, retrieved on 1 February 2016.

[6]

Gemeente Eindhoven (2015) *Samenwerking in living labs*. Online. See: <http://www.eindhoven.nl/artikelen/Samenwerking-in-living-labs.htm>, retrieved on 1 February 2016.

[7]

Gemeente Eindhoven, *Uitvoeringsprogramma Smart Society* (Eindhoven: Gemeente Eindhoven, 2016).

Heijmans, Eindhoven University of Technology, etc.) are pushing the idea of urban experimentation and technological innovation.

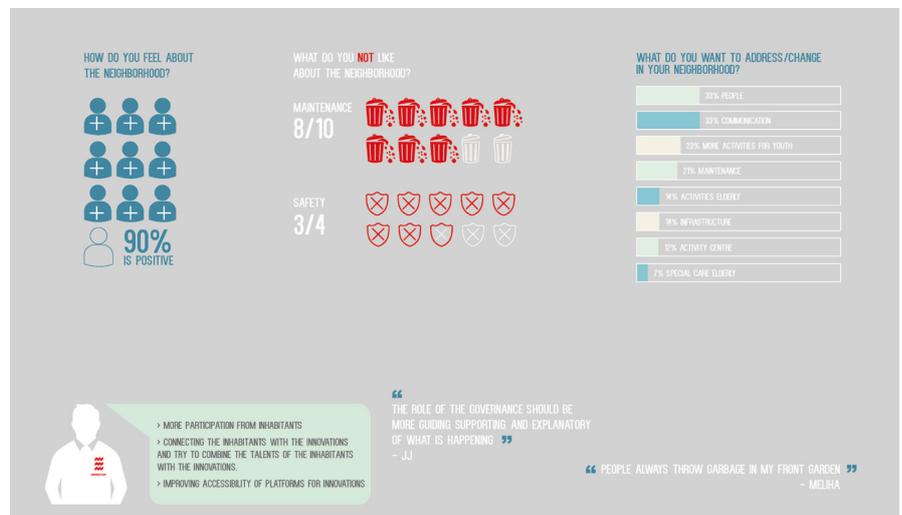
By means of a thematic analysis of our interviews with residents in Woenselse Heide and De Tempel, we identified challenges within the two neighbourhoods in the areas of social diversity, safety, ageing, communication, and governance. An overview follows.

## Civic culture: social diversity and safety

Research shows that physical and social components are important for making inhabitants feel connected to a neighbourhood.<sup>8</sup> Residents living in Woenselse Heide and De Tempel for more than 20 years were generally positively disposed toward the area. They emphasised the quality of the public spaces, open green areas, access to facilities, social networks and activities, and civic culture in the neighbourhoods.

[8]

L. Manzo en P. Devine-Wright, *Place Attachment: Advances in Theory, Methods and Applications* (London: Routledge, 2014).



In interviews, residents of Woensel-Noord expressed positive feelings about the neighbourhood but also concerns about safety and maintenance. Source: Eindhoven University of Technology, 2016–17

The interviews showed that the neighbourhoods were favoured as places to live because of their low-cost housing, proximity to people's workplaces, ample public space, and proximity to the city centre.

*Very nice neighbourhood; a lot of activities happening. There's a playground for children; a lot of people, children, also play in the street. It makes the neighbourhood lively. Very connected and active too. The community centres organise various events. (Male resident, De Tempel)*

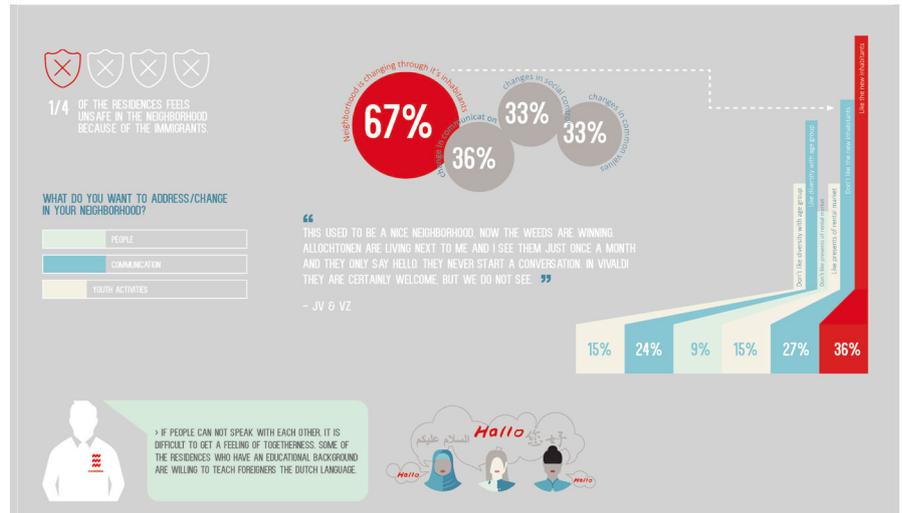
The number of residents of non-Western origin in Woensel-Noord is currently on the rise, and the interviewees were very much aware of this transition. A number of older residents saw a direct link between the changing demographics of the neighbourhood and its changing qualities. They often referred to the neighbourhood as it was in the past, recalling its spatial and social qualities:

*Used to be a nice neighbourhood, with the same type of people living there. Beautiful houses. Henri Dunantpark is lovely, especially with the grandchildren. (Female resident, Woenselse Heide)*

The negative connotations attached to non-native newcomers have led to a wide range of responses by local residents and associations, including a neighbourhood watch group and street festival

organisations. They have also pushed the municipality to identify challenges posed by demographic changes as a matter that needs to be addressed within the planning, social and economic domains.

The interviews indicated that new immigrants and changing demographics were key concerns for residents. Source: Eindhoven University of Technology, 2016–17



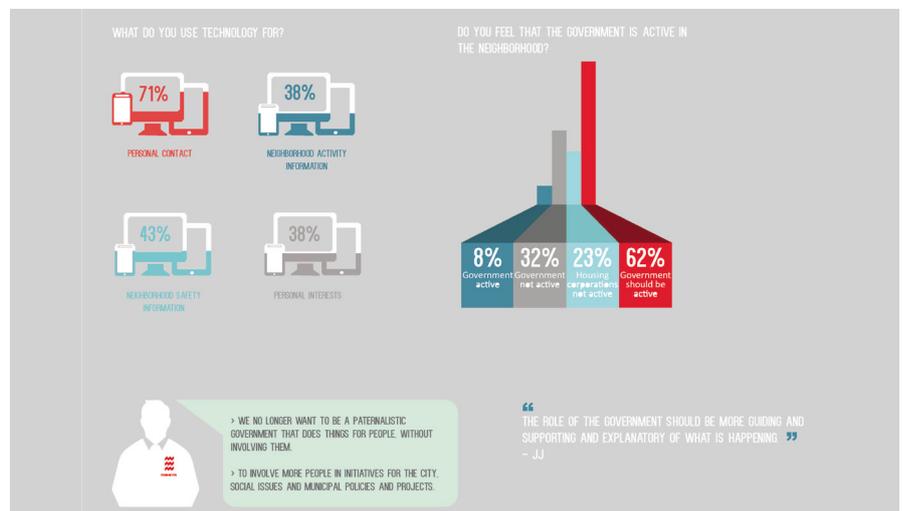
“ The neighbourhood suffers from pauperisation. People don't take care of their houses and front gardens any more. [She blames pauperisation partly on poor integration.] They just pave them. We should teach people to keep a garden and maintain their yards. (Female resident, De Tempel)

“ There are a lot of antisocial families. Foreigners mainly. It's due to the Woonbedrijf [housing corporation]'s policy of letting all these people into this neighbourhood that used to be so nice. Now we have youths hanging around, especially at night. I'm scared of who my new neighbours will be when the current ones leave. (Male resident, Woenselse Heide)

## Growing digital culture

“ We're connected to the local young people on a very personal level. We aim to engage them in projects in the neighbourhood and connect them to other institutions that can help them with specific issues. We use social media, like WhatsApp groups, to connect to young people for the events we organise. We aren't actively using other platforms. (Social worker, Buro Cement)

Residents' answers regarding their own use of technology and the role of the municipality in the neighbourhood. Source: Eindhoven University of Technology, 2016–17



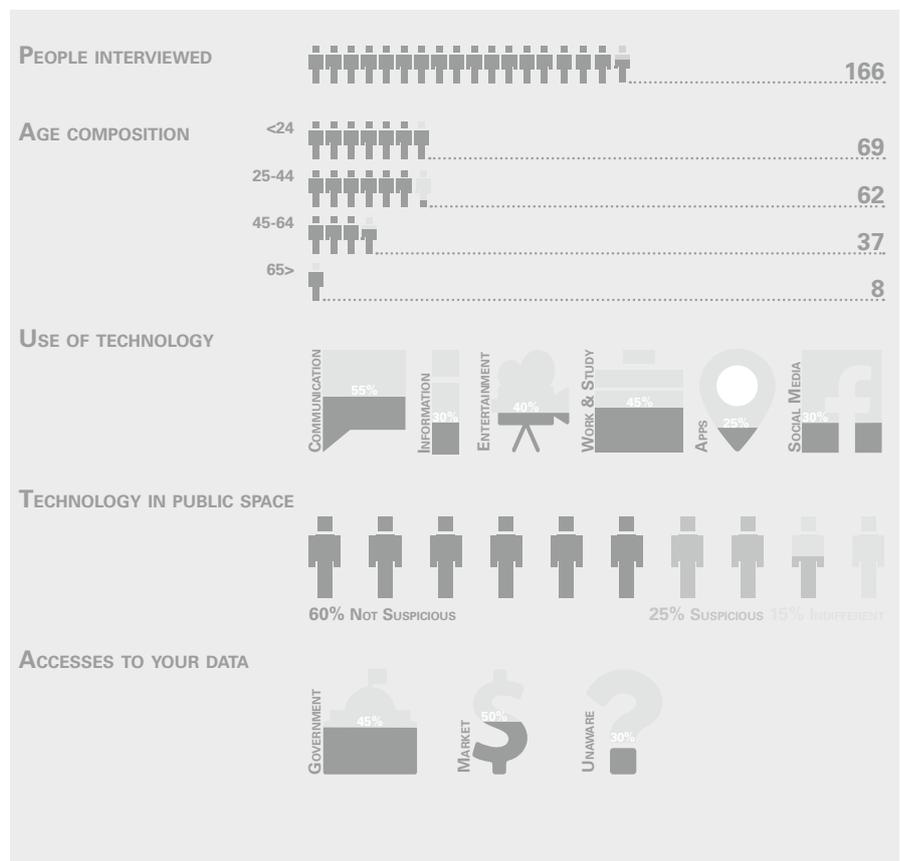


# Technology and public space: people at the centre?

One of the main findings from our initial data collection was that people and lived experience should be placed at the centre of the smart-city debate, especially when decisions are being made on urban futures. To explore this, we decided to run a graduate course in 2017 through which we could get a (partial) overview of the impact of contemporary technologies on public space. It focused on questioning the role of technology, its impact on architectural and urban design practices, and the involvement of the urban public in its future. After interviews with around 160 residents from four different areas, our general findings can be identified as follows.

## Interaction and awareness

In the four areas comprising the empirical work, students found that residents were satisfied with the spatial and social quality of their neighbourhood but raised concerns around issues such as social interaction between different demographics, awareness about the benefits of technology within public space, and the importance of interacting via technology to reduce barriers between users and non-users. The four researched neighbourhoods were demographically varied, and residents' differing preferences were reflected in their statements about willingness to share data for neighbourhood improvement, who should have access to this data (public or private institutions), the intended use of and exposure to technology for various demographics, and how technology should be used to improve public space. In response to these statements, the students proposed interventions including more fully and visibly involving the public in urban projects, creating public spaces



General findings from collected data on the relationship between public space and urban technology. Source: Eindhoven University of Technology, 2017

that encourage interaction between various social groups, and using augmented reality to showcase past and future changes in the neighbourhood. The overarching aim of the exercise was to answer the call from the DATAstudio for more data transparency and accountability around the use of technology in public spaces.

## Pushing for everyday needs and lived experiences in technological urban futures

Identifying cultural and ethical objections early, enabling democratic decision-making through participation, and refining the response increases the chance that technological innovations will be socially robust and fair.<sup>10</sup> In the current neo-liberal phase, it is important to involve not only professional expertise but also the personal experiences of inhabitants, which provide knowledge essential for urban planning. Over the years, there have been many studies on how to encourage public participation with open-mindedness and imagination.<sup>11</sup>

March and Ribera-Fumaz (2014),<sup>12</sup> Vanolo (2014),<sup>13</sup> and Kitchin (2014)<sup>14</sup> have criticised the lack of attention paid to social context when it comes to the application of technological (i.e., smart-city or smart-society) concepts within spatial policy. This is echoed in our findings for the city of Eindhoven. It comes from a technocratic, depoliticised view of smart urban policies resulting from a noncommittal, ambiguous definition, a lack of solid underpinnings and citizen participation, and the corporatisation of urban governance. There are also inherent concerns about the role of citizens and their position within the future of engagement and experimental practices.

The current challenge the city faces is probably a general one, often encountered in interdisciplinary fields: to integrate practices and to conduct a strong interdisciplinary debate so parties can learn from each other rather than to carry out the technocratic development of initiatives in parallel to a universe of sociological criticisms. The aim should be to identify unintentional gaps and to clarify methods and criteria used for urban experimentation intended to create a "smart society".

[10]

M. Gibbons, "Science's new social contract with society", *Nature* 402 (1999), 81–84.

[11]

J. Shorthose and N. Maycroft, *Understanding Creative Business: Values, Networks and Innovation* (Abingdon, Oxon.: Routledge, 2016).

[12]

H. March and R. Ribera-Fumaz, "Smart contradictions: The politics of making Barcelona a self-sufficient city", *European Urban and Regional Studies*, vol. 23 (2014).

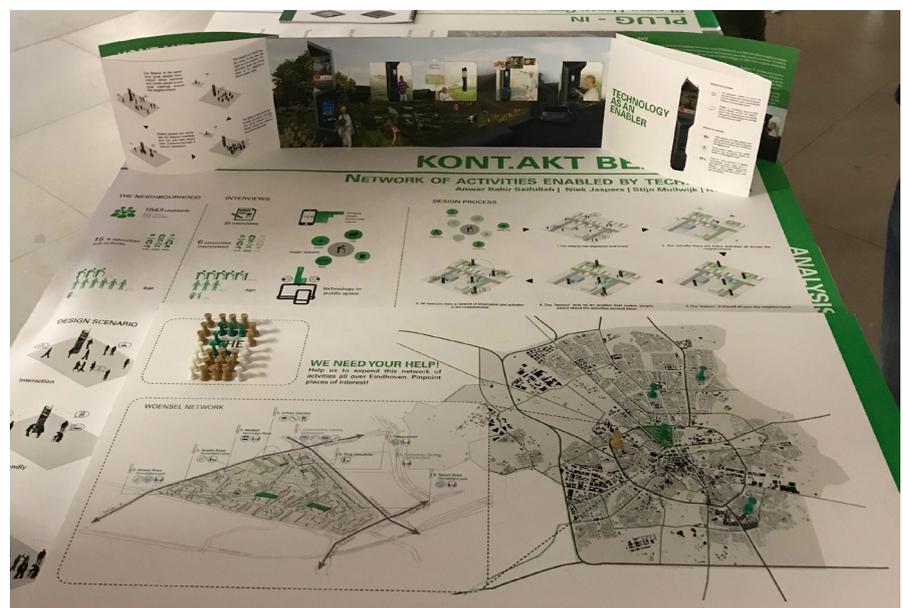
[13]

A. Vanolo (2014), "Whose smart city?", *openDemocracy*. Online. See: <http://www.opendemocracy.net/print/81108>, retrieved on 10 January 2016.

[14]

R. Kitchin, "The real-time city? Big data and smart urbanism", *GeoJournal* 79 (2014), 1–14.

The student project *Kon.takt Beacon* repurposes existing CityBeacons around Eindhoven, using technology as a means to connect various populations. The beacons link areas of the city by showcasing events taking place in different neighbourhoods. The project specifically focuses on an older demographic, who can use the beacons as a source of information and possible social contact. Photo: Sukanya Krishnamurthy





## Credits

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The DATAstudio was a joint programme of Het Nieuwe Instituut and the City of Eindhoven (2015–2017). It addressed the question of how we can build a smart society rather than just a smart city. In other words, how can we use data and technology to benefit citizens and neighbourhoods? The DATAstudio organised a range of activities, including workshops, lectures, school programmes and the *Embassy of Data*, always with the aim of understanding or supplementing collected data. We asked aloud how we should handle data and the associated technological possibilities. And we looked at how we might use them to build better neighbourhoods together. The *Embassy of Data* constituted the conclusion of the three-year DATAstudio project.

The DATAstudio was made possible in part by Albert Jan Kruiter (Instituut voor Publieke Waarden), Alwin Beernink (Park Strijp Beheer), Anab Jain (Superflux), Anne-Marijn Burgers, Architectuurcentrum Eindhoven, Beam it Up, Eindhoven Library, Boy Vereecken, Basisschool De Driesprong, Basisschool Reigerlaan, Basisschool Strijp Dorp, Bureau Cement, Chris Sigaloff (former director, Kennisland), Dan Hill (Arup Digital Studio), Design Academy Eindhoven (Daniëlle Arets, Paolo Patelli, Alice Twemlow), Designhuis, Dietmar Offenhuber (MIT Senseable City Lab / Northeastern University), Dorien Zandbergen, Drew Hemment (FutureEverything), Dutch Design Foundation / World Design Event, e52, Eerdbrand, Evelien Tonkens (University of Humanistic Studies), Fontys University of Applied Sciences, Gijs van de Sande, Jaromil (Dyne.org), Karim Benammar, Kennisland, Koehorst in 't Veld, Linnet Taylor (Tilburg University), Lola Lorite, Marcel Schouwenaar (The Incredible Machine), Marit Geluk, Mark van der Net (OSCity), Martijn de Lange (Utrecht University), Maurits Martijn (De Correspondent), Maya Indira Ganesh (Tactical Technology Collective), Merel Noorman (Maastricht University), Modebelofte, Montessorischool De Tempel, Nadine Roestenburg, Basisschool Louis Buelens, Pieter van Klaveren (SintLucas), Play the City, Priya Prakash (Design for Social Change), Richard Vijgen, Saskia Beer (TransformCity), Soenke Zehle (Hochschule der Bildenden Künste Saar), Sophie Rijswijk, Stichting Cultuur Eindhoven, Stratumseind Living Lab, STRP, 't Trefpunt, Eindhoven University of Technology (Caroline Hummels, Sukanya Krishnamurthy), Tsjalling Swierstra (Maastricht University), Usman Haque (Umbrellium), Woonbedrijf, and Wunderbaum.



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