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Peril on the Road to Utopia – Opportunities and Risks of Infusing Personal Data into the Smart City Ecosystem

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Abstract

Technology is not always living up to its promises. The idea of smart cities has been around for over ten years and is finally gaining traction. Urban data platforms are being adopted across Europe. However, smart cities still struggle to engage citizens. Also struggling is the internet. Many, including the founder of the World Wide Web, feel that it is broken: hijacked by big tech, trapping us into filter bubbles. How can the use of personal data remedy both of these struggles? With control over our personal data using personal data vaults, we could limit exposure to unwanted manipulation online. Next, by rendering our personal data for solving societal problems, we help improve smart city services. Finally, we can use insights from our integrated personal data to change our own behaviour and become truly smart citizens. Sounds too good to be true? Maybe. But more importantly, let us not repeat past mistakes and, this time, put in place measures to identify and resolve adverse effects. EU legislation and European values are foundational measures. In addition, by using scenario thinking, we propose two broad strategies for finding more measures. One is adopting a human-centric paradigm, rather than an economic paradigm. The other is adopting a contextual-values paradigm rather than an individualistic paradigm. We recommend that the use of

personal data should not be left to technocrats with an exploitative mind set. It should be handled by city designers that can indeed imagine utopia and craft a path towards it.

1.1 Introduction

In Greek mythology, Daedalus, a skilled inventor, wanted to help his son Icarus escape captivity. He built him wings made of feathers held together with wax. In his enthusiasm, Icarus does not heed his father's warning and flies too close to the sun. The wax melts, and Icarus falls to his death in the Aegean Sea.

This myth teaches us that technology can “give us wings” but that we need to handle it with care. We should be well aware of our own limitations and those of technology. But, most importantly, we should not fall prey to hubris, like Icarus did.

Our world is digitalising at a vast pace and, today, almost every aspect of our lives can be captured in data. Can these *personal data* be used to make the world a better place? And how do we know when we are “flying too close to the sun”? These are the questions that inspired this essay.

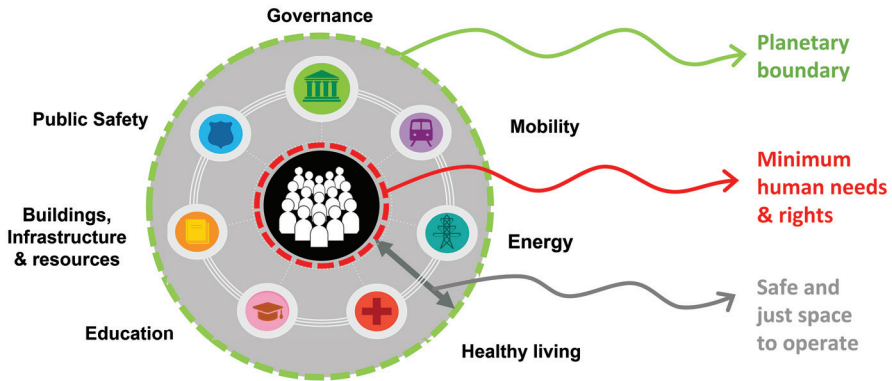
1.2 Broken Promises

Can you imagine a world without digital technologies? They are pervasive, make our lives and our world hyper-connected and hyper-intelligent, and blur the line between the physical and virtual. You do not have to be a Luddite to have real concerns about the expectations and the use of digital technologies by companies, governments, and citizens. Let us have a critical look at the idea of a smart city that promises to make our cities liveable, and at the Internet that would enable us all, promising a more equal and democratic society.

1.2.1 The smart city is finally coming of age

With the vast urbanisation at a global scale, many of today's ecological and socio-economic challenges concentrate in urban areas. The technology companies like IBM and Cisco that minted the term smart cities more than a decade ago, therefore, thought that cities were a good place to start solving some of our societal problems by using digital technology.

The first cities emerged only 6000 years ago in Mesopotamia. Cities rise and fall and their demise is caused by natural disaster, changing economics,



Inspired by IBM & Kate Raworth

Figure 1.1 A smart city as a bounded “system of systems”.

war, or environmental depletion. The latter was the case for Tikal, one of the great cities of Mayan civilisation. Back then and still today, not crossing planetary or ecological boundaries is essential. With (digital) technology, we hope to prevent looming demise on a much grander scale than Tikal. A smart city should help us stay within planetary boundaries, whilst catering to minimum human needs and fundamental human rights (see Figure 1.1).

There are at least two signs that the concept of smart cities is finally gaining traction. The first one is the fact that of the 80 cities surveyed over two years ago as part of the Horizon 2020 RUGGEDISED project,¹ 30% had an operational Urban Data Platform, and all of the rest were either in the exploration or planning phase. Urban Data Platforms are increasingly seen as the vital infrastructure that can help smart city pilots scale. Another sign is that the EU believes that the way to fight climate change is through a “Twin Transition”, i.e., the energy transition and the digital transition, together. This twin transition is also embedded in “The EU Smart Cities Mission” that aims to have 100 smart cities that will lead the way to climate neutrality.

Two findings from the RUGGEDISED study stand out. First, of all, trust was identified as one of the critical success factors for an Urban Data Platform. Trust in the technology and capabilities, trust in the organisations that control

¹ Sheombar, H., Van Oosterhout, M., Diran, D., Bagheri, S., & Popp Larsen, C. (2020, November). Governance, Trust and Smart City Business Models: the Path to Maturity for Urban Data Platforms (RUGGEDISED – 731198). EUROPEAN COMMISSION. https://ruggedised.eu/fileadmin/repository/Publications/RUGGEDISED-D6.6-Governance-Trust-SmartCity_business_Models-EUR-FINAL-2020.11.13.pdf

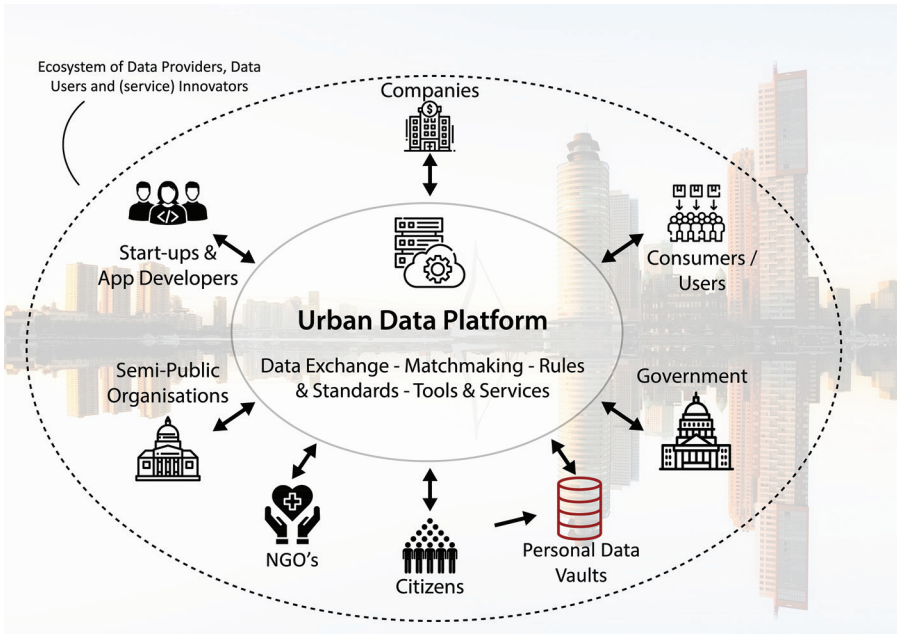


Figure 1.2 The Urban Data Platform, personal data vaults and the smart city ecosystem (based on RUGGEDISED).

the platform, and, most importantly, mutual trust between the public and private sector involved in financing, owning, and managing the platform. The study also showed that cities find it really hard to engage citizens: everyone says that it is important; hardly anyone is actually doing it. This is not really surprising because the smart cities approach to date was skewed towards smart infrastructure, whilst a smart citizen is an integral part of the smart city.

Not only are smart cities about the twin transition, they are also characterised by “twin speed”. As Townsend recalls in his book about smart cities, it took a year to build the congestion charging system for the city of London in 2002, while it took policy- and law-makers almost 40 years of deliberation to decide.² This difference in speed between technology and policy may explain the slow progression of the smart cities. Another explanation is the low involvement of citizens. Using citizen’s personal data by means of personal data vaults (PDVs) (see Figure 1.2) might be a way to improve citizen engagement in the smart city ecosystem.

² Townsend, A. M. (2013). *Smart cities: Big data, civic hackers, and the quest for a new utopia*. WW Norton & Company.

1.2.2 Is the internet broken?

In March 1989, Tim Berners-Lee, a CERN employee at the time, wrote a proposal for what would become the World Wide Web. He proposed a web of “hypertext documents” that could be viewed by “browsers”, making it easier for CERN researchers to find and share their research outcomes.³ Soon after its inception, the World Wide Web became the most important service on the internet.⁴ Berners-Lee’s original vision for the web was a medium for secure and decentralised exchange of data.⁵ He hoped it would become an open and free environment with egalitarianism at its core.

Fast forward 30 years, and this dream has been shattered. In 2019, Berners-Lee called out that “Platform power is crushing the net” and has allowed people to “weaponise the web at scale” referring to the fake news crisis.⁶ He also stated that the current web has been captured by corporations and that it has become a set of “walled digital gardens”.

Another pioneer of the early days of the internet, Marleen Stikker also declares that the internet is broken. Being a thought leader on the digital society, she shares Berners-Lee’s view that the promise of the internet has been wasted and perverted. She uses the analogy of green vs. brown fields, where green represents the virgin unspoiled earth and brown represents the divested and used up planet. The current online environment has become this brown field earth. An environment plagued by uncertainty about your own data, spying and hacking. It is a web where data black boxes, AI, and the illusion of objective data create serious dangers and disadvantages for users.⁷

In her 2019 book “Surveillance Capitalism”, Shoshana Zuboff sounds the alarm bells that the power of big digital technology companies has become

³ Maddux, C. D., & Johnson, D. L. (1997). The World Wide Web: History, Cultural Context, and a Manual for Developers of Educational Information-Based Web Sites. *Educational Technology*, 37(5), 5–12. <http://www.jstor.org/stable/44428413>

⁴ The World Wide Web: History, Cultural Context, and a Manual for Developers of Educational Information-Based Web Sites on JSTOR

⁵ Berners-Lee, T. (2018, 22 October). One Small Step for the Web. Inrupt. <https://www.inrupt.com/one-small-step-for-the-web> Accessed, 25/07/2022

⁶ Lomas, N. (2019, 12 March). Marking 30 years of the web, Tim Berners-Lee calls for a joint fight against disinformation. TechCrunch. Marking 30 years of the web, Tim Berners-Lee calls for a joint fight against disinformation | TechCrunch. Accessed, 26/07/2022

⁷ Stikker, M. (2020, July). Open The Black Box. <https://waag.org/sites/waag/files/2020-07/Marleen%20Stikker-Essay-VNG%20Smart%20Society%20Cases%20Open%20the%20black%20box.pdf> Accessed, 23/07/2022

a threat to our democracies, sovereignty, and ultimately to our humanity.⁸ The extractive business model of “Big Other”, as she calls these companies, turns human experience into profit, by feeding (advertising) engines of behavioural modification. Not only have humans been reduced to sensors, but they are also being actuated at a massive scale. This business model has for too long been left unchecked because the governments and law-makers have failed to understand the digital age and provide countervailing power in the form of legislation.

1.3 Promising Responses

The “broken state” of the internet, the slow take-off of smart cities with their low level of citizen engagement, is being remedied. Various EU legislations will curb the power of “big tech” on the internet, and personal data vaults may become the trusted tools that citizens need to engage.

1.3.1 European legislation

In Europe, 90% of its citizens believe that data should be uniformly protected across its member states.⁹ To this end, the EU has created several institutions, rules, and laws, of which GDPR and the Data Act are particularly relevant to the use of personal data.

GDPR: The General Data Protection Regulation introduced in 2016 regulates the processing of personal data and its flows. It strengthens the fundamental rights of EU citizens by making clear the rules for private and public actors in the unified digital market. This single EU law also removes the current fragmented systems of different member states. National data protection authorities are hosted in each EU member state, to monitor GDPR adherence.

DGA and the Data Act: The goal of this legislation is to create an adaptable data ecosystem. The Data Governance Act (DGA) strengthens the single market’s governance mechanism and establishes a framework to facilitate general and sector-specific data-sharing. The newly proposed Data Act addresses the actual rights on, access to, and use of data. These acts make it easier to harvest and use personal data. Particularly, by complementing the

⁸ Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Public Affairs.

⁹ The European Commission. (2022). *Data protection in the EU*. European Commission. https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en Accessed, 27/07/2022

right to data portability of GDPR, making it easy to switch between providers or request that your data is given to your personal data-vault provider.¹⁰

DSA and the DMA: The Digital Markets Act and the Digital Services Act are two laws that limit the unbridled power of digital technology companies, particularly their “winner takes all” platform business models. As personal data will be shared through platforms, these laws may build the trust that citizens need to have in the systems and organisations behind these platforms.

1.3.2 Taking back control with data vaults

Another reaction to the broken promise is the development of means to give individuals control of their personal data. One of the originators of this idea is Tim Berners-Lee. He co-founded the start-up Inrupt, in order to allow governments and organisations to give control of data back to individuals, by means of solid personal data vaults (PDVs) and the associated platform.^{11,12}

These PDVs are individually controlled safe data stores and key to privacy. The PDV separates the collection and storage of personal data streams from their dissemination. Instead of people directly exchanging their personal data streams with services, they use secure containers that only the user can fully access. With various forms of access control lists, the PDV permits the selective sharing of subsets of this information. This way, the data owner can actively participate in influencing data sharing decisions rather than depending on third parties. Ease of use and understandable data tools are key requirements.¹³

The European Union has also recognised the potential of this approach and has created an initiative to give citizens control over their personal data, namely the DataVaults initiative. The goal is to mobilise a movement that will advocate the removal of the barriers that currently prevent a citizen from sharing their data more broadly, whilst staying in control of the process.

¹⁰ Considerati. (2021, 12 July). European Data Act & Data Governance Act: the kids with game changing potential. <https://www.considerati.com/publications/eu-data-act-data-governance-act.html> Accessed, 01/08/2022

¹¹ Solid. (z.d.). <https://solidproject.org/origin> Accessed, 01/08/2022

¹² Solanki, M. R. (2020). SOLID: A Web System to Restore the Control of Users' Personal Data. *Advances in Intelligent Systems and Computing*, 257–267. https://doi.org/10.1007/978-981-15-8289-9_24

¹³ Mun, M., Hao, S., Mishra, N., Shilton, K., Burke, J., Estrin, D., Hansen, M., & Govindan, R. (2010). Personal data vaults. *Proceedings of the 6th International Conference on - Co-NEXT '10*. <https://doi.org/10.1145/1921168.1921191>

This will help the drive towards smart cities and galvanise the adoption of urban data platforms. The availability of personal data would expand as a result, stimulating the data economy and improving the state of the data ecosystems. All players can reuse data once individuals have given their approval.¹⁴

1.4 Think!

The internet did not pan out as the founder of the World Wide Web as early internet pioneers envisioned. Governments were late in pushing back against the domination by “big tech”. Governments and companies alike find it hard to entice citizens to engage within the smart city. Yet, even with this *shaky track record*, we are enthusiastically paving the way for the next big, data driven, innovation: personal data vaults in the smart city.

Maybe this time, with the experiences of the smart city and the internet in mind, we can try to think a bit more before we succumb to our increasingly insatiable hunger for data. Far from being Luddites, we feel that taking a long view and assessing both the risks and opportunities of using personal data is no luxury. Berners-Lee had a good reason for wanting to build personal data vaults: to give control back to us. It was not necessarily to make it easy for smart cities to “hoard data”, especially not personal data or for fuelling the data economy that wants to turn all pockets of unused data into gold.

Trying to think ahead is difficult but necessary, especially in these times of *profound change and great uncertainty*. In his 2020 new year’s speech, Antonio Guterres of the United Nations described our times of uncertainty as the four horsemen of the apocalypse: geopolitical tensions, the climate crisis, global mistrust, and the dark side of technology.¹⁵ According to the Edelman Trust Barometer,¹⁶ distrust seems to have become society’s default emotion. Media and the government are viewed as divisive forces, with less than half of the respondents trusting government leaders (42%) and journalists (46%).

¹⁴ DataVaults. (2022). Smart Cities Marketplace – Citizen Control of Personal Data Initiative. DataVaults I EU. <https://www.datavaults.eu/material/liaisons-relevant-links/citizen-control-of-personal-data-initiative-citizen-focus-action-cluster/#about-citizencontrol-initiative> Accessed, 01/08/2022

¹⁵ United Nations. (2020, 27 January). UN chief outlines solutions to defeat ‘four horsemen’ threatening our global future. UN News. <https://news.un.org/en/story/2020/01/1055791> Accessed, 27/07/2022

¹⁶ Edelman. (2022). 2022 EDELMAN TRUST BAROMETER. https://www.edelman.com/sites/g/files/aatuss191/files/2022-01/2022%20Edelman%20Trust%20Barometer%20FINAL_Jan25.pdf

Trust in government is lower than trust in companies in 23 out of the 28 global countries surveyed, and in all seven of the European countries surveyed, with social media companies as a noteworthy exception.

In these times of profound change, we must make an effort to curb the possible “dark side of technology”. By using scenario thinking, we aim to increase awareness of the early warning signs of crossing over to the dark side. But first we take a closer look at what it means to have a personal data vault.

1.5 Personal Data Vaults Matter

The personal data vault might become the most important tool in our journey as a citizen. Balancing the benefits against the pervasiveness of this tool should be a conscious decision, subjected to continuous evaluation.

1.5.1 Capturing and influencing the citizen journey

In the digital age, individuals generate data from the cradle to the grave. Every aspect of our life, including our emotions, is being digitised and, if possible, quantified. It starts when we are born and stops when we die (see Figure 1.3). All this data becomes food for algorithms and machine learning. For instance, from our educational data and social background, one can predict the likelihood of study success. Study advisors can use this to intervene, hopefully with our best interest at heart. Our healthcare records

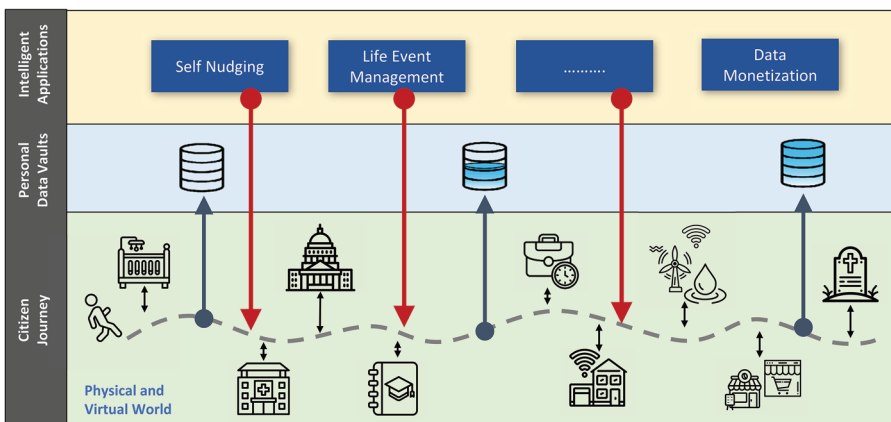


Figure 1.3 A citizen journey reveals points of sensing and actuation using personal data vaults.

in combination with our location data give public health institutions insights into the environmental and social impact on health. And as we all know by now, our browsing, shopping, and social media behavioural data are the “oil” that fuels the big tech advertising machines.

So, along our life journey, data is not only generated and harvested but also used to steer our journey into a particular direction. And this *steering or actuation* is happening at a massive scale, using all kinds of smart devices, in particular the smart phone. The idea behind EU legislation is that we know which data is being collected about us and that we have the right to summon this data and store this in our personal data vault. We can then decide who we want to share this data with and by whom we want to be steered during our journey. Can we?

1.5.2 Who will help us?

Can we expect citizens to be savvy enough to know who to share their data with, and under which conditions? Are we not on the path of increasing the *digital divide*? Or will there be benevolent parties, like specialty data trusts or stewards, that will help us to manage our data and, to some extent, thus our lives? Would we trust the government to this on our behalf?

The Flemish Data Utility Company¹⁷ is a very interesting government initiative focusing on responsible and secure data sharing to increase citizens’ trust in exchanging data. At the same time, the initiative aims to stimulate the Belgian economy by facilitating data discovery and interchange and by fostering collaboration. They hope to act as an impartial third party, a catalyst for creative projects, and an engine for societal and economic success. An “advanced and cutting-edge platform” of personal data vaults will be created. Flanders is the first government to use the data vaults of Tim Berners-Lee’s Solid project, in collaboration with Imec and Ghent University.

Imagine, for a moment, the alignment of this initiative with the citizen journey. At birth, the government not only gives you a social security number and a digital identity, but also a personal data vault. Throughout your life, the government will proactively advise what policies apply to you at life-events, i.e., major changes in your administrative status. Undoubtedly, this will spark the discussion, like with Urban Data Platforms, whether data vaults should be *public or private* infrastructure. The default PDV would be provided by the

¹⁷ Het Vlaams Datanutsbedrijf. (z.d.). The Flemish Data Utility Company. Digitaal Vlaanderen. <https://www.vlaanderen.be/digitaal-vlaanderen/het-vlaams-datanutsbedrijf/the-flemish-data-utility-company> Accessed, 01/08/2022

government, but the baby’s parents are free to choose another provider. Why would citizens want to participate in this data sharing?

1.5.3 Personal benefits of the PDV

We would like to emphasise three benefits of personal data vaults: the protection against online manipulation, the enhancement of city services, and the possibility to change individual behaviour.

Lower online manipulation:

The core idea is that data vaults can be used to self-determine who uses your data and for what purpose so that you are aware that a particular service is tailored to your profile, which, when done right, is also a reflection of your needs. Most of us consent to the terms of use of apps without reading them and without really questioning how our data is being used. The research by Pew shows that about half of Facebook users are not comfortable with how they are categorised.¹⁸ With a PDV, we still cannot control how we are categorised, but we can control what data is used to categorise us.

Better city services:

The Horizon 2020 project “Data Vaults” showcases a wide range of examples of how personal data can be used to improve city services, e.g., healthcare data sharing, smart home energy data sharing, and using personal data to improve services in the tourism industry. Data can be used at an aggregated and at an individual level. At the individual level, services can be personalised. But caution is advised. Personal data driven policies and services in the social domain have been criticised for leading to drive containment and control, rather than improve services.¹⁹

Cities find it hard to engage citizens. Interestingly, when asked about how citizens could be better engaged in the usage of an Urban Data Platform, in the RUGGEDISED UDP study, representatives from both the public and private sectors, whilst disagreeing on other aspects of citizen engagement, gave a high priority to “monetisation” of personal data (see Figure 1.4). Apparently in the mind of practitioners and policy-makers, citizens need to be incentivised to help improve city services.

¹⁸ Hitlin, P. and Rainie, L., Pew Research Center (2019), Facebook Algorithms and Personal Data. Facebook Algorithms and Personal Data | Pew Research Center

¹⁹ Van Zoonen, L., (2020) Data governance and citizen participation in the digital welfare state. Data & Policy, vol.2 no. E10, pp. 1 – 16.

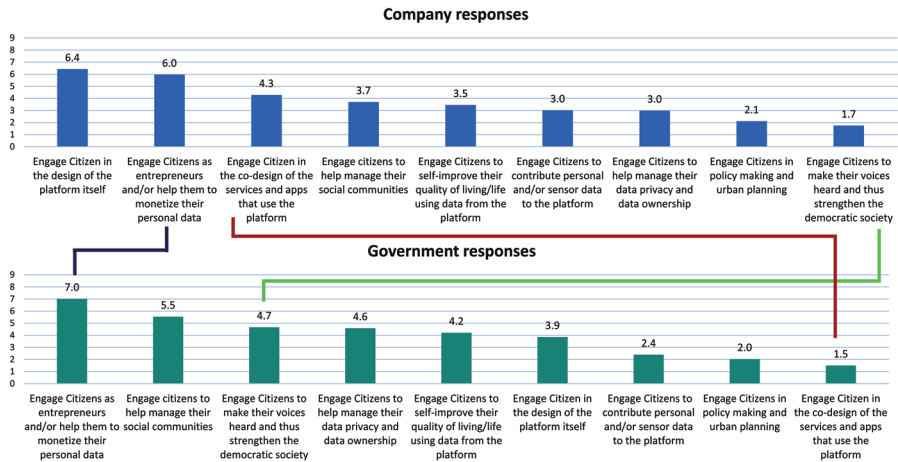


Figure 1.4 Reasons for companies and companies to engage citizens differ (source: RUGGEDISED study).

Impact on self-nudging:

With personal data comes the opportunity of self-nudging. Smart devices such as the smart phone are with us 24 × 7 and are the ultimate “nudging” device. As we have seen, along the customer journey, there are many potential points of intervention, and in the case of self-nudging, we decide what those points are. To this end, we need to have a smart personal digital assistant (PDA), which we must program to meet our needs and will help us get closer to an ideal virtuous life.

Do these benefits of the PDV outweigh its pervasiveness and potential intrusiveness? That is the question. Not getting this balance right may drive us toward dystopia, even when we have the best intentions of making the world a better place.

1.6 Utopia or Dystopia? A Scenario Analysis

The use of personal data will undoubtedly have both upsides and downsides. We want to consider the downside upfront. By taking a long view using the scenario thinking technique, we aim to understand how things could work out. The purpose of this forward looking thought experiment is to heighten the awareness of all the many pitfalls, as we pursue personal data utopia. The kind of pitfalls that we failed to envision in the case of the internet and the smart city. What could be the outcomes of infusing personal data into the smart city ecosystem? And what measures are needed to mitigate the risks?

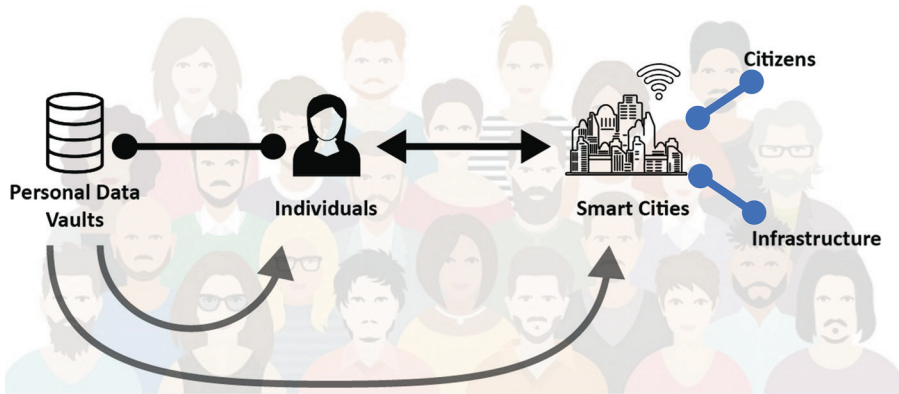


Figure 1.5 What is the impact of personal data on individuals and on the city?

1.6.1 Scenario drivers

Both the idea and technology of personal data sovereignty are in their infancy, and their impact is hard to predict. Therefore, we will paint a dark and a sunny picture for the impact on the individual and on the citizen. We ask two questions (see Figure 1.5):

1. What are the potential positive and negative impacts of personal data (vaults) on the individual?
2. What are the potential positive and negative impacts of personal data (vaults) on the city?



These two drivers will subsequently be used to construct four scenarios in the next section. Table 1.1 gives a high-level summary of these scenario drivers.

First driver: Impact on the individual:

The positive impact of personal data on the individual is *empowerment*. Data can be used to alter one's behaviour change for good, e.g., through healthy living, and prudent financial management. Service providers in both the public and private sectors can use personal data to personalise services leading to greater customer and citizen experiences. A well-functioning and trusted government may even proactively help citizens manage their life events, e.g., going to work, picking up children, etc. And last but not least, citizens can get value from their personal data, e.g., in health trials, or consumer research.

The negative impact of personal data is *subjugation*. People are reduced to their digital profiles and become cogs in a supposedly intelligent machine. If personal data is mindlessly shared with service providers, we will still be

Table 1.1 Highlights of both the negative and the positive impact on the individual and the city.

			
Impact PDV on the individual			
State of mind	Subjugated, manipulated loss of autonomy, feeling excluded	Empowered, free, full of potential, positive	
Behaviour	Irresponsible, ignorant, irreverent, not caring	Virtuous, conscious of societal challenges, self-controlling (PDA)	
Financial	Not able to get value from data, exacerbating the digital divide	Able to monetize personal data, improve employability	
Impact PDV on the Smart City			
Economic	Too tightly coupled, not capable, no room for exploration	Efficient, well functioning, clean, good services, adaptive, vibrant	
Political	Big brother-ish, intrusive, authoritarian	Engaged citizens, democratic	
Collective, Community, Social	Segmented, profiling, un-equal, excluding, discriminating	Inclusive, acceptable level of inequality, coherent	

manipulated, coaxed into echo chambers, and will risk losing our privacy; only this time, with our explicit consent. Surveillance capitalism will be fortified and we may end up in different digital castes depending on our digital savviness. We may even (temporarily) lose some of our autonomy, if governments deem it necessary that we render our personal data, all nicely wrapped into a single box; e.g., in case of emergencies or other reasons that serve the “greater good”. In the Netherlands, reluctant psychologists and psychiatrists are mandated by healthcare authorities to share patient data.²⁰

Second driver: Impact on the city (i.e., public and private actors in the city): The positive impact of personal data on the city will lead to a *Vibrant City*. This city is well run because of improved service provision based on aggregated personal data. For example, monitoring the movement of citizens using their GPS data enables better operational and tactical design of mobility infrastructure and services. The city is more efficient and resources become available to invest in the quality of life in the city. Improved social policies,

²⁰ Blijker, J. D. (2022b, July 21). Toezichthouder verzamelt ongevraagd info over 800.000 ggz-patiënten. Trouw. Accessed 8 August 2022, <https://www.trouw.nl/binnenland/toezichthouder-verzamelt-ongevraagd-info-over-800-000-ggz-patienten~b68a0bef/?-referrer=https%3A%2F%2Fwww.google.com%2F>

using citizen data, may lead to more engaged citizens and less inequality, which are good for democracy.

A city negatively impacted by personal data will become a *corrosive city*. Based on aggregated data and an efficiency mind set, the city becomes overly efficient, not leaving any room for exploration and diversity. Because not everyone can benefit equally from the use of personal data, we widen the digital divide, increase inequality, and lose sight on part of the population. People that do not fit into mould become outliers, are excluded, and may ultimately disengage. Bias of either institutions or the collective, manipulation, and abuse by “big brother on steroids” is among the biggest risks.

1.6.2 Four scenarios

If we combine the positive and negative impacts on cities and individuals, we get four scenarios as depicted in Figure 1.6. In Utopia, personal data is used for the betterment of the city as well as the citizens. In Dystopia, the government and companies will use our personal data to constrain us, while many individuals will not be able to leverage the data to their benefit and disengage.

The four scenarios can be described as follows. Please keep in mind that this is merely illustrative and no attempt is made to be academically precise. The purpose of this exercise is to ignite our collective imagination and create an *early warning system* for the abuse of personal data (vaults).

Unacceptable stagnation: Even though individual citizens thrive, e.g., by monetising their data, they will not accept the constraining living circumstances of the city. Excessive profiling will divide the city, physically and politically. The ecosystem will fail to develop good city services, and the political climate and tight government control squelch entrepreneurship.

Utopia: Both the city and the individual flourish from the use of personal data. People are empowered and engaged. There is private and individual initiative to tackle societal problems, e.g., climate change through innovation and behavioural change. Great city services attract people to the city and turn our cities into thriving hives of innovation.

Dystopia: This city much resembles Oceania in George Orwell’s novel “1984”. Through the use of personal data, both companies and the government have a firm grip on citizens. People share their data mindlessly, exposing themselves to manipulation. Ultimately, they feel exploited and will stop trying to live a virtuous life. In today’s Dystopia, Orwell’s “Big Brother” and Zuboff’s “Big Other” are good friends.

Unsustainable subjugation: Government and companies are able to extract value from personal data. With personalised services, the government

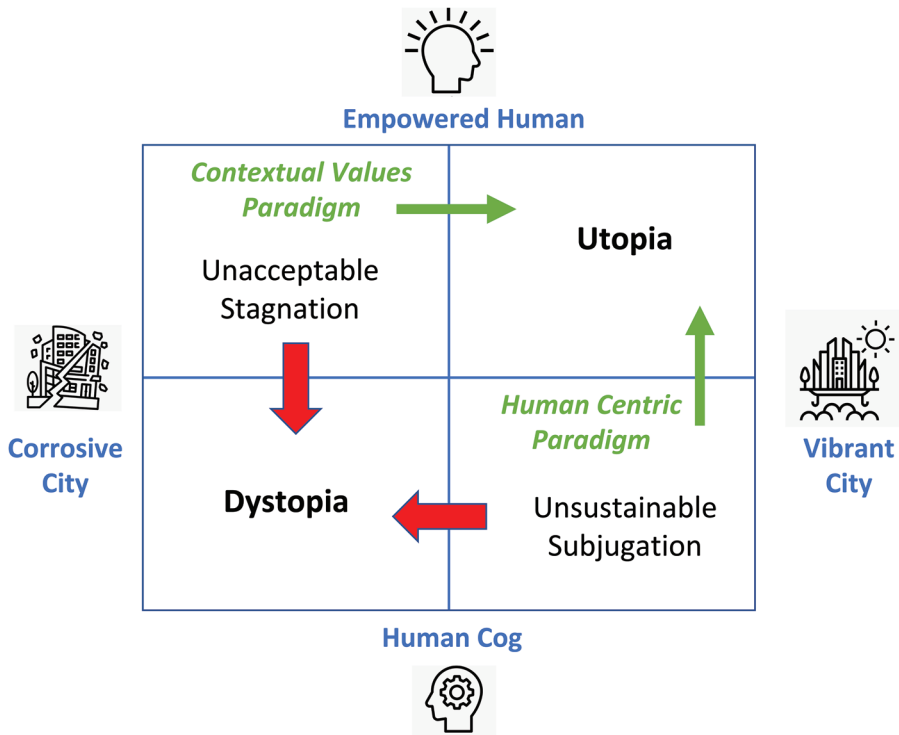


Figure 1.6 The future impact of personal data (vaults) in terms of four scenarios.

is even capable of engaging citizens into democratic processes. However, citizens feel objectified and are just “cogs in the machine”. They will lack initiative and ultimately, without good and smart citizens, the well-organised and liveable city will deteriorate into decline.

1.6.3 Strategies to reach Utopia

The scenarios “unacceptable stagnation” and “unsustainable subjugation” are inherently unstable. It is very unlikely that empowered individuals will remain so in a corrosive city or that a city will remain efficient if the majority of its citizens feel alienated. Therefore, in our thought experiment, these scenarios either progress toward “utopia” or regress into “dystopia”. From thermodynamics, we know that a system left to its own devices will deteriorate into chaos. So, to prevent dystopia from happening, we need to have *active strategies* to push these two scenarios towards “utopia”. On a high level, we see two strategies (see Figure 1.6).

A “*human centric*” paradigm ensures that we have the citizen at the top of our mind when devising policies and designing our cities. A human-centric paradigm asks that we do not focus on the data economy only, i.e., seeing data as a means to generate economic value. Abandoning an economy-first paradigm is not easy but necessary. To get to Utopia, the twin transition should actually be a “triple transition”, making the social transition as important as the energy and digital transitions.

With a “*contextual values*” paradigm, we expect the government and the rest of the city ecosystem to create an environment for individuals to thrive. Doing so requires us to move our attention away from the individual per se, to the context in which that individual can thrive. A context that abides by our European values. A context that allows for exploration and creativity, which stimulates diversity and by doing so creates a city where all individuals, today and tomorrow, can fulfil their full potential and play their part in solving today’s challenges.

With these strategies in mind, we will not only focus on the nuts, bolts, and benefits, but we will also be mindful of possible adverse effects or blatant misuses of personal data. At least, that is our idea: preventing us all, unlike Icarus, from “flying too close to the sun”.

1.7 Personal Data: “Fragile, Handle with Care”

Personal data vaults can be a force for good, both in terms of the empowerment of the individual and in terms of making our cities a better place to live. However, from the very outset, we should be mindful of what can go wrong when we deliberately capture, integrate, and unleash sensitive personal data into smart city ecosystems. So we do not repeat the mistakes of smart cities not being able to engage citizens or of the internet being hijacked by Big Tech. Thereto, at least three topics must be on our personal data and smart cities “radar”.

Human dignity: At the base of human rights is human dignity. With rapid “datafication” of our lives, we run the risk of being reduced to our profiles, and as such, we become artefacts. Attacks on our inherent dignity include being objectified, treated as unequal, being invisible, and not having a voice.²¹ It is not hard to imagine how the pervasive use of personal data might harm human dignity.

²¹ Leidner, D.E., & Tona, O. (2021). The care theory of dignity amid personal data digitization. MISQ 45(1), pp 342–370.

Digital divide: There are two levels to the digital divide: one level is internet access and the other level is the skills people possess to benefit from digitalisation.²² Not all citizens are equally tech-savvy or have the digital literacy to participate in the smart city. Research has shown that more in general socio-demographic characteristics also impact the use of digital technology.²³ By adding yet another digital instrument like the PDV, we are only exacerbating an already existing gap. Those that do not (know how to) share will feel “invisible”, overwhelmed, and left behind. History teaches us that it is bad.

Algorithmic Bias: When we talk about using personal data, we are not talking about data only but also about the use of AI. The more data that is out there, the more AI will proliferate. All data will at one point in time be fed to algorithms and machine learning. When we rely too much on AI, or we can no longer explain how AI works, we run the risk of losing control. Bias, lack of transparency, and lack of accountability are a few of the issues that are widely recognised.²⁴

The promise of smart cities with personal data is the promise of a human-centric smart city as described, e.g., by UN Habitat. It is the promise of a city with smart effective infrastructure as well as smart engaged citizens. A city where those that cannot cope with the speed, complexity and uncertainties of the digital age are helped, so they do not become prey for undemocratic forces. It is a city where the entire ecosystem, all actors in the quadruple helix, play their part in solving the grand challenges of our time. This is no small promise.

To fulfil this promise, we will need at least the following:

- the right privacy enhancing technology that respects human rights and ensures responsible AI;
- the right governance to implement the strategies that mitigate the “regression to dystopia”;
- the right leadership, ethics, and values from citizens and institutions to obliterate the digital divide and safeguard human rights;

²² Hargittai, E. (2002). Second-Level Digital Divide: Differences in People’s Online Skills. *First Monday*, 7(4). <https://doi.org/10.5210/fm.v7i4.942>

²³ Shin, S. Y., Kim, D., & Chun, S. A. (2021). Digital Divide in Advanced Smart City Innovations. *Sustainability*, 13(7), 4076. <https://doi.org/10.3390/su13074076>

²⁴ Bird, E., Fox-Skelly, J., Jenner, N., Larbey, R., Weitkamp, E., & Winfield, A. (2020, March). The ethics of artificial intelligence: Issues and initiatives. European Union. <https://doi.org/10.2861/6644>

- the right research to fully understand digitalisation and the behavioural, economic, and political dynamics of our augmented humanity.

This is a lot to ask from ourselves as citizens and our institutions. It is fair to assume that we should not leave the use of personal data to the engineers and technocrats that have so far focused on the smart infrastructure part of the city. We need designers and practitioners who understand the opportunities and risks and who are capable of crafting and guarding a “path to Utopia”. Because with the combination of personal data and other data, the active engagement of citizens willing to change their behaviour, and the current legal and financial stimuli from governments, the potential solutions for a better world are limited only by our imagination.

