



Smart Cities: A Key to a Progressive Europe

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Abstract

This paper has served as input for the FEPS SAMAK report 'A Progressive Approach to Digital Tech: Taking Charge of Europe's Digital Future'. It takes a critical look at the prevailing mode of governing digital technology at the level of the city, where the debate today is dominated by a narrow focus on efficiency pushed by global vendors of smart city technology. The paper argues that a progressive approach to smart city projects should ensure transparency, accountability, and participation, and makes a number of recommendations as to how to achieve that. A crucial tool for public authorities will be the use of public procurement to enforce these standards. Finally, the paper concludes with practical advice to public authorities, to ensure their smart city projects lead to more democratic and equitable outcomes.



FOUNDATION FOR EUROPEAN
PROGRESSIVE STUDIES
FONDATION EUROPÉENNE
D'ÉTUDES PROGRESSISTES



**FEPS - SAMAK
Policy Paper**

February
2020



| | |
|------------------------------------------------------------------------|-----------|
| EXECUTIVE SUMMARY | 3 |
| INTRODUCTION | 3 |
| 1. SETTING THE SCENE | 4 |
| 2. WHAT MAKES A SMART CITY? | 6 |
| 3. NARRATIVES MATTER | 8 |
| 4. A CURRENT SNAPSHOT | 10 |
| 5. SMART CITIES – PRIORITY AREAS FOR ENGAGEMENT | 11 |
| 6. POLICY RECOMMENDATIONS | 15 |
| 7. AN ANALYTICAL FRAMEWORK FOR SMART CITIES | 18 |
| ANNEX: ALTERNATIVE MODES OF GOVERNING TECHNOLOGICAL DEVELOPMENT | 22 |
| REFERENCES | 25 |
| ABOUT THE AUTHOR | 26 |



EXECUTIVE SUMMARY

Smart cities promise more efficient resource management, which is also the narrative promoted heavily by Smart City technology vendors. But as data-driven systems they also pose significant challenges to digital and human rights as well as governance, transparency and accountability structures.

Smart Cities are a focal point where a range of issues intersect, from geopolitics to local governance and participation to civil rights. Yet, the current discourse is too narrow to consider all these implications, which poses a serious risk to cities and a healthy local democracy.

Instead, we see an uneven playing field — a mismatch in resources and technological expertise — between global smart city technology vendors on one side and city governments on the other.

In this paper, we explore a broader framing to have a meaningful debate around Smart Cities that allows us to pursue the changes offered by Smart City initiatives while protecting citizens from unintended harm. Finally, we propose to build Smart City initiatives not around efficiency, but around transparency, accountability, and participation.

INTRODUCTION

One of the **key areas where new digital technologies and infrastructures are being deployed is at the level of the city**, and here important decisions about technological use are being made, with important ramifications. At the same time, cities are powerful focal point for political participation. This places cities right at the intersection where the impact of the big technology drivers overlap with an active and diverse citizenship, making cities a preferred place to discuss progressive policy options for this space.

Connected technologies, especially algorithmic decision-making, are increasingly embedded in all parts of our lives—including at the city level, and often without our knowledge or meaningful consent. Currently, these technologies and machine decision-making systems tend to be “black boxes”, i.e. the way they function is not transparent or fully understandable even by experts.

Therefore, this paper focuses on what is known as the “Smart City”. As a complement to this paper, we propose an analytical framework to map and categories or benchmark Smart City developments from a progressive point of view, hence allowing to take stock of the situation in Europe, and to track developments.

This document roughly follows a three-part structure: A **normative part** that sketches the big picture around Smart City developments and provides a framing for thinking about the implications of Smart City developments. A **descriptive part** discusses the current trends, actors, opportunities and risks in the Smart City space. Finally, we suggest **policy recommendations** that incorporate European progressive values into Smart City thinking. Throughout the document, **real world examples** are used to highlight and demonstrate key points.

In this document we highlight a number of challenges that we see in the Smart City debate, and in many current implementations of Smart City projects. We do not list these with a “Smart City ban” in mind, but quite the opposite: We believe that Smart Cities can promote citizen empowerment and participation and have beneficial effects across all stakeholder groups as well as — possibly — the



environment. However, to get to these positive outcomes we need a different approach from the one that has historically dominated this space: We need a rethinking of governance and economic models, to prioritise multi-stakeholder approaches and put citizens — not vendors — first. And we need to open up the *black boxes* that Smart Cities are today.

1. SETTING THE SCENE

“Technology is neither good nor bad; nor is it neutral”

— *Kranzberg’s First Law of Technology*

When Dr. Melvin Kranzberg, a professor of the history of technology, phrased what hence have become known as *Kranzberg’s Six Laws of Technology*, he posited that “technology is neither good nor bad; nor is it neutral.” This statement is highly relevant again today as we discuss the development, deployment, and public use of Smart City technologies. All too often, technologists frame technologies as neutral arbiters when really all technology, and especially all algorithmic decision making, is deeply political.

Context matters

Smart City technology today often is shaped by its—and its creators’—origins. Usually, the Smart City technologies we see spreading in metropolises and municipalities around the globe are based on the technologies and the logic powering global supply chain management; communications networks; and data mining and analysis. In these original areas, the same technologies now offered on the Smart City marketplace are largely non-controversial: In industrial contexts, efficiency is key while societal concerns like privacy play a minor part. But when considering the qualities that make for good, desirable urban living, the same characteristics that are desirable in areas like global supply chain management (like efficiency, speed, cost savings) are just a few of the many characteristics to take into account — and often they are problematic. Other characteristics like quality of life, privacy, and economic opportunity are as important, if not more so. Technical developments frequently have environmental, social, and human consequences that go far beyond the immediate purposes of the technical devices and practices themselves, and the same technology can have quite different results when introduced into different contexts or under different circumstances.” (Sacacas 2011) In practice, this can mean that sensors introduced to monitor environmental data could possibly be modified to serve surveillance purposes, or simply that a technology has unintended and unforeseen consequences. In other words, it’s not just the technology that matters: *Context matters*.

Data-driven systems can reinforce power imbalances

A growing body of research¹ shows that data-driven systems reinforce power imbalances: Smart Cities manifest them. Smart City technologies in public space concern 100% of the population. After all, in public space, there is no opt-out. Every citizen and most visitors are impacted by Smart City technologies and their effects.

¹ For their analysis of inherent issues of automated machine decision making systems and how they frequently reinforce systemic biases, see for example *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor* (Virginia Eubanks 2018) and *Weapons of Math Destruction* (Cathy O’Neil 2016) or the many media reports about problematic machine learning systems based on faulty training data.



Furthermore, more and more research into machine decision-making (Whittaker/Crawford 2018) shows that the benefits are not necessarily spread equally across all stakeholders: Many of the benefits of machine decision-making, and hence also of Smart City technology, tend to accrue with those who already do well, whereas the costs and externalities are often felt most intensely by minorities and other vulnerable groups and communities.

The AI Now Report (AI Now 2018) identifies as key issues of the growing influence of algorithmic decision-making in recent years — which apply directly also to Smart Cities — the “increasing government use of automated decision systems that directly impact individuals and communities *without established accountability structures.*” This is directly applicable to smart city technology as well. Also, “unregulated and unmonitored *forms of AI experimentation on human populations,*” and “the *limits of technological solutions* to problems of fairness, bias, and discrimination” (highlights by the author).

Smart City solutions are often implemented or piloted under the banner of efficiency and cost savings, yet poorly tested, understood, or designed regarding unintended consequences. When (AI systems or smart city systems) “make errors and bad decisions, the ability to question, contest, and remedy these is often difficult or impossible.” (ibidem).

Hence, it is essential that before deploying any Smart City technology outside a controlled lab environment, we need to fully understand the implications and trade-offs, the benefits and costs for all stakeholder groups. Large-scale “learning in the wild”, as preferred in the Silicon Valley logic of iterative software development, simply does not offer sufficient protections against damages done to vulnerable groups and other unintended consequences.

There is no “opt-out” in public space

For the purpose of discussing Smart Cities, the importance of this statement cannot be overstated. The ways technologies are developed, embedded and used reflect certain values and involve important trade-offs. What are acceptable “behaviours”, or characteristics, of technologies and their vendors in industrial contexts are not necessarily acceptable behaviours in the context of connected urban living. After all, *no citizen can opt-out of public space.*

In fact, we posit that the characteristics that make for “good” industrial services is almost necessarily only a small subset of characteristics that make for desirable Smart City technology — yet because of their origin they make up a disproportionate amount of the promises that Smart City vendors make to municipalities. Rendering services to citizens is a core tenet of the state, and in an area like Smart Cities that’s too new for us to fully understand all its implications, feedback loops between administration and vendors need to be tight and backed by strong (not just technological but also legal/regulatory) safeguards.

Infrastructure vs disruptive innovation

In our thinking about Smart Cities, we furthermore need to be deliberate about what our key infrastructures are: These are areas that need to work reliably and should not be experimented with lightly. They need to be as resilient as possible. On the other hand, there are areas where we might be more open for experimentation and iterative innovation. Key infrastructures are likely less well suited for the kind of Smart City projects that work under the assumption of iterative innovation but instead



need to be robust and resilient from day one. This should be taken into account when we discuss policy for the Smart City (development, urban planning, etc.).

Balance between public and private

The first generation of Smart Cities was rooted solidly in a neo-liberal, market-driven frame. However, to move forward we need to find a balance between public and private. Public accountability is best guaranteed through public ownership, and where that's not preferred or an option, other safeguards are needed to ensure public interest isn't negatively impacted. For the context of public space, the focus should be on the public good and the commons — which also happens to increase democratic legitimacy as well as resilience in the face of rapid urbanisation, climate change, and other, not-yet-knowable challenges.

Furthermore, **transparency, accountability and oversight** should not be an afterthought. They are key characteristics to be incorporated in every step of the way from the early inception phase.

2. WHAT MAKES A SMART CITY?

First, a look at what encompasses a Smart City. **We propose a broad, inclusionary understanding of the Smart City that allows us to model for positive societal impact holistically** as opposed to focusing more narrowly on predominantly technological aspects.

Since the potential *impacts* of algorithmic decision-making on citizens are virtually the same whichever technological underpinning powers the decisions, for the purpose of this paper we use the terms “algorithmic decision making” (ADM), “artificial intelligence (AI)” and “machine learning (ML)” interchangeably. In doing so we follow the definition for algorithmic decision making as laid out by Vieth and Wagner (2017) and translated from the original German by VZBV (2019): „Algorithmic decision-making refers to the entire process from data collection, data analysis and evaluation and interpretation of the results through to the use of the results to deduct a decision or recommendation for a decision.“

Concretely we propose to take into account all aspects of **data-driven systems** with touch points to the physical realities of public space: The physical infrastructure plus a data layer. Smart City technologies include, but are not limited to:

- Sensors and actuators in public space;
- Data-driven systems including artificial intelligence (AI), machine decision making, machine learning, etc. insofar as they are used in public space;
- Internet of Things (IoT) as used in a public space or governmental use context;
- Big data and analytics systems if used in public space;
- Key infrastructure (if data-driven or internet connected);
- Public service delivery (if there is an aspect of data collection, processing, or output involving public space).



Smart Cities have emergent properties²

More importantly, while the list above offers a broad understanding of the technological infrastructure that drives a Smart City, such a list of technologies can never suffice: Because of the way that these technologies are connected by software, and the way these complex systems tend to interact and allow for wholly new, often unforeseen new services built on top of them, the emerging picture is often more complex. Smart Cities are determined by the *impact* these technologies have in ways that such a list would never meaningfully communicate.

To illustrate the wide range of Smart City systems that are relevant to take into account, this includes (but is not limited to!) sub-domains such as smart lighting, smart grids, tracking systems for people movement, infrastructure for autonomous mobility, 5G networks, air quality sensors, police body cams, CCTV cameras with facial recognition and other automated image analysis, and others, many of which do not yet exist. To a degree, even digital platforms that enable collective decision-making (like Decidim, Barcelona) and public service delivery should be included here on a case-by-case basis.

For example, publicly available CCTV camera feeds can now easily be connected to facial recognition systems to allow for wide-spread surveillance and to track people through the city. The means and skills required to do so are now trivial, as the New York Times demonstrated in a trial³:

“To demonstrate how easy it is to track people without their knowledge, we collected public images of people who worked near Bryant Park (available on their employers’ websites, for the most part) and ran one day of footage through Amazon’s commercial facial recognition service. Our system detected 2,750 faces from a nine-hour period (not necessarily unique people, since a person could be captured in multiple frames). It returned several possible identifications, including one frame matched to a head shot of Richard Madonna, a professor at the SUNY College of Optometry, with an 89 percent similarity score. The total cost: about \$60.”

By combining various tools and methods that were not developed to be used together, something *qualitatively new* emerges. And while privacy activists have warned of scenarios like this, the ease and low cost required to perform something invasive as this is highly counter-intuitive. It is a stark reminder of the emergent properties of complex connected data-driven systems. And not all of these unforeseen capabilities are negative: We are likely to see just as many positive and equally unforeseen examples.

This shows that in order to discuss opportunities, risks, and impact of a Smart City — its real meaning — we necessarily need an understanding of the Smart City that takes into account **societal impact** (on an individual and a collective level) as a focal point, i.e. it has a human-centric focus as opposed to a technology-centric focus — even if it means redrawing the line that marks where the term “Smart City” begins or ends. And it means optimising our policies for positive outcomes while preventing, or defending against, potential negatives.

² The concept of *emergent properties* is used in many fields like biology and other disciplines. It denotes properties that a collection has, but which the individual parts of the collection do not have. For example, a heart is made out of cells: While any one cell do not pump any blood, the whole heart does. Emergent properties occur in complex systems like ecosystems, artificial intelligence, or cities.

³ See the New York Times Interactive on facial recognition (16 April 2019) available online at <https://www.nytimes.com/interactive/2019/04/16/opinion/facial-recognition-new-york-city.html>.



A city should not be run like a commercial social media platform

Barcelona's CTO Francesca Bria illustrates eloquently what happens if we don't take such a broad view. It would mean that our cities are run like commercial social media platforms, by global tech companies in an environment that favours centralisation, means a loss of autonomy, and undermines trust in local governance structures (Bria 2018):

"The heavily centralised, platform-knows-best model of the smart city that has conquered many localities in the past decade is a perfect testament to this predicament. It promises so much in terms of involving citizens in policy-making, democratising access to important infrastructure – and yet such plans often yield only more centralised institutions, transferring power to Big Tech rather than the citizens and making public decision-making even less transparent than before."

It's worth pointing out that for all the talk about Smart Cities and technologies, it is easy to lose track of the key stakeholders that cities should serve: Its citizens. If a Smart City project doesn't notably improve citizens' lives, then it should obviously not be implemented. Furthermore, if the city and its infrastructure might end up less resilient or requiring more energy with the introduction of any Smart City project, it might be worth holding off on it, too. Oftentimes, workers are the first to be exposed most directly to Smart City technology, as they are more likely to be embedded in the efficiency-optimising systems that characterise public transport or urban logistics, so looking at the impact on workers can be instructive.

Only a broad, inclusive definition helps look at the technologies and their impact holistically and discuss their potential benefits & risks meaningfully.

Specifically, we urge policy makers and other decision makers to consider emergent properties of data-driven systems: Individually, technological systems might seem harmless, but in combination they could have unexpected and much larger impacts. In public space it is essential to thoroughly consider possible unintended consequences.

3. NARRATIVES MATTER

As we have established before, the dominant paradigm for Smart City developments is founded on a framework of market-driven efficiency — powered by the logic of global supply chains and big data analytics. Data-driven management, so the sales pitch by Smart City vendors goes, means neutral, objective management. However, data is never neutral but encodes power dynamics. The framing of neutral data and the market as key priority is not neutral, though. It implies a political statement that the market is the highest good, and societal functions (democracy, equality, public infrastructure thinking) are secondary to the market.

We believe that this framing is myopic, if not misleading, and recommend rejecting it wholesale.

After all, efficiency is not a city's most important characteristic. You manage what you measure. Measuring mostly physical aspects (movement, air quality) and consumption (energy consumption, retail) means optimising within a much-too-narrow framework. Most characteristics that are relevant to urban living aren't measurable with these sensors, so they would not be managed (opportunity, quality of life, serendipity, economic opportunity). There are harder to measure but no less important.



Cities perform key societal functions, and as such should not be dominated by the logic of the market. Instead, we should identify policy priorities and goals and optimise for those. Not least among those other priorities should be sustainability and environmental protection: Smart Cities offer a unique chance to improve cities' energy efficiency. This angle also harmonises with the European Commission's Horizon Europe commitment to fund the mission area „climate-neutral and smart cities“⁴, and with the European Parliament's declaration of a climate emergency.⁵

Language shapes thinking, and narratives matter. The language of “market first” is ideological. It creates false choices, and sets wrong expectations through its technology framing, which leads to wrong priorities. We should be deliberate about which narrative, which vision of future and smart cities we pick and work towards. Promoting progressive policies for Smart Cities requires a progressive framing and narrative.

Critical voices are coalescing around high-visibility projects

A more critical debate around Smart Cities is coalescing around high-visibility projects like the *Sidewalk Labs* development in Toronto, where a vocal opposition has been forming against what is seen there as a problematic intervention by a sister company of Google. The risks they identify range from a lack of transparency and oversight to the validity of a “big data” data collection or surveillance model for public space. As the director of the Canadian Civil Liberties Association (CCLA) Brenda McPhail puts it: "Comprehensive data collection online is harming individuals and groups (...) It is affecting everything from the way individuals are targeted with products to how they are targeted to influence their votes. So we question why on earth we think it is a good idea to import that big data model into our cities' streets."⁶

The criticism goes to a more fundamental level, too: What role should private companies play in developing and running what are otherwise considered public spaces? As Columbia University professor Saskia Sassen summarises⁷: “In principle, having a private corporation doing public work is fine and a lot of the time it works out. But when you are dealing with them installing a complex system, then chances are they will also do the next steps - thereby further privatising the work.” Part of this debate is also the lack of public oversight over data that might be collected and/or processed by private entities.

Over the last few months, we have seen a number of better alternative narratives proposed, including the **Vision of a Shared Digital Europe**⁸, which proposes to replace the European Union's Digital Single Market framing completely and instead focus on **four foundational principles** (Empower public institutions; Enable self-determination; Decentralise infrastructure; Cultivate the commons) as well as the **Cities Coalition for Digital Rights**⁹ is a network of progressive city CTO offices that coordinate to better protect digital rights of their citizens. Again, these are just some starting points for establishing

⁴ See the EU Commission's website at https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme/mission-area-climate-neutral-and-smart-cities_en (last accessed 28. Nov 2019).

⁵ See the EU Parliament's press release (28. Nov 2019) <https://www.europarl.europa.eu/news/en/press-room/20191121IPR67110/the-european-parliament-declares-climate-emergency>.

⁶ See the BBC's reporting about Sidewalks Labs, „The Google city that has angered Toronto“, BBC, 18 May 2019. Available online at <https://www.bbc.com/news/technology-47815344>.

⁷ Ibidem.

⁸ See <https://shared-digital.eu/vision/>.

⁹ See <https://citiesfordigitalrights.org/>.



alternative narratives. As a first step, the most important thing is to reject the currently dominant framing.

4. A CURRENT SNAPSHOT

There is a wide range within the Smart City field: Some projects are small and iterative, others massive and disruptive. Some are at the prototype stage while others are very mature and advanced.

It's important to keep this in mind, and also to be aware that it is inherent in today's dominant approaches to Smart City that once a solution is considered successful in one place it can usually easily be replicated, or "rolled out" in industry parlance, to other locations. In other words, while there are many smaller scale prototypes of Smart City projects, there is a strong tendency towards a *winner takes all* logic just like we have seen it across the world of online services (one dominant search engine, one dominant social network, etc.). Hence, there is a trend towards a *one size fits all* model: While many pilot projects might appear at first glance to be a local, custom-built option made for local administrations and citizens, usually they are just minimally customised versions of bigger platforms and tools that are designed to be rolled out globally.

We argue that a *one size fits all* approach is not appropriate for urban development.

The origins of current Smart Cities

For any meaningful analysis of Smart Cities as they are debated today, a look at the origin of the underlying technologies and business models is very instructive.

Most significant commercial Smart City companies are global enterprises with backgrounds in global supply chain management, communications networks; and data mining and analysis. A recent ranking of dominant Smart City companies conducted by an industry research firm called Compass Intelligence lists these 15 companies as the dominant players in the industry¹⁰: General Electric, Intel, AT&T, Microsoft, Amazon (AWS), Honeywell, IBM, Google, Cisco, Dell, Ericsson, Qualcomm, Huawei, Verizon, Schneider Electric.

In the same report, a researcher from that research firm also speaks openly about the financial incentives as well as the goals of an all-encompassing integration that these companies are striving for (highlights by the author): "By 2020, the global smart cities market will climb to \$1.4 trillion, with the industry *rapidly evolving to integrate technology into infrastructure, mobility, surveillance and security, lighting and access control*, and other community-oriented areas."

Surveillance is not a side effect, but core to this integrated, data-driven business model. It follows that privacy is not just impacted negatively *as a side effect* of Smart City projects, but it is often threatened by the very core of these projects — where strong privacy protections are seen as a business risk to minimise and mitigate.

¹⁰ „Top smart companies named in new index“. Smartcitiesworld.com. Blog post, 8 March 2018. Available online at <https://www.smartcitiesworld.net/news/news/top-smart-companies-named-in-new-index-2683>.



Smart Cities are dominated by non-European companies

It is of note that only few big actors in the Smart City industry are of European origin. They do exist, depending on which analytical model is used. The ranking above lists Schneider Electric, a French multinational. Bosch, a German enterprise, is a strong contender, and there are others. However, the field has long been dominated by US companies, and recently seen strong global competition from Chinese firms. (A trend amplified especially in emerging markets through China's Road and Belt initiative.¹¹)

Drawbacks of the current landscape: Non-European technology to solve complex societal issues, deployed at rapid pace without meaningful oversight

The facts that a) the Smart City market is dominated by technology giants that are b) mostly based outside of Europe has clear drawbacks for European citizens.

1. **Technology can never solve complex societal challenges.** The industrial origin of these technologies leads to a strong focus on *technological solutions* rather than multi-stakeholder approaches or similar ways to tackle complex societal challenges. We need societal, political approaches to get to better outcomes, and this means a focus on governance, participation, and oversights rather than technological "quick fixes".
2. **The regional origin of these multi-nationals threatens European sovereignty.** It prevents, or at least complicates, meaningful oversight, governance, and protection of citizens' rights.
3. **Pilot projects lack meaningful oversight.** Smart City projects are currently launched at rapid pace, often under the framing of *pilot projects*. This leads to quicker approval of these projects, at the cost of meaningful oversight and societal consensus-building.¹²

5. SMART CITIES – PRIORITY AREAS FOR ENGAGEMENT

The tech vendors still dominate the Smart City discourse, but there is also a growing body of research and initiatives that can guide further inquiry, and that have started to establish alternative narratives.

Alternative narratives

Over the last year or two we have seen a small first wave of critical research and proposed approaches to guiding the development and use of emerging technologies that are directly relevant for the Smart City space. Many of these research projects focus nominally on artificial intelligence, but many of their insights and findings can directly be brought to bear on Smart Cities — especially where machine decision-making is concerned. The structural issues, challenges and opportunities are largely the same. Please note that this is *not* a comprehensive list of Smart City critiques, of which there exists a small

¹¹ For an overview, see "Mapping China's Tech Giants", a recent mapping effort about China's technology companies' global expansion by the Australian Strategic Policy Institute (ASPI) from May 2019. Available online at <https://chinatechmap.aspi.org.au/#/map/f6-Smart%20cities>.

¹² AI Now Institute (Reisman, Schultz et al 2018) highlight the risk of how transparency can be sidestepped through pro bono pilots: "Not all automated decision systems will come to an agency via standard procurement processes. There are many examples of systems acquired through in-kind donations, federal grants, and funding from private foundations. The data analysis company Palantir, for example, gave their analytics platform to the New Orleans Police Department pro bono, thus making it less visible to the New Orleans City Council."



but well-established canon by now. The following initiatives go beyond critique by providing either approaches to solving the underlying structural issues, or they aim to provide some framework for developing the methods.

European AI Ethics Guidelines: The European High Level Group on AI's ethics guidelines are considered a strong document that aims to provide guard rails against for the development and deployment of AI. At the guideline's core are three requirements for AI, namely that "(1) it should be lawful, complying with all applicable laws and regulations (2) it should be ethical, ensuring adherence to ethical principles and values and (3) it should be robust, both from a technical and social perspective since, even with good intentions, AI systems can cause unintentional harm."¹³ Note that these guidelines were criticised by one of the co-authors as "ethics washed", i.e. critically softened after industry pressure.¹⁴

Opinion of the Data Ethics Commission: Set up by Germany's Federal Government, this group of mainly academics, together with some representatives of the public sector, German industry, and consumer organisations, was mandated to provide guidelines for automated decision-making systems. The Commission published its recommendations (Datenethikkommission 2019) with the goal of "upholding the ethical and legal principles based on our liberal democracy throughout the entire process of developing and applying artificial intelligence" as well as „promoting the ability of individuals and society as a whole to understand and reflect critically in the information society.“ The group takes a broad view, and their recommendations do not just cover AI, but the ethical issues surrounding algorithmic systems and data in a broad sense, and were well received.

AI Now 2018 Report and Algorithmic Accountability Policy Toolkit: The New York based AI Now Institute has been providing world leading research into the societal impact of artificial intelligence including an overview and many examples of how systemic bias in societal systems tends to be represented in the data sets that are used to train AI, and hence the AI learns how to reinforce those same biases and power imbalances. Their outstanding and hugely influential work touches on issues of gender and race, data-based discrimination as well as transparency.¹⁵

Finland's national AI strategy: Most countries have launched or are developing AI strategies. However, Finland's AI strategy is worth singling out for their highly unusual approach. Where the US is the market leader in commercialising AI and China is becoming the second global AI superpower, Finland — with its hugely fewer available resources like funding, research talent, and training data — takes a totally different, innovative approach. In an attempt to become a market leader in *applied* AI research and development, 1% of the Finnish population is to learn a basic understanding of the way AI works, allowing a more diverse group of citizens to think about possible ways and areas to apply AI.¹⁶

¹³ Ethics Guidelines for Trustworthy AI. European Commission, April 2019. Available online at <https://ec.europa.eu/futurium/en/ai-alliance-consultation>.

¹⁴ See interviews with WIRED (EN) and Tagesspiegel (DE) on the occasion of the publication of the report at <https://www.wired.com/story/how-tech-companies-shaping-rules-governing-ai/> and <https://www.tagesspiegel.de/politik/eu-ethikrichtlinien-fuer-kuenstliche-intelligenz-nehmt-der-industrie-die-ethik-weg/24195388.html>.

¹⁵ All of AI Now's reports are available online at <https://ainowinstitute.org/reports.html>.

¹⁶ See Politico's summary of Finland's AI policy strategy at <https://www.politico.eu/article/finland-one-percent-ai-artificial-intelligence-courses-learning-training>.



From narrative to principles

The city as an organisational unit represents a broad cross-section across society. As such, any attempt to pick just one or two areas of policy to focus on would be futile. Instead, we propose to look at the “**participation infrastructure**” level: The foundation upon which citizens and policy makers can build, and without which none of the other areas would be likely to thrive. Concretely, this means **focusing on how aspects of a smart city could foster participation, civic engagement, digital rights and economic opportunity for local stakeholders; and appropriate models of governance (incl. procurement) and accountability for the technology and for the data involved.**

The city is a first hook for real citizen influence over the digital transformation.¹⁷

This leads us to high-level principles that can guide all operationalisation:

- **Transparency:** All aspects of a Smart City project should be as transparent as possible, from procurement processes to the algorithms employed in public space.
- **Accountability:** Municipalities as well as private sector partners need to be accountable. This also extends towards establishing meaningful channels for redress in case there are negative or unforeseen impacts on citizens.
- **Participation:** Participation mechanisms should be part of all Smart City projects, right from the beginning and throughout the deployment and use phase. Participation is what gives the projects legitimacy and trust, and what makes sure the project serves all stakeholder groups equally. This should be done through formalised processes involving external subject matter experts as well as environmental, labour, human rights groups, etc.
- **Citizens’ rights:** All Smart City projects should serve citizens first. Citizens’ (including workers’) rights need to be respected and/or strengthened. If citizens’ rights are not as strong as or stronger compared to if the project didn’t happen, the project should not proceed. Right include but aren’t limited to human rights, digital rights, equality and non-discrimination, privacy and data protection.

On the more operational level, these high-level principles translate to the following guidelines (please note that this is not a comprehensive list but a starting point):

1. **Establishing a foundation of “participation infrastructure”:** Digital technology should enable cities to be hubs for real local democracy (participation, civic engagement) and economic opportunity while protecting citizens’ rights. This requires

¹⁷ It may not be realistic for every citizen to engage in this debate directly, but there are mechanisms to involve citizens meaningfully beyond traditional participation and representation mechanisms. From Stockholm’s citizen panels and Barcelona’s successes with the digital participation platform *Decidim*, to building in meaningful ways for citizens to seek redress when faced with the consequences of algorithmic decision-making. The city needs to involve citizens at all stages in order for the (digital) city to work well for them, and for the city to be legitimised and trusted. Balancing the interplay between traditional representation, civic engagement, and external experts is crucial even if it may require different approaches in different places.



- a. Prioritising technologies that are decentralised, transparent, interoperable, participatory;
 - b. Deliberating about ownership models of the platforms used for public service delivery (public, cooperatives, PPP, etc.);
 - c. Ensuring appropriate governance for municipal data sets (specifically Open Data approaches favouring civic tech, local business, non-profits, and community groups);
 - d. Protecting citizen rights in the digital space, including and especially at the intersection of digital and physical, which is particularly relevant for the smart city. The focus of the protection of data rights should go beyond individual data ownership and instead encompass collective data rights (Tisné 2018).
- 2. Appropriate governance:** Only when there are appropriate governance models for (for example) digital public service delivery platforms and the data they collect, use, and produce, as well as for the algorithms controlling this data, can citizens truly engage and participate and exercise their rights.
- a. **Increased scrutiny and stronger governance mechanism need to start at the pilot project stage.** Once a company has installed the first Smart City project — something as benign as a connected version of public street lights, or free Wi-Fi in the local subway — they have essentially established a foothold in that municipality: The vendor lock-in has begun. Often, this happens without a debate about even the most basic debate about privacy protections, privacy policies, or data policies.
- 3. Citizens in control:** As machine learning (“artificial intelligence”) and big data become more and more ubiquitous models for data-driven decision making and urban management, these technologies must be under control of citizens and local governments rather than remote corporations. Concretely this means
- a. **Transparent algorithms:** Insight into how certain algorithms function (mandatory transparency) so they can be steered towards positive outcomes for individuals and society: social justice, human rights, and sustainability;
 - b. **Remedies against algorithmic bias:** Active and ongoing evaluation, management and interventions so automated decision-making systems can be secured against misuse and algorithmic bias: Data is never neutral, the data sets used for training machine learning algorithms are always biased and those biases need to be actively countered and remedied. This includes recognising that bias is always there, and disproportionately impacts minorities and vulnerable groups (women, poor, disadvantaged, minorities);
 - c. **Values-based public procurement:** A powerful point of leverage is a reform of public procurement guidelines that give heightened importance to important values (privacy-friendly, sustainable, with the possibility for active local governance; no black box algorithms), and specific data policies that favour access to local services securing important social and/or public values.



Privacy and data protection — even a right to anonymity in public space — are essential for a working democracy. **Whenever privacy is threatened by Smart City projects, the priority *must* be on protecting citizens' rights over the vendors' business interests.**

In other words: **We propose an approach prioritising collective rights and societal needs.** We propose this specifically as opposed to a technocratic model, i.e. separating means from ends, let a select class/machine decide for efficiency reasons. This also dovetails with the German Federal Data Ethics Commissions (Datenethikkommission 2019) recommendations for the development of artificial intelligence, which translates well to the context of smart cities: They recommend focusing strategic considerations “on **creating appropriate framework conditions to promote the ability of individuals and society as a whole to understand and reflect critically** in the information society.”

These principles are also mirrored in the Declaration of the Cities Coalition for Digital Rights (2018), a coalition of cities that aims to share best practices, learn from each other's challenges and successes, and coordinate common initiatives and actions. Since its inception the group has become a defacto standard setter in citizen-led Smart City planning.

Following these principles and creating these foundational conditions is a necessary first step towards a progressive approach to Smart Cities and responsible use of technology for societal good. These are the starting points towards Smart Cities and a digital agenda that is based on, and reinforces, equality, freedom and solidarity.

6. POLICY RECOMMENDATIONS

After policy making for new technologies had long been problematic due to the extremely fast development cycles especially in the online/software world, more recently we have seen a number of approaches and proposals to draft policies that are proactive and technology-agnostic, in other words: more open-ended and hence more resilient. The literature and research in this space offers complementary and consistent advice to draw on for the Smart City context, but also for new and data-driven technological developments beyond the Smart City — after all, the lines between Smart City technologies, Internet of Things (IoT) and artificial intelligence (AI)/algorithmic decision-making tend to be blurry at best.

Drawing on Doteveryone's report Regulating for Responsible Technology¹⁸, insights from the **Barcelona Model of Smart Cities** (as laid out by Morozov/Bria 2018), as well as **top-level guidelines to put citizens before vendors** in the Smart City that my co-author Prof. Dr. Christoph Bieber and I developed¹⁹ for the **Federal German Government**, the following approaches offer clear pathways to improving the regulation of new internet technologies:

- **Building capacity inside the public sector** to match the tech sector;

¹⁸ See <https://doteveryone.org.uk> for the organisation or <https://doteveryone.org.uk/wp-content/uploads/2018/09/Regulation-Paper-Final-Version-Google-Docs-compressed.pdf> for the report (PDF).

¹⁹ Executive summary in English available at <https://thewavingcat.com/2016/04/smart-cities-in-the-21c-humanity-on-the-move-the-transformative-power-of-cities/>.



- **Develop a long-term vision for the role of technology**, and define metrics and policies that integrate **social, environmental, ethical and innovative** measures for **safeguarding the employment, social and citizen rights**;²⁰
- **Expand horizon scanning and foresight** activities;
- **Strengthen collaboration between regulators**;
- **Empower the public to understand the impacts** of new technologies;
- **Empower citizens to be “data sovereign”** and hence to be well-equipped for participation and problem solving when facing possible technological problems of digital urban infrastructure;
- **Develop mechanisms to seek redress** for issues that fall in the gaps between existing regulatory mechanisms.

Being intentional about the long-term vision and reflecting this vision in the procurement process offers a powerful point of leverage. **Barcelona has introduced** a number of pioneering and innovative processes summarised under the banner of **Sustainable Public Procurement** that integrate broad societal aspects and is also explicit about its goal to foster a circular and sustainable local economy that promotes the economic activity of local medium-sized, small and micro enterprises and, especially, social enterprises.²¹ **Many potential issues can be avoided at the procurement stage**, including and especially long-term issues around data ownership and usage rights — see the idea of **“city data commons”**, a “New Social Pact on Data to make the most out of data, while guaranteeing data sovereignty and privacy.” (Morozov/Bria 2018) — and long-term maintenance. Please note that these should not just be viewed as one-off problems to solve but rather as procedural issues as they relate directly to long-term resilience: Who gets to own, use, or license data about citizens is both a question of control/power as well as of business models and revenue for the public sector.²² Equally, if maintenance can only be done realistically by one vendor, then new dependencies are created. To secure the broadest possible options space for city governments, vendor lock-in should be minimised through approaches focused on internal capacity building, open source/open data, and data mobility.

By shaping policy and procurement, as well as the ongoing relationship between city governments and technology vendors, to serve those long-term goals and these broader, more societally beneficial metrics, we can create the conditions for a thriving, expansive (as opposed to oppressive and reductive) **Smart City**.

It appears clear that **biases in machine decision-making systems (“AI”) cannot be entirely avoided**. However, this makes it all the more important to **make sure that the data sets, processes and algorithms are as open transparent as possible** while preserving citizens’ privacy, and to **build in safeguards** and ways to get redress. This explicitly also holds true in the face of commercial IP rights: If a vendor wants to do business with public administrations in the realm of data-driven products and services, i.e. Smart Cities or AI, then citizens’ rights to transparent and unbiased algorithms have to take precedence. What AI Now (2018) states clearly for the context of AI for public sector use applies Smart City technologies as well:

²⁰ UN Human Rights Principles, UNDP Sustainable Development Goals, and the principles laid out in the Declaration of the Cities Coalition for Digital Rights offer a robust starting point.

²¹ See Barcelona’s Public Procurement website. Available online at <https://ajuntament.barcelona.cat/contractaciopublica/en>.

²² Cities can set the conditions for access to data as they see fit, and it is relatively trivial to grant free use of some data to public entities or public interest groups while charging for commercial use.

“AI companies should waive trade secrecy and other legal claims that stand in the way of accountability in the public sector. Vendors and developers who create AI and automated decision systems for use in government should agree to waive any trade secrecy or other legal claim that inhibits full auditing and understanding of their software.” Before entering into any agreement with a vendor, it is essential that there are no “black boxes” that are opaque and unaccountable and hence make it unacceptably hard to seek redress in case of failures. In much the same vein, AlgorithmWatch (DE) has been demanding a publicly accessible database in which any algorithmic decision-making system employed by public administrations would be registered and its functionality/intentions explained.²³

Furthermore, there need to be **appropriate redress mechanisms built in from the very beginning**. If algorithms fail, there needs to be a human-in-the-loop who is empowered and capable of looking into what failed and how, and to correct any wrong decisions on behalf of the algorithm. Furthermore, the redress mechanism needs to feed back into the overall model of the algorithm to improve for the next round of decisions.

Finally, there are tremendous potential gains to be explored through **alternative economic models** that better align the needs of citizens, administrations and vendors. We recommend promoting exploration of innovative economic modes of production including such as tech worker co-ops. Especially a **focus on commons over markets** seems like a promising approach (Bloemen, Keller, Tarkowski 2018).

Concretely, in the short term we see as immediately actionable:

- Prioritising broader societal goals and metrics in procurement (see above);
- Broadening stakeholder participation (advisory and representation) incl. environmental, labour, and human rights groups.

For a strategic, longer-term perspective we see it as advisable to:

- Be explicit and intentional about setting goals, boundaries, and metrics, especially for engaging with private sector in Smart City projects;
- Prioritise those aspects that broaden (rather than narrow) future options for public administrations (incl. strengthening the commons, building up internal technical and strategic capacity, and prioritising public ownership).

To summarise, we see a number of areas where policy makers can promote promising approaches that optimise for progressive values, local stakeholdership as well as resilience and opportunity, and that guard against technical and political failure that would increase power imbalances.

- On the **governance level**, priority should be given to participatory processes, capacity building, empowerment, and redress against algorithmic failures;
- On the **risk-assessment level**, priority should be on identifying potential risks and benefits of any Smart City project, and with a focus on innovative participatory foresight and horizon scanning, especially to identify potential risks to more vulnerable communities and unintended consequences.

²³ See AlgorithmWatch: Atlas of Automation. April 2019. Recommendations available at https://atlas.algorithmwatch.org/report_en/recommendations.



- On the **technological level**, transparency, openness, data portability and decentralisation can help remedy risks and increase potential benefits, if balanced against privacy concerns.
- Finally, on the **procurement level** there is leverage to encode these requirements and characteristics into the procurement guidelines and make them binding conditions for entering into a partnership or client relationship with public administrations.

Taken together, any Smart City built on this foundation should be resilient and help promote opportunities and equality while offering remedies against potential unforeseen damages and failures.

It is important to remember that there cannot be a policy or regulatory “golden bullet” that will work in 100% of cases, and rather we have to think in long-term processes. As Martini (2019) reminds us: “In areas sensitive to fundamental rights, a one-size-fits-all-approach is comparably easy to implement legally and therefore seems appealing. However, a simplified approach would fail to do justice to the complex reality of the matter subject to regulation. The methods and areas of life and economic sectors in which algorithm-based procedures are used are simply too diverse. Instead, a well-balanced, finely-tailored system of protection is needed, consisting of a diversified set of regulation instruments,” with regulatory and policy mechanisms to be chosen on a case-by-case basis. AI Now’s Algorithmic Impact Assessment framework (Reisman, Schultz et al 2018) can help public administrations determine priorities.

7. AN ANALYTICAL FRAMEWORK FOR SMART CITIES

The first generation of Smart Cities as represented by Masdar City and Songdo is at the same time recognised as somewhat outdated, yet it still is hugely influential. This model that treats cities like an enclosed cybernetic model is rightfully criticised as unable to capture the complex, messy realities of a living society and its politics.²⁴

What could a more contemporary — possibly even future-proof — approach look like, and how can we even analyse where any given proposed Smart City project might land?

Luckily, there are a handful of tools at our disposal now that can help administrations to get an overview of potential impacts. These tools were developed for the context of artificial intelligence as well as consequence scanning and **can easily be adapted to analyse potential impacts of Smart Cities including, but also beyond, their direct impact on key values and characteristics like transparency, accountability, non-discrimination, and privacy/data protection.**

Building on AI Now’s Public Agency Algorithmic Impact Assessment (Reisman, Schultz et al 2018) for machine-decision making in public service context as well as AlgorithmWatch’s recommendations (AlgorithmWatch 2019), both of which apply directly also to Smart Cities, key elements of the assessment are:

1. Agencies should **register algorithmic decision-making systems (incl. an explanation of the way they work)** and conduct a **self-assessment of existing and proposed automated decision**

²⁴ For an insightful discussion, listen to the debate between urbanist Greg Lindsay and futurist Scott Smith in *Underfutures #4: Ghost Smart Cities*. Available online at <http://www.greglindsay.org/blog/2019/05/ghost-smart-cities-a-comotion-x-underfutures-crossover/>.

systems, evaluating potential impacts on fairness, justice, bias, or other concerns across affected communities;

2. Agencies should develop **meaningful external researcher review processes** to discover, measure, or track impacts over time; and advisory structures including civil society (environmental, labour, and human rights groups, etc.);
3. Agencies should **provide notice to the public disclosing their definition of “automated decision system,” existing and proposed systems**, and any related self-assessments and researcher review processes before the system has been acquired;
4. Agencies should **solicit public comments to clarify concerns** and answer outstanding questions; and
5. Governments should **provide enhanced due process mechanisms for affected individuals or communities** to challenge inadequate assessments or unfair, biased, or otherwise harmful system uses that agencies have failed to mitigate or correct.

For the context of Agile and/or participatory practices in the development of Smart City projects, Doteveryone’s Consequence Scanning Kit (Doteveryone 2019) can be useful; it also works well as a stand-alone toolkit for policy and strategic projects. In Consequence Scanning, an extremely lightweight process will help surface answers to three questions about any proposed product/service/system:

1. What are the intended and unintended consequences of this product or feature (see notes below)?
2. What are the positive consequences we want to focus on?
3. What are the consequences we want to mitigate?

Both an algorithmic impact assessment and consequence scanning should be part of any analytical exercise.

Clear goals & intended consequences: The importance of being clear, strategic, and intentional about goals should be self-evident, but in the Smart City discourse we all too often see a focus on technology and innovation as a goal in itself. This is furthered by a widespread misunderstanding that data is neutral, and that big data allows for objective decision-making.

However, as Kasy (2019) argues compellingly, **data and machine learning is never objective:** „We need to carefully think about the goals we want to achieve, and the policies we might possibly use to achieve them. Data cannot absolve us of this responsibility. They do not allow us to avoid value judgements, and do not relieve us from taking sides in distributional conflicts.“ If the goal is to promote inclusive prosperity, Kasy cautions, „**we need to be explicit about the necessity of judgements**, and we need to partake in a public debate about them, but we should also unapologetically take the side of those worse off when making these judgements.“



So if we want a Smart City project to promote equal opportunity, we'll have to take a different approach from one aimed at increasing efficiency in public transport. Noah Siegel of the City of Portland described Portland's experience with Smart Cities as it evolved from failing techno-solutionism to now evaluating Smart City projects against two simple questions: „Is it good for the climate? Is it bad for racism?“²⁵

Beyond the level of toolkits, there are concrete questions that can guide the analytical process. These are by necessity rather open-ended and not overly specific: They serve to surface and identify any potential red flags, any areas that would then require further examination (usually by trusted experts outside the companies whose offerings are being evaluated).

Based on the reviewed critical literature on Smart Cities, AI and digital/human rights research, these questions are best thought of as lenses to apply, to guide further inquiry. They fall into any of these larger categories:

1. Decide, are we dealing with a Smart City project?

Does this fit into a broad definition of Smart City that includes algorithmic decision making; sensors & actuators in public space; infrastructure; service delivery; and goes beyond the technology and instead is citizen/human centric (societal impact, not technological capability as focal point). This broad, inclusive definition helps look at the technologies and their impact holistically and discuss their potential benefits & risks meaningfully.

2. Do we understand potential implications of this Smart City project?

Consider emergent properties of data-driven systems: Individually these systems might seem harmless, but in combination they could display unexpected and larger impacts. In public space it is essential to thoroughly consider unintended consequences. What are *red lines* that may not be crossed? This aims to be one of the tools to surface those unintended consequence.

3. Do we understand possible governance, accountability, and transparency issues?

What kind of impact could/should this have? Who is involved in decision-making, and how are decisions made?²⁶ Who's responsible, and how can that be meaningfully implemented? What fail safes and remedies are needed, and what can they look like?

4. Do we know which stakeholder groups might benefit or suffer most?

Do the guaranteed benefits outweigh the potential harms, and by enough margin? Are benefits equally distributed, and are negative impacts equally distributed? How can we make sure that the most vulnerable stakeholders are protected and benefit disproportionately, and that externalised costs are minimised?

5. How confident can we be in these predictions?

And how can we increase the confidence in our predictions?

Depending on the context, it can be helpful to frame these questions from different angles:

²⁵ See Aspen Institute Center for Urban Innovation's newsletter from 30 April 2019.

²⁶ While we'd argue that algorithms need to be made completely transparent, there might be cases where this isn't possible (those should be the absolute exception.) In those cases, as Canadian heritage minister Mélanie Joly said at RightsCon 2018, „we don't need to know the recipe, but we want to know the ingredients.“ (See <https://www.theverge.com/2018/5/16/17361356/toronto-declaration-machine-learning-algorithmic-discrimination-rightscon>).



Box 1.1. Framing around Impact

- How does this impact privacy for groups XYZ?
- How does this impact economic prospects?
- How does this impact the labour situation for groups XYZ?
- How does this impact opportunities for participation and engagement for groups XYZ?
- How does this impact environmental parameters / carbon footprint?
- How well is it known what the impact will be (vs unforeseen/unintended consequences)?

Box 2.2. Framing around *certainty/predictability*

- How predictable is the outcome (for stakeholder groups, policy, other areas)?
- How well is it known what the impact will be vs unforeseen/unintended consequences?
With what confidence?
- How confident are we the input data was good?²⁷

Box 2.3. Framing around *stakeholder involvement*

- Who stands to benefit most/least?
- Who stands to suffer most?
- Who gets to participate in which part of the process (development, planning, use, later benefits)?

As a rule of thumb, this leads us to this (over-simplified) formula for a promising Smart City:

A Promising Smart City = Beneficial Impact x Knowledge of Impact x Confidence in knowledge about impact x Stakeholder equality x Stakeholder benefit x Robustness and failsafes.

²⁷ While physical things (like movement of people or goods through space, or energy consumption) can be measured reliably, many other things cannot (like opportunity cost, or quality of life, or intentions of people moving through space). When we build algorithmic decision-making systems, they base their decisions on input data. It follows that the quality of the input data determines the quality of the decisions the system makes. In computer science this is referred to as the „trash in, trash out“ problem: If the wrong or low-quality data is used as foundation for decision-making, the results will also be low quality or wrong. For the context of algorithmic decision making in the Smart City, this means we need not just figure out *what* data to use, but *if* that data can be used to begin with, if it is the right kind of data to measure against defined goals, and also how confident we are in the input data. Only using data in which there is high confidence is a requisite condition for confidence in the resulting decisions.



ANNEX: ALTERNATIVE MODES OF GOVERNING TECHNOLOGICAL DEVELOPMENT

In his annex we want to highlight some alternative modes of governing technological development that can support important social-democratic values such as equality and democratic participation by giving some examples from around the world, clustered by their approaches.

Participation, digital rights and citizen empowerment

vTaiwan²⁸ (Taiwan) is a platform and process established by Taiwanese civil society movement “g0v” following g0v’s role in the Sunflower Movement protests. It is designed as a neutral platform to engage experts and the public in a large-scale deliberation on various topics and aims to facilitate constructive conversations and consensus building.

Decidim Barcelona²⁹ (Spain) is the Barcelona City Council’s online platform for participatory democracy. It is a mobile-first digital infrastructure to build a more democratic city by offering citizens access to the participation channels and mechanisms for their city, including consultations, participatory budgeting, and design of public policies.

Our Data Bodies³⁰ (USA) is a research project that looks at digital data collection and human rights of vulnerable local communities to show how different data systems impact re-entry, fair housing, public assistance, and community development.

Accountability & Oversight

New York City Automated Decision Systems Task Force³¹ (USA) is an initiative by the New York City government tasked with recommending a process for reviewing the City’s use of automated decision systems (more commonly known as algorithms). However, while this initiative seemed promising and unique, the task force has since come to a stop after focus issues (disagreements on what counts as “algorithmic” and what doesn’t) as well as an alleged lack of willingness on the side of the administration to share relevant data.

Resilience, bottom-up innovation, alternative governance/economic models

Prototype Fund³² (Germany) is a funding program of the Federal Ministry of Education and Research (BMBF) that is supported and evaluated by the Open Knowledge Foundation Germany. Individuals and small teams (of freelance coders, hackers, UX designers and more) can receive funding in order to test their ideas and develop open source applications in the areas of Civic Tech, Data Literacy, IT Security and Software Infrastructure. The aim is to enable freelance developers that bring a wide skill set to the development of technology into digital social innovation and produce software for the common good.

²⁸ See <https://vtaiwan.tw/>.

²⁹ See <https://www.decidim.barcelona/>.

³⁰ See <https://www.odbproject.org/>.

³¹ See <https://www1.nyc.gov/site/adstaskforce/index.page>.

³² See <https://prototypefund.de/en/>.



Code for America³³ (USA) is a network that places tech workers (like software developers and designers) in public institutions to build digital tools that help make digital service delivery for citizens better and more effective, and provide these tools as open source so they can be used and adapted in other institutions as well. Part of their mission is to advocate for delivery-driven government that focuses on concrete citizens needs rather than administrative processes and workflows.

BetaNYC³⁴ (USA) is a civic organisation focusing on improving lives in New York through civic design, technology, and data. It's part capacity building program, part interdisciplinary bridge building, part citizens' rights advocacy.

Tech cooperatives

We see a renewed interest in cooperatives for the production of digital tools, albeit in very early stages:

Digital Life Collective³⁵ (UK) researches, develops, funds and supports Tech We Trust, technologies that prioritise citizens' autonomy, privacy and dignity, positioned as an alternative to big tech platforms.

Redecentralize³⁶ is a network of people "pioneering technologies and governance models to redcentralise the web." While still early stage, this push for decentralisation (both on a technological level as well as in ownership and governance structures) as a key ingredient to limit the power of big tech platforms resonates across many initiatives in this space.

Speculative design to inform policy development

There is a growing number of speculative design project with the goal to inform a debate about future policy development.

Transparent Charging Station³⁷ (Netherlands) by Rotterdam-based design studio The Incredible Machine is an experiential demonstrator that lets users explore how algorithmic decision making can work by different sets of rules, using the example of a smart car charging station.

Mitigation of Shock³⁸ (UK) by London-based designers Superflux is an installation of a future London apartment radically adapted for living with the consequences of climate change. The idea is to allow citizens to experience a possible future to make today's policy changes more graspable and concrete.

The Museum of the Future³⁹ (Dubai) is a participatory futures thinking platform that turns possible desirable long term futures into experiential exhibitions to foster debate. A project by the Dubai Future Foundation, MotF was initially started as a recurring format to inform participants of Dubai's World Government Summit, but results of future instalments will also be displayed in a permanent museum.

³³ See <https://www.codeforamerica.org/>.

³⁴ See <https://beta.nyc>.

³⁵ See <https://diglife.com/>.

³⁶ See <https://redcentralize.org/>.

³⁷ See <https://the-incredible-machine.com/chargingstation.html>.

³⁸ See <http://superflux.in/index.php/work/mitigation-of-shock/#>.

³⁹ See <http://www.museumofthefuture.ae/>.



Better ways to think about metrics and governance for Smart Cities

NYC Internet Health Report⁴⁰ (USA), a research report by Mozilla Foundation authored by Meghan McDermott, identifies 5 crucial issue areas to promote a healthy digital space in the urban context (not just for Smart Cities): Digital inclusion, decentralisation, privacy and security, openness, and web literacy.

The **Trustable Technology Mark**⁴¹ (Germany) by non-profit ThingsCon e.V. establishes a checklist to determine holistically if a connected product respects its users' rights. Some, if not all, of the items on this checklist might be adaptable for the Smart City context (full disclosure: The author of this report also led the development of the Trustable Technology Mark).

Environment & sustainability

It is increasingly recognised that technology (esp. internet-connected technologies) is a major contributor to climate change.

The **EU's Horizon Europe program** addresses this specifically with a dedicated funding mission for carbon-neutral & smart cities.

Smart City vendors often focus on energy saving potentials.

There is an **emerging movement** around the Green Web and carbon-neutral internet. Notable actors here include the Climate Action Tech community, a loose network of tech sector workers and employees, and the Green Web Foundation that focuses on internet hosting to become 100% renewable.

It seems obvious that there is also a resilience angle to explore here, but it seems likely that it would yield very different results depending on the local context (cities built along the water are likely to have different challenges in this regard than those built in dry climates).

Miscellaneous⁴²

We also see a first wave of commercial entities – esp. startups – that use digital rights like privacy as a differentiator for their offerings. In the Smart City space, these are the kind of approaches that should be considered as opposed to surveillance and data mining.

Numina⁴³ (US) has developed a smart city traffic analytics product (cameras plus software) that prioritises privacy by stripping everything it captures off personally identifiable information (PII) on device.

⁴⁰ See <https://internethealthreport.org/an-internet-health-report-for-new-york-city/>.

⁴¹ See <https://trustabletech.org>.

⁴² „If the Internet was a country, it would be the 6th largest polluter“, according to the Sustainable Web Manifesto (2019). Available at <https://www.sustainablewebmanifesto.com/>.

⁴³ See <http://www.numina.co/>.



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Peter Bihr explores how emerging technologies can have a positive social impact. At the core of his work is the mission to align emerging technologies and citizen empowerment. To do this, he works at the intersection of technology, governance, policy and social impact — with foundations, public and private sector.

Peter is the founder and Managing Director of [The Waving Cat](#), a boutique research and strategic advisory firm built around this mission. He also co-founded and chairs the board of [ThingsCon](#) e.V., a not-for-profit that advocates for responsible practices in Internet of Things (IoT).

Peter was a Mozilla Fellow (2018-19) researching trustable technology (IoT), and an Edgeryders Fellow (2019) exploring smart cities from a civil rights perspective. Postscapes named him a Top 20 Influencer in IoT (2019). He is the author of *View Source: Shenzhen* (2017) and *Understanding the Connected Home* (with Michelle Thorne, 2015).