D2.1 Analysis of Experiences in Other Industries

This is a text-only version. The web version is available at https://casestudies.urbanite-project.eu/

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Contents

About

This research was conducted as part of the Urbanite project, and has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement # 870338. The research contributes to the project deliverable D2.1, ‘Analysis of experiences [with disruptive technology] in other industries’. Research, writing, editing, and publication occurred from Summer 2020 through Spring 2021 and was led by Max Kortlander and Danai Papathanasiou at Waag, with substantial contributions from other Urbanite project partners.
The subject of this report, ‘experiences with disruptive technology in other industries’, covers a wide subject range and brings with it the need to identify and limit the scope. The title and subject raise a number of questions:

- What is disruptive technology?
- Which industries are relevant for this study?
- With so many examples of disruptions ‘in action’, which examples should this study consider in order to contribute quality insights to Urbanite partners and others involved in the field of participatory mobility?

What is disruptive technology?

The term ’disruptive technology’ is often framed in glowing terms, along with utopian promises from a market-centred ‘Silicon Valley’ perspective. Under this lens, disruptive technology is about upending existing business models and power structures, with the suggestion that this disruption benefits people’s lives. When considered in terms of society and governance, however, we must observe the effects of disruptions on our daily lives and challenge the assumption that they are ‘good’ – have disruptions like Uber and ‘smart cities’ really made life better in our cities? Or do such disruptions only further condense power in new hands, while exacerbating old issues (like inequality) and creating new ones (like privacy infringement)?

‘Disruptive technology’ is credited as being coined in 1995 in the Harvard Business review. The original authors revisited ‘disruptive technology’ 20 years later and describe this traditional understanding of the term:

> “‘Disruption’ describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent businesses...Entrants then move upmarket, delivering the performance that incumbents’ mainstream customers require, while preserving the advantages that drove their early success. When mainstream customers start adopting the entrants’ offerings in volume, disruption has occurred” (Christensen, Raynor, and McDonald).

It is important to note the limits of this perspective: Firstly, ‘technology’ excludes disruptions from being related to natural phenomena (e.g. a pandemic), methods (e.g. co-creation), laws (e.g.

GDPR), or any other non-technical phenomena that disrupt. Secondly, the conventional view of 'disruptive technology' places a biased weight on economic impact, while largely ignoring disruptions which are socially disruptive, environmentally disruptive, politically disruptive, or otherwise. Thirdly, the term 'disruptive innovation' carries a connotation of being groundbreaking or life changing. In reality, however, applications of so-called disruptive technology often make incremental shifts and can serve to uncover the problems, limits, or unrevolutionary character of a more generally *disruptive trend*.

> "The term "disruptive innovation" is misleading when it is used to refer to a product or service at one fixed point, rather than to the evolution of that product or service over time...Most every innovation—disruptive or not—begins life as a small-scale experiment" (Christensen, Raynor, and McDonald).

This report thus considers disruptions and disruptive innovation generally, not as disruptive technology alone. Disruptions are considered for their impact on a wide range of factors. A given disruption will have certain general characteristics but vary in how it is actually applied. These applications take the form of pilots, initiatives, or experiments and provide the main source of information in this report as case studies.

Which industries are relevant for this study?

Urbanite can be loosely identified as related to the field of 'participatory mobility policy'. Breaking this term apart, Urbanite is thus at the confluence of participatory methods, mobility, and the public sector. This study considers disruptions in fields related to Urbanite – thus, case studies come from various examples which are related to participation, mobility, or policy, but does **not** focus on other examples from participatory mobility policy specifically.

Examples of disruptions in the public sector are particularly relevant to this report, because one of the report's aims is to inform a process by which Urbanite partners identify the current attitudes and experiences of civil servants towards disruptive innovation.

Much of the existing research into disruptive innovation and public services comes from a perspective where the market is the priority and where public services are considered in terms of their economic value (Deloitte; European Commission; Eggars & Gonzalez). While this is a valid perspective – we are indeed tied to financial limitations – there is a lack of focus on *democratic values*, or how disruptive innovations can affect (positively or negatively) democratic robustness with regard to openness, transparency, political engagement and civic participation. Research under this perspective of added democratic value is growing, however, particularly (but not exclusively) within the European Union (Leitner & Stiefmueller; CO3 Project).

Which examples of disruptions should this study consider?

Which examples of disruptions should this study consider in order to contribute quality insights to Urbanite partners and others involved in the field of participatory mobility? This report most directly informs Urbanite partners and stakeholders. Primarily and specifically, this report informs SoPo Labs and the application of AI and algorithms in Urbanite. More generally, this report identifies areas of disruption that are relevant for Urbanite partners and, by extension, others (externally) in the field of participatory mobility.

The process of creating this report involved interviewing consortium partners (in groups and one-on-one) and asking:

- Which 'disruptions' do you have experience with or knowledge about that would be useful for the consortium to know about for their work in Urbanite?
- Which 'disruptions' do you think will play a role in Urbanite that we should know more about?

Starting from the answers to these questions, the authors further placed a (non-exclusive) focus on cities and countries represented in Urbanite use cases. Similarly, there was a **preference to include case studies where Urbanite partners have direct experience**, as direct experience was found to considerably improve the depth of a case study and the quality of its recommendations. As a secondary effect, the writing of this report also facilitated an internal knowledge transfer amongst project partners, familiarising partners with each other's work, experiences, and areas of interest and expertise. This effect was particularly welcome during the Covid-19 pandemic which limits other avenues for getting to know project partners.

Following from these considerations, the common thread between the following case studies is to illuminate how disruptive innovations **threaten** or **improve** democratic governance of mobility policy and data, particularly with regard to civic participation, (social and environmental) sustainability, and shared values including openness, transparency, equality, and accountability.

References

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Case Studies

Disruptive Methods in Participation and Governance

Disruption: Participatory Democracy

Participatory processes are increasingly employed by governments to explore new opportunities for democratic citizen engagement. These processes go beyond voting, and allow citizens and other stakeholders (e.g. civil society organizations, governments, academia, and/or businesses) to take part in ideating, debating, and implementing initiatives in the public sphere. In participatory approaches, citizens are invited to go beyond voting and contribute to drafting proposals, debating them, and implementing them in collaboration with local governments and other stakeholders.

Participatory budgeting is a common form of participatory democracy in recent years, where citizens vote to determine the allocation of particular funds (determined by local authorities) oriented towards community projects. The projects being voted upon are often co-created and generated from citizens' ideas, to encourage deliberation amongst the community and more ownership over shared public resources. Firstly introduced by Porto Allegre in 1989, participatory budgeting is increasingly adopted by various countries in all continents. Participatory budgeting is becoming widespread in Europe following its initial popularization in the early 2000s.

Other forms of participatory democracy are similarly adapting to the changing attitudes towards governance, technical developments, and drastic changes in the public sphere (due to societal disruptions like social media proliferation and Covid-19). Participatory democracy, often aided through the use of online voting and deliberation platforms, is currently being applied to various fields in the public domain including environmental monitoring, urban planning, education, and transportation and mobility.

Criticisms of participatory democracy note:

- Limitations and difficulties in including a diverse, representative portion of the population;
- A tendency towards over-reliance on technology (which in turn may exclude certain people from the process);
- The scope (for example, budget, topic, or area) of participation is often limited and pre-determined by authorities;
- The difficulties, uncertainties, and long-term efforts which are inherent in participation.

The field of participatory democracy shows signs of addressing these criticisms in practice. Practitioners interviewed for the case studies below indicated an awareness of the challenges faced in the field. Current projects can and are taking steps to improve participatory practices by:

- Dedicating resources towards identifying people and groups who may traditionally be excluded in participatory practices, and working to include these people (e.g. by hosting live events in a given neighbourhood; collaborating with established community groups; communicating with media that is already familiar with a given group.
- When possible, hosting live meetings rather than working digitally.
- Allowing the boundaries of participation themselves to be a subject of participatory governance (e.g. allowing voters to decide how much budget will be dedicated to a participatory budgeting process);
- Tailoring budgets and project plans to account for experimentation and uncertainty.
- Being critical and realistic: asking questions like “To what extent is this process actually participatory?” and “What can we realistically achieve given our budget and mandate?”

Case Study: Participatory budgeting in the city of Helsinki

Contributors: Heli Ponto, project manager, Forum Virium Helsinki and Max Kortlander
Interviewee: Kirsi Verkka, Development Manager for participatory budgeting, City of Helsinki

Description

OmaStadi is a participatory budgeting process facilitated by the city of Helsinki that lets citizens generate ideas, design proposals, formulate decisions, and be active in the implementation of how the city spends an allocated portion of its budget. Idea generation is open for everyone. Citizens and other stakeholders in the city develop and refine ideas during events. Virtual voting is open to all citizens over 12 years of age, and the city co-creatively implements the most highly-voted proposals. Voting takes place on the OmaStadi website, which was built by implementing, adjusting, and adding to the open source Decidim platform. Other municipalities are able to use and build upon Helsinki's implementation of Decidim which is documented at https://github.com/City-of-Helsinki/decidim-helsinki.

A first round of participatory budgeting in Helsinki began in 2018. Residential associations and local community managers organised idea sessions in different districts at local libraries, through schools, and with other existing community organizations such as elder care homes. The city also utilized gamification, the online platform, and live events to raise ideas between citizens.

The preliminary suggestions estimated costs and developed as proposals together with city representatives. Proposals were divided by districts (north, south, east, west). Once voting opened, citizens had an amount of money to be allocated to different projects. Live events were held to assist people with voting.

The first implementation of participatory budgeting in Helsinki had an allocated budget of €4,4 million. Now, a second implementation of participatory budgeting is currently underway with a budget of €8,8 million. Examples from this year's preliminary suggestions include: better lighting, better lit traffic streets, an outdoor gym, a railroad in southern Helsinki, and playgrounds for children with special needs.

Assets

- Active live events helped citizens to raise ideas and make decisions concerning city planning.
- Citizen participation can be partially facilitated via online tools. This may be a low-threshold way to participate for people who are comfortable using digital tools, but can alienate others.

- Participatory budgeting has the potential to involve a significant portion of the population. In Helsinki, almost 10% of the population voted. Due to close collaboration with schools, 40% of young teenagers in the city participated in this process.
- Various methods for feedback (online and offline), including surveys, evaluation workshops, and polls made it easier for a diverse set of people to provide feedback and to do so in ways which captured different types of information.
- The process is very open. The project's leadership is accessible and easy to contact. Digitally, clean documentation can be found on GitHub. The OmaStadi website clearly communicates the co-creation process of ideation, voting, and implementation. In this regard, OmaStadi is a positive example for how to practically implement openness in a participatory process.

Risks and Limitations

- Citizens were not directly involved in deciding how much budget would be allocated to participatory budgeting (i.e. €4,4 then €8,8 million).
- Groups that were already active could more easily activate masses of people to vote for their ideas (e.g. football players proposing a new football field).
- Some suggestions could be seen as a part of the city's 'normal' urban development process that should take place even without participatory budgeting (e.g. to plant more trees in Helsinki). However, this criticism could be made of any proposal, which demonstrates the difficulty in choosing which proposals to exclude for being considered 'normal' in this way.
- During the Covid-19 pandemic, the second implementation of participatory budgeting is taking place largely online. The project is adapting to this setting, for example by building from existing open source platforms for deliberation and voting, and dedicating project resources to adapt to co-creation to an online setting to the extent possible. For example, Helsinki city services contacted elderly people, those with disabilities, and others to help proactively involve groups who were less likely to be represented in this process. Generally speaking, digital environments can risk excluding or giving a disadvantage to people who lack digital access, digital literacy, or simply do not feel comfortable communicating online. While some processes (like voting) translate fairly well to an online setting, other processes (like deliberation, brainstorming, and other collaborative activities) are often found to be better suited to a live, physical setting when possible . This general 'rule of thumb' however shows signs of changing, particularly during the Covid-19 pandemic as the general population has gained skills in working online. On the OmaStadi platform, for example, the latest round sees much more online deliberation (in commenting and connecting ideas) than previous rounds. Recent online events for OmaStadi have had more participants online than facilitators would expect in an offline equivalent.

Recommendations and Lessons Learned

- Clear boundaries should be set regarding what participation can influence and what it cannot. Informing citizens by providing crucial information at an early stage played a major role in this project's success. As one facilitator said, "providing information is not so easy" – it takes more effort than expected. In this case, facilitators held workshops, created educational materials, and led a communications campaign all with the primary focus of informing citizens about the participatory budgeting process, its expectations, and its limitations.
- Groups at risk of exclusion were helped with the voting process in Helsinki. In all participatory projects, participation will be more difficult for some people and this imbalance may not always be immediately visible. Cities and facilitators need to make extra effort to support the participation of all people, for example by reaching out to different leaders, groups, offices in government, and types of citizens who would like to be involved. Participants should reflect the diversity of the city's population in order to provide relevant solutions and make quality decisions. OmaStadi addressed this challenge by cooperating directly with NGOs who advocate for immigrants, which generated over 100 new ideas from immigrants alone.
- Foster deliberation (not just voting and competing) between citizens and governments. Remember that there is often very little deliberation online. The most fruitful conversation occurs in live workshops, where nuances are easier to express and where a sense of community can emerge.

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Case Study: Mobility Urban Values in Amsterdam

Contributor: Max Kortlander

Description

MUV was a co-creative project focused on mobility & gamification, citizen science, and mobility policy. In Amsterdam (one of six European cities involved in the project), the third and final pilot phase "tested and produced co-created strategies for the sustainable implementation of citizen participation in the city's efforts surrounding data and mobility. This occurred during a series of meetups between stakeholders." (MUV D5.5)

Upon the pilot's completion, participants (mostly citizens and municipal employees, but also some representatives from the private sector and academia) produced the following:

- A value ladder and design principles (PDF – see appendix 2) for Amsterdam's mobility policy as part of a program on bicycle data commons.
- Citizen Insights and Recommendations for Participation (PDF – see appendices 3 and 4) regarding the status quo and ways to improve the future of participatory mobility policy in Amsterdam.

Assets

- From the perspective of Urbanite partners, MUV's experience provides a valuable resource of insight into how citizens and civil servants in Amsterdam view mobility; what the current level of their knowledge and participation is; and what already exists that may be built upon.
- (In Amsterdam) there is a very strong commitment to participatory ideals. Municipal employees are eager to learn, joining sessions and workshops, and trying to improve participatory practices at the personal and organizational level. The co-creative sessions seem to play a strong role in **improving this commitment to and knowledge of participatory practices** within the municipality.
- This participatory culture has helped to make Amsterdam open and accountable regarding how data is produced by citizens as well how it is gathered and used.

Risks

- **Lack of participation from citizens,** both with regard to the number of citizen participants and the continuity of committed participation – Mobility alone is not particularly interesting for many citizens, and questions around mobility data can seem overly complicated. This can be countered by linking mobility with other areas of concern (such as safety, quality of life, privacy, air quality, etc.); and by addressing those areas of mobility policy that are of greater concern to citizens (in Amsterdam, this seemed to be interest in participation when developing values and guidelines as well as staying

informed. Issues involving detailed considerations of specific data usage or individuals laws and practices generally sparked less interest.)

- **Lack of clarity about what goals of co-creation sessions are and what outcomes can be guaranteed or expected** – First and foremost, this requires clear planning and agreement amongst the core team. Secondly, this requires clear, simple, and consistent communication that both sets and manages participants' expectations.
- **Lack of depth / dead-end roads** – Participatory projects risk not getting past the 'ideation' phase, especially when long-term options and commitment are lacking.
- **Commitments or results do not lead to implementation** – KPIs, commitments, and accountability mechanisms for implementation should be created as part of the co-creative process. Doing so helps to ensure that commitments are held and results are visible.

Recommendations and Lessons Learned

Both citizens and municipal employees have the question, "What's next?". In Amsterdam, and in other large urban European cities, participatory approaches are becoming more common and familiar within municipalities. Municipal employees are generally available and likely to join sessions, particularly when a clear goal in line with their own work is communicated. Public servants often want to be in touch with their constituents, and may view co-creation sessions as an opportunity to do so.

Certain citizens (in Amsterdam) are enthusiastic about participatory democracy and issues surrounding mobility, but often unaware of the different options the city is offering. When citizens are aware of such opportunities, they often feel they do not receive a clear message about what is at stake and to what they can concretely contribute.

By basing pilot plans off of **existing** shared interests (and initiatives) of citizens, the municipality, and other stakeholders (bottom-up, not top-down), and by gradually implementing these plans together, a participatory mobility project can move past the phases of ideation and positioning (which are nonetheless important/necessary in their own time and place) and into tangible progress. A committed community of collaborators is in this case more valuable than a large one.

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Case Study: Participatory Budgeting in Madrid: Decide Madrid

Contributor: Danai Papathanasiou

Description

The municipality of Madrid adopted e-participation as one of its means for local governance in 2015. It has since become an established function in local governance, surviving a change in administrations. Through Decide Madrid, an e-participation umbrella platform comprised various e-participation tools (e-forum, e-consultation, e-voting, participatory budgeting) the citizens of Madrid are offered the opportunity to share input on public matters, propose ideas and vote for the realisation and budget distribution on urban projects. Anyone from age 16 and older can register and participate.

Participatory budgeting is the most popular and used feature of Decide Madrid. With a budget of 100 million euros, the registered citizens of Madrid can propose ideas and projects[1], either for the entire city or for a specific district. The projects undergo evaluation by the City Council after which both the approved and rejected projects are posted along with their respective reports on the Decide platform. The most highly voted projects (presented alongside their estimated budgets) are then promoted to the next phase. Registered citizens can vote for any number of city-wide projects and for one in their district. As long as the projects with the most votes do not exceed the city's budget, they are included in the Initial Project of the General Budget of the City of Madrid.

Assets

- **Open source platform for bottom up participation**: The Decide platform is operated and governed by the Municipality, avoiding the participation of private intermediaries and commercial motives. At the same time, citizens propose projects and have the opportunity to focus on ameliorating their environment, increasing their connection to the city. This helps to establish a relationship of trust with local authorities.
- **Online and offline participation:** Decide is open for everyone registered in the Municipality of Madrid, and it can be accessed online or through additional analog participation practices. Madrid's 26 Citizen Assistance Offices provide help from trained staff to willing voters with no access to the online platform or lacking digital skills. The project opted for more inclusivity and diversity by approaching special needs groups and facilities, for example by offering IT classes to elderly citizens and leaflets in Braille.

[1] The proposal of ideas and projects is also seen in the *Propuestas* section. The main difference with participatory budgeting is "that authors of similar projects are contacted and offered the possibility of submitting joint projects as a way of limiting the volume of projects and ensuring cost-effectiveness."(DeJohn, 2017)

- **Evenly distributed participation:** The participation and the projects suggested are evenly distributed among the districts, without benefiting only the affluent neighbourhoods with highly educated citizens (whose residents are more likely to take part in participatory governance).
- **Extranational perspective**: Multiple Spanish cities had already adopted participatory budgeting and e-participation, which gave Madrid a foundation to build on. Madrid's citizens were already aware of municipal tools for co-creation and participation through similar initiatives in other Spanish cities. Additionally, the Municipality also consulted Porto Alegre in Brazil (the 'birthplace of participatory budgeting'), Paris, and Better Reykjavik's e-participatory platform.
- **Popularity:** Outside of the actual function of the platform, Decide Madrid has been extensively studied by academics and as a case study for other projects, which makes it a fruitful source of research material.
- **Transparency:** All data is open to the citizens through Datos Abiertos.

Risks

- **Link to the Mayor**: Discussions with citizens of Madrid, indicated the perception that the project was very much affiliated to Manuela Carmena, the mayor of Madrid in 2015. With the transition of the governments, sustaining the programme and convincing the new people in charge was a challenge. While the platform kept on running after Carmena's governing, it would be preferable for participatory projects to not be strongly linked with one person or party, which could pose a threat to its sustainability and continuity.
- **Dead ends**: Input from citizens that led to dead ends and no substantial contribution have been reported. The success rate of the voted projects is seen as an issue as year by year projects are approved but their completion is still pending. With the freezing of all actions and projects due to the Covid-19 pandemic, Decide Madrid is considering to hold voting every other year, hoping to allow one year of focusing on a smaller number of projects that can be carried out and not over-accumulating proposals.
- **Lack of deliberation**: Despite the openness of the platform, the lack of deliberation (on each proposal on the digital platform) between the citizens on the candidate project diminishes its value and results. Those who do not have access to the web platform were aided in voting, but not explicitly aided in deliberation.
- **No proof of diverse participation**: The idea of the project was for everybody to have a voice on public matters; however, no evidence of ethnic, gender and religious diversity in participation was found. The lack of participation by the elderly and the younger generations (18-28) was mentioned by some of the participants. This does not mean that diversity was lacking in practice, but does indicate the challenge that participatory projects have to demonstrate their inclusivity, diversity, and the degree to which they are representative of the whole population.
- **Limited human resources:** Undoubtedly, Decide Madrid is an ambitious project. It involves a large number of participants, affects the entire city and requires

interdepartmental collaboration. The human resources however for the team that runs the program are scarce, with approximately 30 employees on the program and some additional, part-time help from employees in other departments.

Recommendations and Lessons Learned

- With citizen participation efforts, the relationship and commitment between citizens, civil servants, and government varies according to the country and its public philosophy. Urban behaviour derives from many cultural factors and there is no one pattern that fits all. In the case of Madrid, facilitators examined both intra- and extranational examples and adjusted lessons learned to their own context accordingly. That might refer to multiple aspects: from the amount of projects suggested, to the budget, to the way of approaching citizens and more.

- On the same note, a variety of literature has been authored on the particularities and subjectivity of participatory budgeting. The application of a Latin American model to European, Asian, or North American countries and cities demands an assiduous look to gender, economy and politics (Ng, 2016), in addition to the aforementioned public philosophy.

- In order for the project to survive there should be strong governmental support, rather than appropriation or 'championing' by a single policymaker, government official, or political party.

- Participation and diversity must be sought out. This is notably difficult for many projects – even those which are programmed to be inclusive, approachable and easy to understand, but that do not guarantee to spur the interest of a significant and representative portion of citizens.

- There should be a constant drive for amelioration and evolution of digital participatory services. The technology of the platform should be often revisited and updated, not only to stay up-to-date, user-friendly, and efficient, but also improve the platform's fairness, relevance, and inclusivity.

Further reading

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Disruption: Emerging Data Governance Models

There is a need to organize the growing amount of data about people and their environments. On the one hand, this organization can be considered in practical terms of interoperability: How can various datasets come together to compliment one another and be useful for a wide range of people? On the other hand, the organization and governance of data also creates new dilemmas and opportunities around the ownership, control, and value of that data. Emerging data governance models – data commons, data collaboratives, data cooperatives among them – are experimenting with disruptive new (and sometimes rediscovering old) ways of organizing, sharing, and governing data. One of the fundamental questions explored through emerging data governance models is: **How can data be valuable for and controlled by those who actually create that data (such as citizens moving around their own city)?**

The case studies below provide insight into the problems and opportunities encountered when challenging established (and often exploitative) modes of centralised data ownership and surveillance:

- Working with sensitive data, such as healthcare or personal location, requires a thoughtful merging of security and personal privacy concerns into secure, operable technology.
- Functioning, complete data trusts are difficult to develop. Currently, many data trusts exist as prototypes, or as initiatives which provide one (but not all) of the many necessary aspects of a data trust. Those aiming to implement a data commons should not do so alone. The path towards development is long and complex, and requires specialisation and coordination amongst a group of dedicated actors.
- In practice, novel approaches to data governance may encounter blurry legal boundaries. Corporate ownership may conflict with GDPR and other laws and rights related to privacy and personal data ownership. Many specific legal questions are yet to be fully resolved.
- The terminology surrounding data governance models can be unhelpful. There are various uses, understandings, and intentions behind terms like data commons, data cooperatives, and data collaboratives which often overlap, confuse, or conflict with one another. It is thus crucial to consider the ownership, options, and organization around that data in order to assess the actual workings of any particular data commons, collaborative, or cooperative. Mulgan and Straub of NESTA helpfully address this issue by opting for the term ‘data trust’ ‘to broadly denote institutions that work within the law to provide governance support for processing data and creating value in a trustworthy manner’.

The field of data governance appears to be in a moment of flux, ripe for experimentation as grassroots organisations, companies, cities, and others adopt novel practices in data governance which, in turn, provide specific new insights and questions to be explored.

Examples of data trusts demonstrate their potential to give people more power over their own lives and information, and to give citizens more agency in their cities.

Useful resources to learn more about emerging data governance models include:

- Mozilla's Data Futures: Research to shift power through data governance
- The new ecosystem of trust: How data trusts, collaboratives and coops can help govern data for the maximum public benefit, by Vincent Straub and Geoff Mulgan of NESTA
- NYU GovLab's DataCollaboratives.org
- Waag's Commons Lab

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NYU GovLab. Data Collaboratives: Creating public value by exchanging data. Access at https://datacollaboratives.org/

Case Study: Health Data Commons

Contributor: Stefanie Tan

Description

Data commons are first and foremost a citizen-centric approach to data governance; and "combine technical and organisational solutions with the aim of generating sustainable value by sharing data in common, whilst giving people control over their personal data (as required per the General Data Protection Regulation (GDPR))" (Schouten, 2019). Health data commons apply the same principles (i.e., sustainability, inclusiveness, privacy, accountability) (Schouten, 2019), and encompass sensitive personal health and wellbeing data, collected by citizens and patients. The difficulty in creating health data commons (HDCs) lies in the relationship between how data is generated and how it is distributed.

MD|OG is a patient-driven organization that develops solutions for and with people who have a physical or mental condition. Solutions are developed by harnessing citizens' own observations and findings. MD|OG positions itself as a constructive catalyst for a new health economy by pursuing and developing the necessary means for citizens to have control over their health data in a way that is accessible and ethical (i.e., #5 Gezond Akkoord). Mijn Data Onze Gezondheid (MD|OG; *My Data Our Health*) is not itself a fully developed health data commons. It does, however, provide a necessary building block of a HDC in that it addresses this question of data generation and distribution.

In order to achieve its aims, MD|OG creates Living Labs: "spaces where new forms of citizen-driven data collection are linked to new forms of data governance and research" (mdog.nl). This has resulted in living labs such as the Microbiome Center and MyCardio platform, which are potential starting points for HDCs. With the consent of citizen participants, data gathered through these living labs could be brought to research institutions with the aim of answering citizen-generated research questions with citizen-generated data. To this end, MD|OG strives to be an independent benchmarker or guide for initiatives in e-health and citizen-driven health data management (mdog.nl).

MD|OG is designing a system for registration, passive forums (where researchers approach patients) and active forums (where citizens lead with their own research inquiries). The actual movement and transport of data is not planned to be covered by the MD|OG's Gezond Akkord platform. The objective is to deliver a consent module that will be made available as a plug-in for personalized healthcare environments (*persoonlijke gezondheidsomgevingen* or PGOs. MD|OG wants to implement dynamic informed consent that enables citizens to register their interest and participation to the HDC of the Netherlands, which is in the process of being set up. Ideally, such a registry, or dynamic informed consent module, would allow people to register what they allow to be done with their data, by whom, and for how long.

The desired outcome is that patients or citizens are enabled to consciously, individually and collectively execute their rights upon their health data and their health data commons. This is currently being developed with a primary group of users. On January 21st, 2021, MD|OG hosted the fifth workshop of #5 Gezond Akkoord, which took steps towards developing a proof of concept for dynamic informed consent. This and other co-creative workshops focus on developing solutions for the facilitation of the use of citizen health data in research wherein both individual rights and collective protection are guaranteed. According to MD|OG, in order for health data cooperation to succeed, four essential sets of guidelines need to be established: registration, consent, guidelines for ethical assessment and processing of requests for data usage (mdog.nl).

Assets

- **Diverse partnerships and bottom up collaboration:** Health data cooperatives require the collaboration of a diverse set of partnerships and organizations. To realize this goal, MD|OG has partnered with various smaller and larger patient organisations (http://mdog.nl/over-ons/netwerk/) as well as working alongside the Municipality of Rotterdam, Medical Delta, TNO, and the Patient Federation in the context of MedMij: an organization that sets the standards for safe data exchange between patients and healthcare professionals. Parallel to these organizational partnerships, MD|OG relies on bottom-up participation in order to realize its goal for patient driven research that could be made possible with a HDC. Moreover, such a diverse range of partnerships allows MD|OG to bring patient interests into relevant stakeholder domains, particularly in the construction of HDC, such as technology and innovation, data governance, and medical research. MD|OG's bottom up collaboration with patients as well as technical and organizational partnerships may aid the development of an HDC that can grow and be sustained.
- **Sustainable value by sharing data in common:** The collective principle, which lies within the name of the organization - *My Data Our Health* - promotes the idea of creating shared and sustainable value by way of sharing health data. With an HDC it could be made possible to securely and exclusively share specific types of health data; which could be especially meaningful for patients with complex or rare diseases. Projects under the umbrella of MD|OG, i.e., MyCardio and Microbiome Center, show that patients are interested in participating in health data collection and pooling data in order to learn about their conditions. Creating sustainable value would mean that patients can both passively and actively collect data, always actively consent to sharing their data, and benefit from results every time their data is involved in health and wellbeing research.
- **Patient empowerment through citizen science:** Individuals can be empowered through more control, ownership, and access over their personal data; and by being more directly involved in research domains that affect or are of interest to them. Collective groups can be empowered to become more active and central in approaching

researchers and driving patient generated research questions – thus, the data and questions that are valuable to patients more directly influence the scope of research.

- **Iterative negotiation of health data applications:** Gezond Akkoord is a proof of concept to explore how people could register into the Health Data Cooperative of the Netherlands, driven in part by a vision to implement dynamic informed consent. HDCs would necessarily entail the technical and iterative ability to collectively consent to research collaborations. Iteration of consent is pertinent and central to Gezond Akkoord as this function enables patients to understand and reconsider what health data is used, and for how long. This would also further enable decision-making processes concerning prevention, diagnosis, and treatment of diseases. Patients may also be more encouraged to start using health informatics systems such as EPRs and mhealth apps; and then to share personal information about their risk of genetic susceptibility with relatives.

Risks and Limitations

- **Technical implementation of Gezond Akkoord:** Generally speaking, health data commons face a number of challenges when trying to develop a functional registry which allows people to determine the use of their data: for what purpose, by whom, and for how long. Gezond Akkoord is currently at a phase of testing what questions need to be considered when patients want to register their health data. Moreover, data management and transfer is out of the scope of this initiative, which facilitates consent and leaves data management and distribution in the hands of the partners that are developing the HDC. This points to the general difficulty of developing an entire data commons alone or from scratch, and points to the strengths of Gezond Akkord's focus and collaborative approach.
- **Definitions and communication:** It is difficult to explain concepts and mechanisms behind HDCs, especially when aiming to communicate a vision or clarify objectives, both to patients and to healthcare professionals. The willingness to use an HDC can vary depending on patients' concerns as well as their health and technology literacy level. Important concerns to address when communicating the purpose and functions of HDC are: public agency's data management, data utilization, data revelation, transparency, and anonymity (Wietzman et al., 2012).
- **Resistant healthcare professionals:** Personalized lifestyle advice, big data analytics, and data governance are not part of a traditional healthcare professional skill set, which risks rendering HDCs' adoption reluctant, difficult, or impractical. Roessel, Ruemann, and Brand (2018) advocate for a new type of health professional that is equipped with understanding and interpreting personal health informatics, or wellbeing data, and how this relates and interacts with patients treatment plans.
- **Citizen data sharing knowledge and restraints:** Citizens restraint towards data sharing is a threat to the HDC model, as data exchange is the principle of this model. Patients are often not sufficiently aware of the granular control they have over sharing

health data. This could have negative repercussions on the perception of HDCs. For example, among 261 experienced personal health record users, only 22.6% reported knowing that they can share part of their medical record as opposed to their whole EPR [electronic patient record] (Wietzman et al., 2012). Lack of appropriate knowledge on health data sharing, due to inadequate communication or poor interface navigability, may prevent patients from wanting to use HDCs. Moreover, citizens may be reluctant to share data through HDCs as it would mean giving third parties access to their personal medical information.

- **Handling sensitive data:** The inherent sensitivity of health data poses risks for ensuring privacy and data security. Numerous data-leaks, and otherwise data linking (i.e., re-identification techniques) and inference strategies, have brought to light how sensitive and personal information are all too often mishandled and distributed. For example, in commercial settings this could result in unwanted pharmaceutical targeted marketing. In an institutional setting, another risk example to be averted is the premature exposure of clinical trials (Roesel, Ruemann, and Brand, 2018). These are just a couple of many examples of dangers posed to people whose data are not secure, or who are not fully aware of the implications of sharing data.
- **Issues of reliability and validity:** Data gathered through HDCs are not gathered in the traditional manner (by professionals in a closed environment). Differences in methods, environment, data collection technology and more can all affect the data gathered.

Recommendations and Lessons Learned

- Health data commons are fundamentally about collective consent; not individual, but collective consent, because the aim of a data cooperative is to make use of citizen data together. Currently, when someone goes to the hospital or to a doctor, they can generally request to share or access their own medical data. The collaborative level, however, is lacking: When people want to do something together with their data, they need to combine sources, formulate combined consent, and ultimately provide useful data for analysts and researchers (author's summary of H. Duinkerken 2021).
- Conditions which may diminish citizen restraints when registering into an HDC have been identified. Willingness to share personal information increases:
    - when citizens have control over their data (i.e., what information and with whom);
    - when they are insured anonymity;
    - when they are given an audit trail of their health data accessibility and sharing;
    - and finally, when they have unlimited access to their health data (Whiddett et al., 2006; Weitzman et al., 2012; Kalkman et al., 2019).

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Case Study: Driver's Seat

Contributors: Danai Papathanasiou and Max Kortlander

Description

Ridesharing apps and the emergence of the driver-on-demand are disruptions to mobility on their own. The question remains unanswered as to whether ridesharing constitutes a supplementary or an alternative means to public transport (Lindsay, 2017; Çetin, 2017). However, the centrality of data to ridesharing's function and business model is immediately evident.

As drivers and ridesharing customers share various personal data such as location, bank accounts, electronic addresses and birth dates, the storage and use of this personal data can not afford any ambiguity. In the name of data transparency, and as ridesharing rapidly establishes its presence in urban mobility, the need to educate the users on data privacy and value led to the creation of Driver's Seat.

Driver's Seat is a driver-owned, North American, prototype of a rideshare cooperative. Acting as a form of data commons for ridesharing mobility, its goal is twofold: Primarily, Driver's seat aims to educate drivers-on-demand about their data privacy, production and value. Secondly, it provides the mobility data produced by drivers-on-demand to civil servants, for them to be used in the amelioration of mobility policies.

Driver's Seat stands as an intermediate between the individual driver and the ridesharing corporations. By installing the app, the driver gains certain insights into their data production, e.g. the miles covered, the duration of the drive, how many miles were paid. The data is then to be sold to civil servants, with the idea that any profit distributed as a stipend to the drivers (it was not clear whether or not drivers with the app are indeed actually getting such a profit). The app also aims to improve the driving experience, by informing the driver on the connection between their wages and driving strategies, depending on time and location.

Assets:

- **Approachability:** Downloading the Driver's Seat app is straightforward. The concept itself is comprehensible and helps to make issues surrounding mobility data more tangible. An initiative like Driver's seat has the potential to reach a large audience based on the simplicity of its premise.

- **Regaining the power of data from the private sector:** The rise of ridesharing mobility is emblematic of the gig economy. However, despite taking place in the urban environment, affecting mobility and urban life, the data produced by ridesharing apps

often remain inaccessible to city officials and to citizens about whom the data is produced. Driver's seat is one potential challenge to the artificial scarcity imposed on car mobility by the private sector as it encourages a direct collaboration between data producers (citizens) and local mobility decision makers.

Risks:

- **Opaqueness, limited functionality and small user base:** Information is lacking about Driver's Seat's precise data structure, and how it functions in practice. Little information in this regard is provided on the cooperative's website and most press on the topic comes from privacy advocates who support the concept of Driver's Seat. It is unclear how many people are using Driver's Seat. One particularly critical user review states 'This app is pretty much worthless, it has no functionality that I could make any use of whatsoever. This seems more like a prototype of an app rather than an actual working app itself' (App Store Preview). It is best to consider Driver's Seat as a prototype, proof of concept or an artistic intervention rather than a functioning data commons. It is not (at this point) a functional way for drivers to earn money, nor does it pose any sort of major challenge (in terms of use and profit) to ridesharing companies.
- **Different policy framework:** Driver's Seat was created and deployed in North America, where the framework in data privacy is a lot more compartmentalised and focuses on data integrity from a commercial perspective.
- **A temporary solution:** Driver's Seat is a great move towards data commons and towards the communication of data rights and value. It is however a temporary solution and much more, an external solution: It does not change the status quo or the mentality of ridesharing corporations.

Lessons and Recommendations:

Driver's Seat aims to disrupt another disruption – ridesharing and driver-on-demand mobility – by dealing directly with questions of ownership, use, and awareness that surround personal (mobility) data. Such a model can provide inspiration to European initiatives who are interested in pursuing mobility data commons, deepening the transparency of mobility data, or challenging the status quo in mobility data access and ownership. The experience also holds lessons for the practical difficulties in creating such an intervention, like garnering a wide user base, creating a clear and robust structure for data governance, and developing user-friendly technology that functions well and in accordance with an initiative's aspirations.

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Disruption: Mobility Umbrellas

Mobility is a multidisciplinary subject. It is intertwined with urban planning, economics, geography, physics, democracy, and more. Because of this multidisciplinary nature, mobility projects are often situated between or within separate departments. In response to this internal fragmentation, many cities have taken (and are taking) steps in order to bring their mobility initiatives together under a unified group. These 'mobility umbrellas' bring together people, projects, and datasets so that mobility initiatives may have a more centralised home within municipalities to share findings and knowledge and increase interoperability, collaboration, and uptake between them.

When developing mobility umbrellas, governments tend to face challenges regarding interoperability; large technical and developmental workload; 'WICKED' problems involving a wide range of various factors requiring diverse expertise; maintenance of services built in technical development; and positioning the mobility umbrella within existing organisational structures.

Mobility umbrellas face a general challenge in that the problems they face are often immediate, tangible, and difficult to address while their benefits may be more general and long term. Potential benefits include better services (for example, maps with integrated datasets); less repetition, overlap, and duplication of efforts; and the opportunity to realign (mobility) decision-making processes, ideally to include citizens further by making projects participatory, by making data open and accessible and by making decisions transparent and participatory. Such benefits are more likely to occur when a department leverages the development of a mobility umbrella to create cultural changes which bring in new talent and simplify workflows.

Note that the term 'mobility umbrella' has been developed by the writing team in response to this apparent development. While not used outside of the context of this report, the term refers to a trend which likely applies to many similar initiatives in unidentified municipalities. In addition to the case studies below, related efforts that fit the description of this budding phenomenon include:

- Amsterdam MobiLab
- Jätkäsaari Mobility Lab
- The Sustainable Mobility Forum of Bilbao

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The Sustainable Mobility Forum of Bilbao. https://pmus.bilbao.eus/

Case Study: Smart CitySDK (Amsterdam)

Contributor: Max Kortlander
Interviewees: Tom Demeyer (conceptual owner, architect, lead developer), Bert Spaan (lead developer), Job Spierings (project manager)

Description

Smart CitySDK was a European project that ran from January 2012 through November 2015. Its pilots researched and applied interoperability with regard to open data in three domains: tourism, issue reporting data, and mobility.

Smart CitySDK aimed to define services that can help open up data in the fields of Participation, Mobility and Tourism in various cities in Europe. More generally, Smart CitySDK was part of a broader effort in Amsterdam to open data in a way that was not only *available* but also *accessible*. In this way, Smart CitySDK is indicative of the technical challenges faced by cities who want to implement socially-oriented values (like openness) within existing data systems.

At the time, many (commercial) IT-vendors released SDK's: Software (or Service) Development Kits. The projects' premise was that if cities across Europe could agree on common data- and services standards, those standards could be released as an SDK in itself (notably as a *service* development kit rather than a *software* development kit – 'service' more accurately implies that efforts are ongoing and require maintenance). This would help open up the troves of governmental data for reuse.

Project partners spoke with potential data suppliers and application developers to meet the needs of both parties. Combined with questions from various cities in Europe, these needs could lead to services that are both generic and dynamic – think of, for example, services that help developers to make applications that offer personalized travel advice.

A pilot mobility study was conducted in Amsterdam. The applicability of the services were tested in Helsinki, Manchester, Barcelona, Rome, Istanbul and Lamia.

(Mostly) by necessity municipalities – and the departments within them – are organised into silos. Thus data often is also only available in those silos. For example different cities and departments use different systems for latitude/longitude, address formats or even concepts (consider 'snow', 'bicycle lanes', and 'tram' as terms which may be necessary in one city's database, and completely absent in another's). If one develops an application for city X, it's nearly impossible to re-use it within City Y. This provides a sort of chicken-egg problem: Cities do not make data available (because nobody is using it) and nobody develops applications using data that is not well shared. Development was thus fragmented: APIs, ontologies, and data models were generally non-interoperable. This led to the problem that cities' individual

services were unable to be linked to something bigger, and could not be shared and replicated in other contexts.

The pilot in Amsterdam aimed to work towards a set of standards in the mobility domain. The pilot started with using the OpenStreetMap database as a base-layer. Next, the then quite new GTFS standard was adopted. (GTFS defines a common format for public transportation schedules and associated geographic information.) Waag then made an ontology/data-model and API in which a city could link any geographic dataset to the base-layer of OSM. The pilot uncovered a number of issues related to the adoption of such a standard in a new cultural context (for example, that Amsterdam required a field for bicycle racks, and Helsinki has winter conditions requiring different ontologies to account for local context). More importantly, the pilot process demonstrated the added value of linked data to municipalities and catalysed cultural and technical changes within the Amsterdam municipality that made such interoperability possible.

Assets

- Through the City SDK pilot, the municipality identified the need to adopt JSON standards for data. The city was previously relying on XML data, which was widely considered to be corporate, outdated, and inaccessible to the human reader. By translating a number of XML APIs into JSON-LD (json linked data) APIs, the city was able to attract external developers more easily and ultimately build more interoperable, easy-to-use software. This, in turn, led to ‘cleaner’ and ‘easier-to-read’ webpages and data visualisations.
- City SDK helped to put data on the map (figuratively and literally) within the Amsterdam municipality. Following the project, which helped civil servants to be aware of the data that their own and other departments had, the city then developed maps.amsterdam.nl, launched the Amsterdam CTO as a permanent fixture in the municipality, and established the ‘Datapunt’ (a technical data-infrastructure) and ‘Datalab’ (an application geared towards use of the resources) as organisational units. Open maps are a valuable resource for Amsterdam citizens, both in daily life and as a crucial source of information in citizen-centred participatory processes.
- Mobility as a topic requires much knowledge of the physical structure of a city. The project therefore provided easy access to a variety of databases, apart from the strictly mobility related ones, like buildings & addresses and street furniture, for instance. Applications other than mobility related ones were also facilitated by this effort (for example, the creation of historical maps).

Risks and Limitations

- The amount of data held by municipalities is often vast. Translating APIs, addressing errors in data, and creating functional interoperational services require a large development and organisational effort. Expect that such changes will occur incrementally.

- Many of the original SDK services are outdated or not maintained, and are no longer in service. When discussing or promoting apps, applications or websites, policy makers may expect a one time effort. In reality, however, *services* are often developed which require continuous maintenance, attention, and funding as part of the specific domain's operational continuity. Developers working on applications using these resources are acutely aware of this and will worry about sustained commitment, but may not have the position to be heard.

Recommendations and Lessons Learned

City SDK helped policymakers to understand the scope of the problem to be addressed with regard to interoperability of mobility (and other) data. In this regard, the project was ahead of its time and provided pilot cities with the opportunity to have a head start on data as a resource and addressing interoperability, first within municipalities, and later between them. The challenge of interoperability reveals a labyrinth, which is still being explored today through projects like Urbanite.

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Case Study: Messina Municipality Data Collection/Exposure

Contributors: M.Villari, G.Parrino
Interviewee: F.Musso

Description

The need to improve and control Messina's traffic situation has grown over the last few months (in part due to Covid-19). It was therefore decided to collect and carefully order a discrete variety of data sources relating to the state of air pollution, traffic and public transport in the city of Messina. The information, obtained from heterogeneous data sources, concerns different areas:

- electromagnetic noise
- noise pollution
- air quality
- electric bikes tracking
- weather conditions
- bus/tram tracking.

The project saw the creation of different services that allowed the municipality to harvest data in different ways and formats. Created services include:

- **OpenGTS** (*private instance*) – Open GTS is an open-source web-based GPS tracking service that provides the municipality with all data received from all vehicles of the Public Transportation Company. This system allows Messina municipality to analyze and visualize historical data.
- **Idra** (*private instance*) is a web application able to federate existing Open Data Management Systems (ODMS) and provides the user a unique access point to access open data-sets coming from heterogeneous sources. Idra is a Fiware “Generic Enabler” that the municipality would use to enrich meta-data and share harvested data in the form of OpenData.
- **Public data sharing** - REST API was created in order to improve the interoperability of the Municipality of Messina with researchers and private companies. It is possible for people who are interested in creating their own analyses to access harvested data “directly” through the API.

In order to store harvested data, the main question for the municipality involved which database to use and, subsequently, which services or tools would be used to expose the data.

The first question, about databases, was solved adopting two different types of database: **MongoDB** and **Influx DB**. This choice was adopted in order to increase the performance of the queries in function of the data we will store in them.

A ***Time Series Database*** is a software implemented and optimized to store and process "time-stamped" information, i.e. data associated with a date that uniquely identifies a moment in time. It is therefore a database implemented to manage metrics, events and measurements always projected in the time axis.

MongoDB is a document database: This means that it stores data in the form of JSON-type documents. This approach is not the traditional table-based structure of relational databases and provides a dynamic schema that permits data integration in an easier and faster way.

Regarding the second question of which service to adopt to expose the harvested data, the municipality adopted three solutions using:

- REST API
- IDRA GE
- OPENGTS

Rest API permits the use of specific data in a simple way because it does not require the user to know a specific query language to obtain information from the relative database. The second solution (**Idra Generic Enabler**) is a tool that allows the municipality to create Open Data catalogs more easily. **OpenGTS**, is a web-based tool that can track GPS vehicle data in a simple way and expose them via a clear user interface.

Assets

- **State of the art for Messina Municipality** (*data available*) – This is a starting point from which it is possible to elaborate real use cases in ordering and sharing public datasets. This is a necessary step in order to consider potential technical and architectural solutions which are now possible due to this effort.
- **Architectural structure study and definition** is the natural continuation of the previous step. This is the moment when decisions are made about ***what to do*** and ***how to do it*** in architectural terms.
- **Data collection/harvesting** is an important step because at this stage it is necessary to decide *what types* of data are necessary to the scope, and *which way* all data will be collected *(*e.g. specifying technologies, tools, and so on...).
- **Infrastructural services** (*databases, proxy, server*) – These are the main assets through which the entire architecture will operate. They are responsible for the orchestration of the “flows”, i.e., the *token request/generation* needed for accessing data.

- **Database organization –** This is the step dedicated to the high-level organization of the harvested/collected data and the related form in which the databases will store them (Collections, Time Series, and so on...).
- **REST API creation –** Once the system is up and running, the rest API is one possible way to share data. (The municipality also provided two other ways to share data with *OpenGtS* and *Idra*).
- **Swagger for API documentation –** Swagger is a web tool that permits the municipality to share "information/documentation" about data available in their system (in this case) and the way to access them; it is a sort of digital handbook.
- **OpenGTS** (+ *dump historical data from public Local transport company databases*) – Open GTS is a web tool, as said before, that englobes all historical tracking data, and is useful to obtain deep analytics about the "fleet flow" without using specific query/interrogation languages.

Risks and Limitations

- The main risk in the use case described is related to the data's reliability and correlation. Available data come from heterogeneous sources. Systems that provide data and the sensors that collect it were not conceived and designed to work for a common purpose.
- An open problem is related to the mode in which data will be exposed: in raw format or processed form? Does the target need a different mode?

Recommendations and Lessons Learned

- It is necessary to lead an accurate preliminary qualitative and quantitative analysis of data sources in order to make the right technical choices.
- Different open technologies can coexist, but may require extra effort to make them interoperable.
- The project goal was to facilitate the analysis of heterogeneous data – simultaneously the municipality had the possibility to create a good "interoperability" channel between departments and the set of technologies and tools built gave them the chance to partially overcome the actual "silos" system.
- Regarding the system's use, the municipality hopes to have reached a "good and practical" way to *share the data between users, departments* and so on, in order to avoid the so-called "silos effect". The main aim of the project is the sharing of data – the ideal impacts are usability and, especially, **interoperability.** For the moment data has been shared with different actors that are working with municipality's projects.

By means of these actions the municipality hopes to increase the data-sources in order to enhance system capabilities.

Disruption: Active cities

Active cities aim to motivate citizens to move and interact in community-driven ways in public spaces. Sometimes this takes the form of mobility initiatives; in other cases active cities may promote green/environmentally friendly living, or serve to spur face-to-face interaction among citizens. Whatever the goal may be, active cities tend to involve a playful approach that reimagines new active uses for existing public space.

Active cities hold potential to be places where people come together as communities to drive meaningful change that is owned and directed by the citizens themselves. Achieving this, however, is neither easy, nor straightforward, nor quick, nor cheap, and can easily fall into the traps and dilemmas encountered by smart city initiatives more generally. Questions to help understand this dynamic include:

- To what extent does an initiative answer community needs from the bottom up, rather than prescribe solutions from the top down?
- Who owns the data gathered by these initiatives? How is it managed?
- To what extent is there surveillance, or other products of the initiative that are counter to human rights and shared values?
- In the end, who really benefits? Companies? Governments? Citizens? Which ones?

Co-creative approaches, shared ownership, flexibility and transparency of project plans can all help to keep active cities initiatives on track – to place citizens at the center of priority and decision making in their own cities.

Case study: Boston Beta Blocks

Contributor: Danai Papathanasiou

Introduction

The smart city imaginary (Lindner, Meissner, 2018) exists between the dichotomy of the urban planners' vision and the citizens' dearth of it (Rose, 2018). The limits of the citizen's understanding and imagining of the smart city are set by their exclusion from envisioning and creating it.

In response, the *smart citizen* approach challenges the estrangement between smart city and citizen. The smart citizen approach prioritises the role of citizens in defining the limits and uses of technology in their cities through citizen sensing, participation and co-creation (Veenkamp, Kresin, Kortlander, 2020). Uptake of these ideas are evident in practice as cities experiment with co-creation, living labs, workshops and pilots.

The Beta Blocks project took place in 2018-2019 in Boston, merging gamification with co-creation, and sheds light on the friction that occurs when a smart city project adaps elements of a smart citizens approach. Beta Blocks' stated goals were to educate people, amplify their voice and opinions on urban technology and help them invest in the technological evolution of their urban surroundings. From an outside perspective, it is difficult to judge the extent to which citizen involvement drove the project, which is drawn into question due to the project's emphasis on companies as co-creative partners and its reliance on technology from Microsoft and Amazon Web Services.

Description

Boston Beta Blocks was a collaborative project between The Engagement Lab @ Emerson College, the Mayor's Office of New Urban Mechanics and Supernormal. It aimed to establish the agency of the citizens of Boston in the testing of new technology in their living environment and to explore the potential for civic co-creation. Divided into four components, citizens were invited to test new smart technology and provide feedback through sessions like meetings and walking tours.

The four components consisted of 1) a travelling exhibit (Beta Blob), 2) the setting of three "Exploration Zones" in three districts of Boston that would adopt the to-be-tested smart technology, 3) Tech Explorers, a group of young people that was recruited and trained to run and evaluate the to-be-tested smart tech, and finally 4) the co-creation sessions, with urban stakeholders and citizens.

The completion of the pilot resulted in:

- A roadmap for a people-centered smart city policy, authored by the creators of the project (Gordon, et. al, 2020).
- A Boston Smart City Playbook, authored by the municipality and with the form of a manifesto.
- An academic case study research on gamification and urban policies (Peacock et. al, 2020).

Assets

- **A discussion on the smart city:** Beta Blocks explicitly notes the need for further citizen input regarding the role of technology in the city in the form of a "public privacy policy".
- **Beta Blob:** The Beta Blob aimed to inform and educate people and local governments on data and technology, showcase data, and make that data accessible and transparent. In the case of the Beta Blob, there was interaction between the participants and the gathered data that the municipality uses for mobility policy making.
- **Gradual immersion:** The four different, independent and non-successive stages of the project, allowed citizens to have a gradual and rounded immersion into the project and a deeper understanding of the meaning of people-centered smart tech. Citizens were involved in the formation of the technology and in the communication of the project to the public (with the Tech Explorers).

Risks

- **Visibility of citizen participation in outcomes**: The project's tangible outcomes do not seem to clearly express the voice of the citizens, how the new technology was driven by citizen needs, and how citizens view the new urban smart tech. The project did indeed provide suggestions on how to make a person-centered smart city, but the tangible results of this citizen perspective are unclear in the tech that was used (for example, smart billboards and parking sensors).
- Integrating Microsoft and Amazon Web Services in the Exploration Zones raises **concerns about the privacy** of the data and of their non-commercial use. The core of a smart citizen approach should be the transparency of the data footprint, which unfortunately in this case, is not easily accessible.
- The goal to give the microphone to the people was somewhat achieved; however, the people were introduced and asked to test pre-selected technologies. The needs and requests of people in a neighbourhood should be more central in identifying and prioritizing needs, ideating and voting on solutions, and implementing and assessing those solutions.

Recommendations and Lessons Learned

Putting the citizens in the centre of urban policy making, whether that is smart technology, mobility or other, should be the main goal of smart city efforts. Documentation (academic texts, interviews, open web forums) ought to be visible and include the voice and views of the citizens. A smart citizens mentality was visible in – but not central to – this project, which ultimately raised questions faced by many smart city initiatives: Who owns this data, and who are its real beneficiaries?

Overall, Boston Beta Blocks made some promising strides towards technical democratisation; from informing citizens, to recruiting them – as in the case of Tech Explorers – to introducing new technology directly to people. The project made valuable contributions with its stated goals and published materials, but the technological outcomes of the project indicate the difficulties of deeply instilling such values in the deployment of smart city technology. Despite the ambition and successes of the pilot, Boston Beta Blocks did not evolve outside of the pilot (further Beta Blocks technology was not adopted by Boston).

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Case Study: Lisbon E-Bike Initiative and Pop-Up Lanes

Contributor: Danai Papathanasiou

Covid-19's unexpected emergence created a new context in which to consider urban matters. Adding to the already vast discourse in the urban field on reducing carbon footprint, the distance and safety measures that are required globally for almost a year now limit the options for public and environmentally friendly transportation.

Cities with an established use of bicycles as main means of transport, like Amsterdam and Copenhagen, had the advantage of opting immediately for the limitation of use of public transport without an environmental encumbrance that may be expected in other cities where cars are the most likely 'physically distanced' alternative to public transport. The question lies therefore on what the options are for cities without an established cycling culture, where the land and infrastructure pose challenges to cyclists that are not found in the relatively flat Netherlands and Denmark.

The Lisbon bike mobility initiative derived from the city's annotation as Green Capital 2020 and the unexpected reality of Covid-19. Since 2016, research has been ongoing regarding the implementation of a bike infrastructure in the city centre (Félix, Cambra, Moura, 2020). Public behaviour and disposition on biking were examined in order for the city to understand the source of discouragement for bike mobility thus far. The lack of bike infrastructure and particularly the hilly landscape of Lisbon (the city of the seven hills) are noted to be the main reasons for the lack of a cycling culture in Lisbon.

The Municipality of Lisbon addressed the implementation of biking mobility by:

- Expanding bike lanes (both permanent and 'pop-up' lanes).)
- Providing grants for bicycle purchases for people who live, work and study in Lisbon.
- Constructing bike sharing spots and parking.
- Providing cycling courses for all ages.

Assets:

- **Investing in the future of mobility**: In many cases, shared bike stations did help with promoting biking as means of commuting. Owning a bike however, encourages investment in biking, interest in the infrastructure, and the formation of new opinions about cycling as a mode of local mobility. Similarly, the adult and minor cycling courses allow for education about bike traffic in a manner akin to getting a driver's licence. This, in turn, can help to foster cycling as an established transportation norm.

- **To each their bike:** As opposed to simply providing public bicycles, funding ownership allows people to choose a bicycle that suits their own needs; whether a cargo bike, an electric bike, or a standard bicycle. The family targeted cargo-bike caters to the city's large population of car drivers.
- **Sustainable infrastructure:** Bike ownership does not require budget for the restoration and preservation of the public bikes, which many times get to be vandalised or broken.

Risks:

- **Potential for non-continuity**: Despite any possible success of the project, it has not yet been verified that the bike lanes and the funding will remain after the next elections.
- **Competition with car owners**: There is considerable protest against the bike initiative, particularly from car owners. The pop-up lanes are seen as an unnecessary inconvenience, since car drivers greatly outnumber cyclists (Câmara Municipal de Lisboa Departamento de Marca e Comunicação, 2019). Some streets in Lisbon where the bike lanes were extended are now facing increased car traffic congestion. The frustration of the car owners or a perceived 'us vs. them' mentality between cyclists and drivers can lead to discouragement in adopting the bike initiative (Palma, 2020).
- **Competition with neighbourhood citizens**: Some residents of neighbourhoods where the pop-up lanes were implemented oppose the new mobility measures. Through online neighbourhood groups and online petitions they demand the removement of the bike lanes. Their main argument is based on the excessive traffic congestion and subsequent noise pollution, when the amount of bikers does not excuse the limitation of the car lanes. (Lusa, 2020).
- **Danger in the street:** One of the measures for the new initiative was to establish bike mobility courses. However, courses are only planned for cyclists and not for car drivers, which is a risk as bikes and cars need to co-exist in traffic.

Recommendations and Lessons learned:

- The Lisbon bike initiative is an example of how cities and civil servants can show versatility and adaptability to the character and needs of the citizens. After paying attention to what has discouraged people in Lisbon to adopt the bike as their main means of transport, the municipality tailored their endeavour to cover these specific needs and concerns.
- In this program, citizens own their own vehicle which they have personally purchased and which suits their needs (for example, the option to choose an E-bike). This level of ownership, coupled with infrastructural changes like the extension of the bike lanes, seem to have helped smooth the transition to cycling mobility.
- The adaptability of the Lisbon bike initiative was demonstrated during a quick response in the wake of Covid-19. The emptied streets of the lockdown can be translated into an opportunity to ameliorate the biking infrastructure and promote a sustainable mobility mentality alongside prioritising citizen safety.

- Despite the possible boons of Lisbon's mobility transition as an answer to the increasing need for social distancing, other means of public transport should not fall into obscurity and neglect. Lisbon's public mobility has been challenged since the financial crisis of 2008, leading to the privatisation of bus and tram transport, and therefore to the increasing exclusion of under-privileged citizens. While bike mobility is to be supported it should not cause scarcity to the rest of public transport means (Nikolaeva, et. al, 2019).

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Disruptive Technology in Society and Governance

Disruption: AI/Algorithms in the Public Sector

Artificial Intelligence (AI) and algorithms are gaining in complexity. As their complexity rises, they become more difficult to assess and understand, becoming ‘black boxes’ in which it may be impossible for a human to know how the technology works, or how it came to a certain conclusion.

These ‘black boxes’ may be especially problematic when they are part of decision-making processes (in democratic governments, no less). Increasingly, however, AI and algorithms *are* making decisions that affect who has access to what, under which circumstances. Even in the most banal applications, this can have unanticipated consequences regarding power, citizens, and state.

The two case studies below indicate the wide range in which AI is applied by governments. Charging stations for electric vehicles may seem straightforward, but even here issues of priority, access, and descrimination arise as public decision-making processes (in this case, determining who has access to electronic vehicle charging stations, in which order, at which cost, and under which conditions) are increasingly automated. In contrast, gender violence is a horrific problem, and presents a more complex and pressing issue. The stakes are high, and errors in prediction models can result in a high cost in terms of violence, human suffering, and injustice. Both cases indicate the need for openness, transparency, and human oversight in the design and deployment of AI.

Generally, it seems that the *power* of a technology is proportional to its potential to both help and harm. Obvious questions surrounding AI are: Is it worth the risk? Under what circumstances can it (and can it not) be used? What measures keep AI in check? These questions should be explored further, not only by those who encounter and work with specific instances of AI, but also by citizens and leaders via deliberation in the public sphere.

Case Study: VioGén 5.0

Contributor: Raúl Tabarés

Description

VioGén 5.0 is the latest version of the “Integral Follow-up of Gender Violence Cases System” (*Sistema VioGén* in Spanish) that was released in March 2019 (Gobierno de España, 2019). The system has been in place since the 26th of July of 2007 and it was initially launched by the State Security Secretary of the Spanish Ministry of Home Affairs, according to the Organic Spanish Law 1/2004 of the 28th of December that aimed to establish several measures to enable integral protection against gender violence (Gobierno de España, 2004). Some of the objectives that are promoted by the Law such as making “risk predictions”, “evaluating victims’ risks” or “enabling automated notifications” have been the subject of aided automated decision making by the introduction of Artificial Intelligence (AI) technologies (Chiusi, Fischer, Kayser-Bril, & Spielkamp, 2020).

The new version of the software identifies cases where the risk is high (“special relevance”) and others “with minors at risk” throughout a “dual evaluation procedure” of the new VPR (Police Risk Assessment) form (López-Ossorio, González-Álvarez, & Andrés-Pueyo, 2016). This VPR is composed of 39 items in an online form that a police agent fills upon the information provided by a woman that wants to report an assault from an intimate partner. The agent can also use information coming from witnesses, material evidence, and other databases to fill in the questionnaire. The questions are oriented to assess the harshness of previous assaults (use of weapons), the characteristics of the attacker (unemployed, drug addict, alcoholic, etc.), the vulnerability of the victim (economically dependent, migrant, etc.) and other aggravating factors. All of this information is processed by a mathematical formula that provides a score that evaluates the risk of the aggressor towards the repetition of an assault.

The new VPR form (VPR5.0-H) has incorporated a new calculation that runs in parallel with the former one and that is oriented to evaluate the risk of a lethal assault. This “H-scale” can increase the risk automatically and can stress a particular case with an “special relevance”. Little information has been disclosed about how the “H-scale” works but it has been built upon a 4-year-long study which involved various psychology experts from different Spanish universities. On the contrary, there is a significant amount of public information about how VioGen has been built and how it operates although there is no open code available for the system (González-Álvarez, López-Ossorio, & Muñoz Rivas, 2018). The system is one of the most complex of its kind in the world and its technical efficiency has been measured throughout the “Area Under the Curve”(AUC) which measures the performance of these kinds of predictive models. VioGén scored a reliability between 0.658 and 0.8 (López-Ossorio, González-Álvarez, Muñoz Vicente, Urruela Cortés, & Andrés-Pueyo, 2019). As an illustrative example it is worthy to stress that cancer screening tests usually are considered good when they are between 0.7 and 0.9 (1 is considered as the model never fails and 0.5 as good as a coin toss). In addition,

80% of women that have benefitted from VioGén considered the service as “very satisfying” (González & Garrido, 2015) which also helps the system’s public perception.

Despite the nice technical performance of VioGén, the system is far from being perfect and recent episodes of shocking gender violence where the system scored a low risk of aggression have attracted great attention by the media (Álvarez, 2014). In this sense, there are several points that remain problematic. Firstly, police agents seem to have not been adequately trained as only around 30.000 of them (including regional departments and different bodies) have been trained in the system and only 800-1000 can have access to the system at the same time. This can partially explain why the diagnosis made by VioGén is rarely edited or modified by a human user (in 95% of the occasions the diagnosis is not modified by a human user). The necessary human feedback to the system, which makes it more reliable, is not being provided enough times (only in 5% of cases), mainly because of a lack of available training for officers (González-Álvarez et al., 2018). Secondly, the lack of awareness about gender issues also seems to play a role in this problem as police bodies and law representatives do not have adequate training in these matters. Lastly, the system seems to be working in an incomplete form as the original law that triggered the development of VioGén also demanded the involvement of an interdisciplinary team, including psychologists, social workers and forensic doctors that can study in detail the context that surrounds the victim (Precedo, 2016). These considerations have stressed the need of making the code behind the algorithm open and public for audit.

Assets

- In Spain, there is a **growing awareness about the importance of fighting against all forms of gender violence** and to protect victims and minors of this kind of danger.
- There is an **associationism culture around gender violence** that supports not only the development, implementation and improvement of these systems but also training, skills development and toolbox support on gender issues for police agents, judges and attorneys.
- VioGén offers reliable **technical performance and reliability** for predicting future risks related to gender violence.
- There **is a legal framework** that promotes and enhances the development of VioGén and can extend its evolution and reach.

Risks

- **Technical, legal and social opacity –** There are several documents available where citizens can understand how VioGén works but there are still several technical, legal and social barriers that impede its social appropriation. Public release of its code and more disclosure of restricted information can help to mitigate this opacity.

- **Lack of adequate training for maximizing VioGén efficiency –** Relatively few users have been involved in adequate training to properly manage the system.
- **Absence of interdisciplinary teams to evaluate risk scores –** Although this element was originally conceived in the Spanish Law that triggered the development of VioGén, the reality is that police officers are not carrying out these assessments with the help of psychologists, social workers or doctors.
- **Involvement of end-users or other stakeholders affected by its development –** Another aspect that could be beneficial for the improvement of the system is the direct involvement of women that have suffered this form of violence in the past. This will fine-grain solutions for improvement throughout a user perspective.
- **Privacy and Security trade-offs –** The VioGén system is touching a very complex, controversial, polemic and at the same time critical issue for a secure, inclusive and resilient society. Trade-offs between different values that can be in conflict throughout technological development, such as privacy and security, might be expected and need to be handled with care. This demands multi-stakeholder collaboration.

Recommendations and Lessons Learned

As discussed, VioGén is probably one of the most complex and automated decision-making systems developed in the world aimed towards the mitigation of gender violence. From a technical point of view the system seems to have a nice performance but there is also room for improvement. A major weak point is the absence of a socio-technical integration approach (Fisher, 2019) through the involvement of Social Science and Humanities (SSH) experts that can improve its reliability and clarify the context in which the victim is situated. This will confer to the system a more qualitative approach that is currently missing. This was also proclaimed in the Spanish Law that triggered the development of the system, but the current situation is that police officers are not conducting these assessments, probably due to budgeting reasons and lack of resources or connections with other stakeholders.

Spanish society seems to be increasingly aware about the importance of addressing gender violence. Despite this awareness, nearly half of the population people declare knowing of at least one case of gender violence in their own social network (Público, 2020b). Covid-19 has probably contributed to worsen this situation due to forced lockdowns, mobility restrictions, business bankrupts and forced unemployment which can have affected heavily to women with economic dependency to their partners or with economic problems. In this sense, it seems that it is of utmost importance to facilitate the diffusion of the system into society and to improve VioGén with different non-technological resources and tools for helping to achieve a better and more comprehensive system.

Multi-stakeholder collaboration and participatory decision making can also not only improve the VioGén system but can also favor the social appropriation of this technology by society and promote the role of AI in the public sector for fighting gender violence (Público, 2020a) – a problem which poses a major challenge for Spanish society.

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Case Study: **Public Stack for charging infrastructure**

Contributor: Hannah Grijns

Description

Public Stack for charging infrastructure is a recent publication commissioned to Waag by the Netherlands Enterprise Agency (RVO) and Topsector Energie, in line with the Club van Wageningen guiding principles (a network of changemakers on the digitalizing energy transition). It proposes the Public Stack as a methodological model for the arrangement of physical and digital charging infrastructure for electric vehicles (EV), a domain that has huge potential for contributing to climate targets and the acceleration of the energy transition. With the use of EV projected to grow exponentially in the coming years and especially in light of the upcoming flexibilization of the energy market (that will result in fluctuating electricity prices), it is key to take the citizen as starting point in the development of charging infrastructure to ensure a fair, transparent, inclusive system.

The paper includes two case-specific propositions to ensure that the flexibilization of the energy market does not affect citizens negatively: the concepts of basic rights and public defaults. The former advocates for a set of *basic rights* for each citizen in order to strengthen their position amongst stakeholders with diverging goals (such as purely commercially driven). For instance, each EV-driver has the right to a minimum guaranteed charging speed, on top of which a graduated charging profile could be referenced. The second proposition is especially aimed at protecting citizens from *profiling*, which will potentially become more commonplace due to increasing digitalization of user data within the EV charging landscape. It is essential to respect individual privacy and freedom, not only on moral grounds but also for security reasons. The paper thus proposes *public defaults*: parameters for individualized profiles are not based on personal data, but rather on collectivized (social-economic) contexts and so form a useful basis for system optimization and personalized services without disclosing sensitive private data. A system of public defaults would be built on various pre-conditions and requires further elaboration.

Where *governance* provides an overview of the playing field and its stakeholders, a clear conception of *identity* is necessary to determine how to formalize these actors in such a way that the implications of governance decisions (regarding these actors) become digitally trackable and justifiable. The paper proposes a granular, contextual approach to identity, aiming for a minimal amount of shared user data. The idea of attribute-based credentials (such as IRMA) has potential in this respect, but requires further elaboration to be fully applicable to this case.

The research process involved a number of interviews and a consultation with experts from the fields of digitalization, the Internet and electric transport. This expert willingness to contribute in an expansive manner, augmented by the publication's raison d'être in the first place, highlight

the widely felt sense of urgency both politically and academically regarding the energy transition and digitalization, as well as the general momentum for design thinking and participatory approaches in mobility.

Assets

- This publication underlines the importance of using a broader conception of the 'citizen': not only as end-user of a product or infrastructure, but as actively participating in its building blocks and design. Additionally, also indirectly affected citizens are involved in decision-making processes (i.e. in this use case: not only EV-users, but also other neighborhood residents are included, as charging points are placed in public space, affect the public electricity grid and sometimes receive public funding).
- Two new propositions ('basic rights' and 'public defaults', elaborated above) are useful to ensure that the flexibilization of the energy market does not affect citizens negatively.
- The use of data commons (as a system of federated data management) and a granular, contextual understanding of identity (e.g. attribute-based credentials), both rooted in clearly defined and open governance structures, are suggested as elaboration of the technology stack of the desired mobility innovation.

Risks and Limitations

- The publication is only a theoretical model and remains as of yet to be put in practice. That sets the use case apart from other use cases in this study.
- 'Public defaults' can be valuable to protect individuals from profiling and the invasion of privacy, but a considerable amount of research remains to be done to further develop this proposition. For instance, how does one define the boundary of a social-economic context?
- When developing charging infrastructure along the lines of the Public Stack in practice, it is crucial to find a balance between actively involving citizens in every step of the technological development, versus many citizens' wish for comfort and convenience. How do you secure that (physical and digital) charging infrastructure – or any other technological development, for that matter – is transparent and comprehensible to the average user, without expecting their expert input on each component? Moreover, how do you ensure that each involved stakeholder group (including each group of affected citizens) is legitimately represented?
- EV charging infrastructure should not be seen as an entirely separate system, as it in fact forms only one component of the larger energy system. In the long run, it is key to work towards one integral system of users and assets (including interoperability on the level of protocols etc.), which means applying the principles of the Public Stack on a much larger scale.

Recommendations and Lessons Learned

- There is a shared sense of urgency regarding the energy transition and its digitalization (also coined the 'Internet of Energy') and a general willingness to contribute to an alternative, more participatory approach to mobility and data management; it is pivotal to make use of this network of existing knowledge and key players in a certain domain. The Public Stack provides a concrete methodological model for developing (citizen- or community-) concern-driven technology and infrastructure that are based on public values.
- The coming years will see a constantly changing conception of mobility, rooted in a number of developments. One such development is the upcoming flexibilization of the energy market; this has the potential to catalyze the transition to decentralized, renewable energy sources but simultaneously poses the risk of untransparent business models and energy injustice. Thus, it is key to keep actively including the citizen's perspective in decision-making processes in any mobility question.
- This publication mainly underlines that taking the citizen as starting point *is* possible when developing a (mobility) technological innovation, by securing the citizen's (opportunities for) active involvement in each layer of the technological development. As such, the technology refrains from being a black box and is instead built on shared public values (rather than commercial/private or state values), in order to strengthen the individual's position in a more dynamic energy system.

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Disruption: Ethical Guidelines for the use of AI and Algorithms

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There are many existing guidelines for the use of AI and algorithms. For Urbanite partners and others working with AI in Europe, the EC Artificial Intelligence Strategy's 'Assessment List for Trustworthy AI' (discussed in our case study) is fundamental to read and follow. The EC's guidelines aim to ensure that the European Convention on Human Rights is applied to AI. In addition to GDPR, there are also other national, state, local guidelines and requirements which vary between governments but may nonetheless be necessary to consult when working with AI in Europe.

Other (often independent) guidelines can aid the ethical implementation of AI and algorithms. These guidelines vary in all sorts of ways: the level to which they are legally enforced, technical specificity, aims and goals, and applicability to various sectors and scenarios. As part of Waag's Transparency Lab, Petra Biro contributed a summary and analysis of existing AI guidelines, almost all of which agree upon the principles of explainability, fairness, and accountability, but vary in their approach to ensuring these principles: ('For example, AI4People focuses on more abstract principles, while Center for Democracy and Technology (CDT) offers concrete technical considerations' (Biro). The organization Algorithm Watch has compiled a comprehensive AI Ethics Guidelines Global Inventory, containing a large set of AI ethics guidelines from various sources and in various sectors.

In addition to the EC's Assessment List, other useful starting points for ethical AI development include: FATML's Principles for Accountable Algorithms and Social Impact Statement for Algorithms; and AINow's Algorithmic Impact Assessment.

The existence of so many non-binding guidelines and assessment tools is indicative of the problem that, for now, the burden of choosing and ensuring an ethical approach to AI lies on developers. This problem could be addressed through enforceable, accountable shared rules for the development and use of AI; and by programs which fund (human) resources to help public administrations, companies, and others to help reduce the burden of compliance. There is movement in this direction within the European Union and other democratic countries. A comprehensive approach should offer concrete technical options that **adhere to fundamental human rights by design** in order to uphold civil rights in light of AI's further use and development.

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Case Study: Assessment List for Trustworthy AI

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Description

The Assessment List for Trustworthy AI was developed by a high-level expert group on artificial intelligence to 'translate the [EC's] Ethics Guidelines into an accessible and dynamic (self-assessment) checklist. The checklist can be used by developers and deployers of AI who want to implement the key requirements in practice.' It provides practical instructions for how organisations can utilise and implement the requirements, which are:

- Human agency and oversight
- Technical robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination, and fairness
- Societal and environmental well-being
- Accountability

Assets

- The Assessment List provides useful instructions and guidance for those developing and working with AI.
- The Ethics Guidelines' foundation is based upon fundamental human rights found in the European Convention on Human Rights, taking a step towards applying the same rights and values that we value in our daily lives to technology.
- The Assessment List includes a glossary and is written in accessible language. It is practical and able to be understood by those without expert knowledge in the field of AI.
- The publications set the tone for the EC's official stance and approach to AI.

Risks and Limitations

- The Ethics Guidelines and Assessment List are not binding, but instead state that they are 'intended to help organisations identify how proposed AI systems might generate risks, and to identify whether and what kind of active measures may need to be taken to avoid and minimise those risks.'
- AI guidelines alone may not foresee, cover, or mitigate all risks involved, especially because the field is relatively new and some of its risks are unknown. It is important that those developing and employing AI not only follow (bare minimum) standards, but that they also develop technology in the 'spirit' or 'intent' of the guidelines. The Assessment List acknowledges this cultural component of AI trustworthiness, noting that 'Organisations will derive the most value from this Assessment List (ALTAI) by active

engagement with the questions it raises, which are aimed at encouraging thoughtful reflection to provoke appropriate action and nurture an organisational culture committed to developing and maintaining Trustworthy AI systems.'

Recommendations and Lessons Learned

- Urbanite project partners and others working with algorithms and AI should absolutely read, share, and follow the EC's ethics Guidelines and Assessment List.
- Note that these guidelines are not exhaustive – it is encouraged to go above and beyond them where possible to protect human rights to the fullest extent. In some cases, national, regional, or local requirements may need to be additionally followed.
- The EC's digital ecosystem containing the Assessment List and other resources for AI could benefit from additions: case studies or real life examples of how these guidelines have been implemented; persons of contact and/or helpful external resources to aid implementation.

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Conclusions

- Disruptions do not (usually) seem disruptive. On the local level, the implementation of a particular disruptive innovation may indeed lead to change, but does not often radically change the status quo.

- Disruptive innovations are not inherently good (or bad). Disruptions may lead to unfairness, exacerbate existing inequalities, or threaten shared values like privacy, safety, and autonomy. Care must be taken to protect against such dangers, and even then, a disruption may have unintended consequences. A disruption cannot be 'generalized' but is relatively successful or problematic depending on the way in which it is deployed, the role of citizen participation in its deployment, and the quality of the effort put forth by people on the ground particularly with regard to adherence to ethical principles and social values.

- There is a need for transparency and openness regarding the use of disruptive technologies. This requires strong documentation, meaningful points of (human) contact, accountability mechanisms, public oversight, and more.

- Co-creative and participatory approaches in mobility can help to uphold fundamental rights; and help to maintain relevance (most specifically, to ensure that citizens are the key beneficiaries of data used by municipalities). Citizen participation is crucial when designing a smart city pilot, building new data management structures, or implementing ethical guidelines. Any project or technology that affects society ought to include society and be based upon shared values and principles. Initiatives and development processes tend to become more rigid as they progress. Thus, shared values ought to form the foundation of such endeavors, to include citizens and their values from the start through each stage of design, development, and implementation.

- Technological development and implementation must follow guidelines such as the EC's Assessment List for Trustworthy AI. We would collectively benefit from more robust and enforceable rules for technological development that ensure ethical principles are adhered to by design. Useful next steps in this area include iterative and informed policy development, as well as the provision of educational and human resources to help tech developers and public administrations who currently carry much of the burden and responsibility for creating ethical technology.

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