What kind of urban environment would you like to live in? In this article, we critically reflect on how digital technologies are accelerating and changing the nature of urban spaces. Using examples from around the world, we identify some of the boundaries of our technology-textured living and illuminate how the creation of our urban spaces takes place at the delicate intersection of personal privacy on one hand and the dream of the utopian 'smart' city on the other.

VEINS AND WIRES:
REFLECTIONS ON URBANTECH TRANSFORMATION

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The Covid-19 pandemic has clearly demonstrated how citizens' behaviours and priorities can change almost overnight due to restrictions on movement and socialization. Across the world, citizens have accelerated their use of digital technologies to stay connected and to gain access to essential services, including food delivery, virtual healthcare and online education, while digital platforms have also been a lifeline for many to continue their work from home.

We have witnessed a rapid exodus from some cities due to the global pandemic and some life returning to others. Many have decided to move to quieter pastures and abandon

urban spaces, whilst others ponder and wait for new opportunities. This is a critical time to actively re-think the evolution of the city and the role of technology in the design of future urban spaces. Should these future urban spaces be held together by veins or wires?

IN PURSUIT OF THE 'SMART' CITY

1 While there is no one-fits-all model for how to design, build and manage future cities, we have seen a rush of large technology companies seeking to define the narrative around how we live, work, interact and play in urban spaces[1]. During the last couple of decades, new transformation and regeneration projects have been spearheaded by companies such as IBM, AWS, Alphabet/Google, Microsoft, Cisco, Siemens and Schneider Electric. The digital solutions already in place in many cities include smart waste collection, responsive streetlights, smart parking and route guidance, real-time air pollution monitoring and open data platforms.

In fact, technology companies have long envisioned their prominent role in driving forward city transformation, achieving the utopian ideal of truly 'smart' cities that are underpinned by intelligent digital technology to sense, monitor and direct action within the city. There are good reasons for this. These organisations have decades of experience in developing digital infrastructure and complex technical systems combined with significant reach and opportunities to scale up new digital solutions fast. However, should it be in the hands of these large technology companies to orchestrate future city transformations?

As cities continue to be central hubs for societal interactions, this puts enormous pressure on public and private sector organisations to provide essential services to all citizens and create urban spaces that heighten wellbeing and human value. Concurrently, there is a race for cities to reduce carbon emissions towards becoming carbon neutral and even carbon positive. These two factors have accelerated the focus on how to optimise and enhance efficiency of the provision of city-based services, including healthcare, education, leisure and mobility. Such heightened aspiration has attracted Big Tech to the city transformation arena.

The City of Copenhagen, Denmark, was the first to announce its ambition to become carbon neutral by 2025. This goal has guided new city transformation projects, especially in the area of air pollution monitoring and detection. One of the most successful collaborative projects, Copenhagen Air View, was undertaken by Copenhagen Solutions Lab, the Municipality of Copenhagen, Google, Utrecht University, University of Copenhagen and Aarhus University. For two years, a Google Street View car equipped with advanced air quality monitoring technology has measured the levels of nitrogen dioxide (NO_2), ultrafine particles (UFP) and soot (Black Carbon) by driving around the streets of Copenhagen. With measurements being captured every second, this initiative resulted in approx. 6 million datasets. This is the first time ultrafine particles, which have a negative impact on human health and wellbeing, have been measured at street level in the city of Copenhagen. The findings from the project[2] can inform future policies and give direction to the governance of the city, as it is now clear which parts of the city are most affected by carbon emissions[3]. Significantly, the findings from the project were made available to citizens, universities and other public and private organisations through interactive city maps showing pollution at street level and through the city's Open Data platform, which gives access to the raw data. Giving access to the data creates opportunities for future collaborations and democratises knowledge towards solutions for the

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greater good. This is an example of a 'smart' city initiative with a clear purpose, which is aligned with governmental and municipal goals, undertaken in collaboration with diverse partners and ultimately seeking to enhance quality of life for citizens, while adopting transparent processes and enabling accessibility.

It is, however, not uncommon that technology companies adopt a tech-first approach when they get involved in the development of smart city solutions. The ambition is often driven by the excitement and hype around the imagined possibilities of cities that 'listen', 'see' and 'act'. Cities that extract behavioural, psychological and conversational data created by citizens as they interact with each other and the environment around them. This is the idea of the digitally interconnected, intelligent and even autonomous city[4]. This city is always 'at work', extracting data from millions of data points used to make decisions without much human supervision. Here, human decision-making has been overwritten by 'algorithmic governance'[5], where algorithms that feed off large amounts of real-time data is given authority to use algorithmic classifications to make decisions. This type of approach to the management of urban spaces is seen in China, enabled by large technology companies, such as Alibaba, Baidu and ByteDance (creators of TikTok), and the Chinese government, who continues to invest in smart city initiatives. In 2017, Alibaba launched the City Brain project, which utilises Alibaba's cloud technology, artificial intelligence (AI), machine learning and sensor technology to govern many aspects of urban life, including traffic, healthcare, local governance, manufacturing and aviation. The trouble arises when these decisions can no longer be traced back to their origin, creating a lack of transparency and accountability. In these situations, there is a demonstrable shift of agency (i.e., the ability to act) from the human to the technology[6].

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2 VISIBILITY OF HUMAN-TECH TENSIONS

In recent years, there have been numerous examples of failed city transformation projects. One of the main reasons why these projects fail is that a tech-first approach is taken and attention to the human experience and willingness to live in a technology-textured environment is somewhat overlooked. Instead, those taking a lead on urban transformation may wish to first and foremost seek to create human value.

What is particularly interesting about the less successful, tech-first transformation projects is that they make visible the human-tech tensions, conflicting agendas of collaborators and their perspectives on what constitutes a liveable city. The transformation project of the industrial land along Toronto's Waterfront is a prime example of these human-tech tensions.

This transformation and regeneration project was announced in 2017 as a partnership between Sidewalk Labs (subsidiary of Google's parent-company Alphabet Inc and focusses on urban innovation) and Toronto Waterfront (agency leading the regeneration of the area) with the promise of building a new community "from the internet up"[7]. Waterfront Toronto is a tri-government organisation, fully accountable to the governments of Canada, Ontario and the City of Toronto[8]. The new 'smart' community was to include sensors to monitor traffic, noise, weather, energy use – and even human movement. With technology embedded within the fabric of the new community the ambition was to create an urban space that is more efficient, intelligent, responsive and autonomous. While the vision was to create a 'happy' place for inhabitants to thrive, the project soon met resistance from the public due to concerns over the extensive use of digital technologies, such as AI, and what seemed like widescale surveillance of citizens. Despite the rumbling from citizens, the project was given the go-ahead in 2019, although the site for development had been scaled back from 190 acres to 12 acres. Significantly, Sidewalk Labs was also requested to share any data collected from its sensors with the

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city administration and this data would become a public asset. Despite this scale back, citizens were still concerned about a city built on tech for tech's sake. To cement their concerns, an initial 30 Torontonians set up the '#Block Sidewalk' campaign, which steadily grew in influence and impact. The primary objective of the campaign was to garner support amongst the public to prevent Sidewalk Labs from carrying out their redevelopment project of Toronto Waterfront. Instead, citizens demanded their involvement through consultation to determine the future vision for this area of the city. After much controversy, Sidewalk Labs pulled out of the smart city initiative in May 2020. Less than a year since the discontinuation of this partnership, Waterfront Toronto has launched an international competition to secure new development partners for the Quayside lands. This time around, however, the focus is on sustainability, affordability, human connections and supporting local businesses.

In the wake of this, other smart city projects that were initiated by Sidewalk Labs have also been discontinued, including a project in Portland, Oregon, designed to track citizen mobility patterns. This project was used as a testing ground for location data software, Replica, which tracks people movements within urban spaces. Replica subsequently became a spin-off venture from Sidewalk Labs, taking the lead on the project in Portland. However, an unwillingness of Replica to share detailed data with Portland Metro (City agency) brought an end to the project.

These examples illuminate the tensions arising between stakeholders who wish to convert urban spaces into living data hubs and vehicles for tech sovereignty, and those who are adamant that city transformation must take place in the ethos of 'Privacy by Design'. In the view of Ann Cavoukian[9], the former Privacy Commissioner of the Canadian state of Ontario, the design of cities today typically reflects one of two approaches – building 'cities of surveillance' or 'cities of privacy'.

It may be alarming to some that Facebook is seeking to play a more intensified role in the creation of community engagement within urban spaces. Earlier this year, the company launched their new feature, Facebook Neighbourhoods, for users in Canada. This feature is available within the Facebook app and allows users to join neighbourhood groups based on location and interests. Within these groups, users can share recommendations of places to see, restaurants to visit, vote on their favourite places and businesses, and chat with other users who are part of the same neighbourhood group. This is clearly Facebook's way of responding to new citizen needs that have emerged during the pandemic, as citizens are looking for ways to engage with their local communities, fellow residents and businesses. There is, of course, no Facebook without also the presence of a data- and ad-driven business model. Hence, as Neighbourhoods is designed to sit within Facebook's existing app, it will, no doubt, be tracking users' behaviours and interactions.
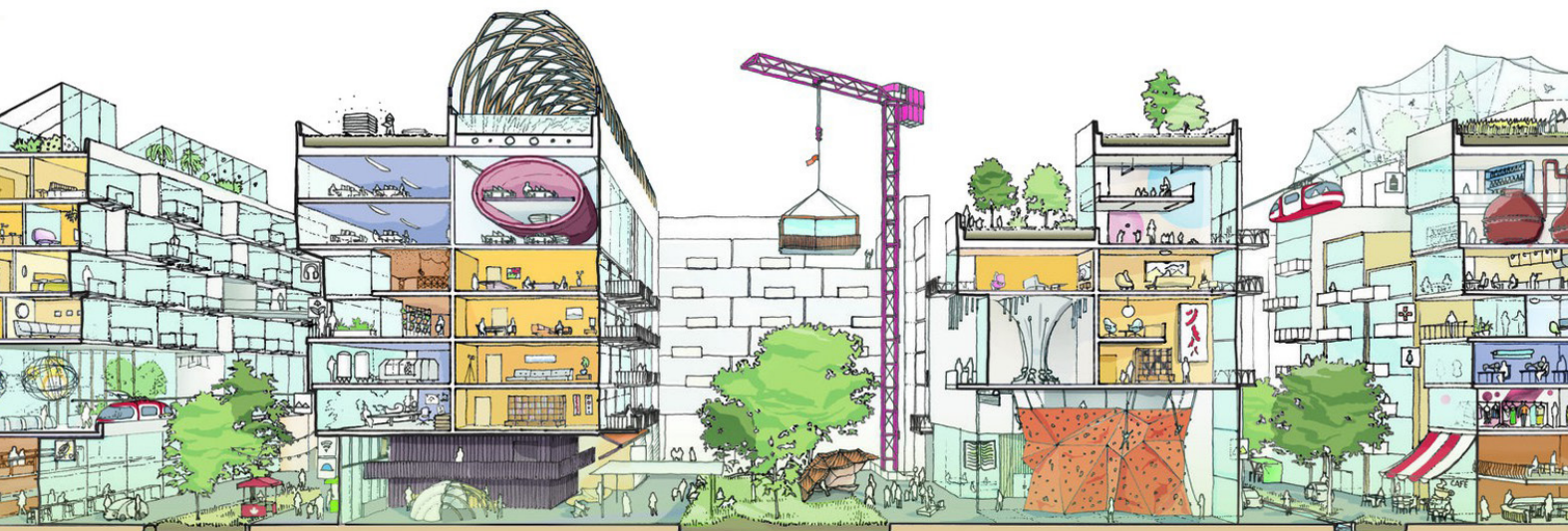
In future urban transformation projects, it is essential that citizen privacy becomes a fundamental and built-in pillar that shapes the design of new initiatives. Such transformation projects must also build trust between citizens, local government and those co-creating the tech-infused solutions. To achieve this, it is critical to first acknowledge that data accessibility is becoming a contested area, driven by different interests, business models and future use cases. Consequently, those leading urban transformation projects across government, public and private sectors will need to clearly develop and define data standards and processes related to how data is accessed, shared, stored, analysed and used within the city. This is already being worked on in the Netherlands in a new initiative between the cities of Amsterdam, Utrecht, Eindhoven, Rotterdam and The Hague. These cities have come together to create a new standard for the exchange of data between cities and shared mobility operators. The output is expected to be a shared platform on mobility patterns (e.g., the use of shared vehicles, traffic patterns and parking), which also adheres to the EU's General Data Protection Regulation (GDPR).

3 COCOONING CITIZENS THROUGH LEGAL FRAMEWORKS

Protecting citizens from living in a surveillance society that lacks transparency and opportunities to engage

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through participatory democracy, is high on the agenda of many governments and regulatory bodies. In Europe, the European Commission has taken a strong stance on how AI can be developed, adopted and applied in an ethical and transparent manner. In April 2021, the European Commission proposed new rules and actions aiming to turn Europe into the global hub for trustworthy AI[10]. The Commission laid out the first-ever legal framework on AI to protect the rights of people and businesses, while also encouraging innovation in AI across Europe. Using a risk-based approach to assess and evaluate AI-systems and their capabilities, AI-systems that are likely to be banned are those that are considered a "clear threat to the safety, livelihoods and rights of people" and which "manipulate human behaviour to circumvent users' free will"[11]. This illuminates the real concerns associated with AI-systems and their capabilities to act autonomously, disguise their trails, and potentially generate harmful and discriminatory impacts.

This legal framework for governing the development of AI extends earlier efforts by the European Commission to create regulatory frameworks for how data is accessed and shared between countries in Europe. The European Data Strategy paves the way for a 'European way' of data

governance with the aim of creating a single market for data[12]. Crucially, organisations and other participants must respect the European privacy and data protection regulations. Some of the expected benefits of sharing data across EU Member States through a single market for data are advances in personalised medicine, improved mobility, better policy making and upgraded public services. Citizens will also be empowered to share information about themselves for the benefit of society and wider communities. This is referred to as data altruism and could accelerate advances in many parts of society, for example in personalised healthcare provision. An organisation that wishes to register as a data altruism organisation has to have a not-for-profit character, meet specific transparency requirements and be able to safeguard citizen rights and interests.

It is not only political and public sector institutions that are making waves with new ethical standards and processes for the design of digital innovation in the connected era. With the launch of the Digital Ethics Compass, the Danish Design Centre has used its 'voice' and reach to educate on how to design and build new digital solutions with data privacy built in.

In the new era of urban transformation, there is little doubt that digital technologies will continue to play a key role. However, there are clear signs that the way digital technologies, platforms and systems are put to use within the city needs to be citizen-centric and with a focus on creating human value, while respecting individuals' privacy.

4 CITIZENS AT THE CENTRE

Many city governments are realigning their efforts to put citizens firmly at the centre of urban transformation. Some of the steps already taken in this direction, are reflected in the initiative 'Cities Coalition for Digital Rights', launched by the cities of Amsterdam, Barcelona and New York in 2018. Since then, more than 50 cities worldwide have joined the coalition. The main aim of the coalition is to protect citizens' rights, including the right to equal internet access, data protection, transparency, participation and open digital standards.

An interesting example can be seen in Barcelona, one of the 'original' cities for rapid urban transformation enabled by several of the Big Tech companies. However, in 2016, the city pursued a different direction as set out in the Digital Transformation Plan. The City Council was to become "the vanguard of efficiency, transparency and social innovation"[13]. Central to the new plan was the focus on 'technological sovereignty'. Spearheaded by the Chief Technology and Digital Innovation Officer at the time, Francesca Bria, the City Council had an aspiration to gain greater control of the new digital infrastructure and solutions, including the data that underpinned these solutions and the accumulated output from their use. In essence, this meant reclaiming greater control of data flows within the city. Acting on this aspiration, the city joined the movement for open-source software. According to the City Council this allows "the apparatus with which the City Council works every day to be audited publicly and in-depth. It also facilitates interaction between the local developer community and the public administration, which may lead to improvements in systems"[14]. This desire to operate with enhanced levels of transparency and accountability is also seen in the way the city engages with citizens through participatory democracy. The City Council of Barcelona has been using the digital platform, Decidim ("We Decide", in Catalan), since 2016 to give voice to citizens and facilitate active involvement in urban transformation projects. Decidim enables free and open-source participatory democratic processes. Consequently, the 2016 Municipal Action Plan included nearly 7 thousand citizen proposals that were shared via the open platform.

The approach taken by the City Council in Barcelona to become less reliant on the Big Tech companies creates opportunities for re-thinking how to wire the city, involve citizens and obtain privacy by design. Perhaps, though, this is at the cost of knowledge, insight and access which companies such as Google, Cisco and Schneider Electric have accumulated from decades of experience in the smart city arena.

CONCLUSION

Cities will continue to evolve, and technology will have a strong presence in this transformation of our urban spaces. With the opportunity to stand back and reflect on what kind of urban environments we wish to create for the future, we propose that urban transformation leads, policy makers and other ecosystem participants acknowledge the human-tech

tensions that already exist. If human-tech tensions are allowed to boil over or erupt, it will significantly challenge the progress that has been made so far in urban transformation initiatives.

Adopting either a purely human-centric urban transformation approach or a preferential tech-dominant approach may hinder the progress we must ensure. Future visions for urban transformation should not be veins *or* wires, but utilise technology and the expertise of experienced technology companies for the benefit of citizens and in line with data regulations and emerging privacy paradigms. Big Tech will no doubt need to play a significant role within the urban transformation agenda, but at the same time must embrace a nuanced human-centric approach that can create liveable and sustainable urban environments to drive human value. **EBR**

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