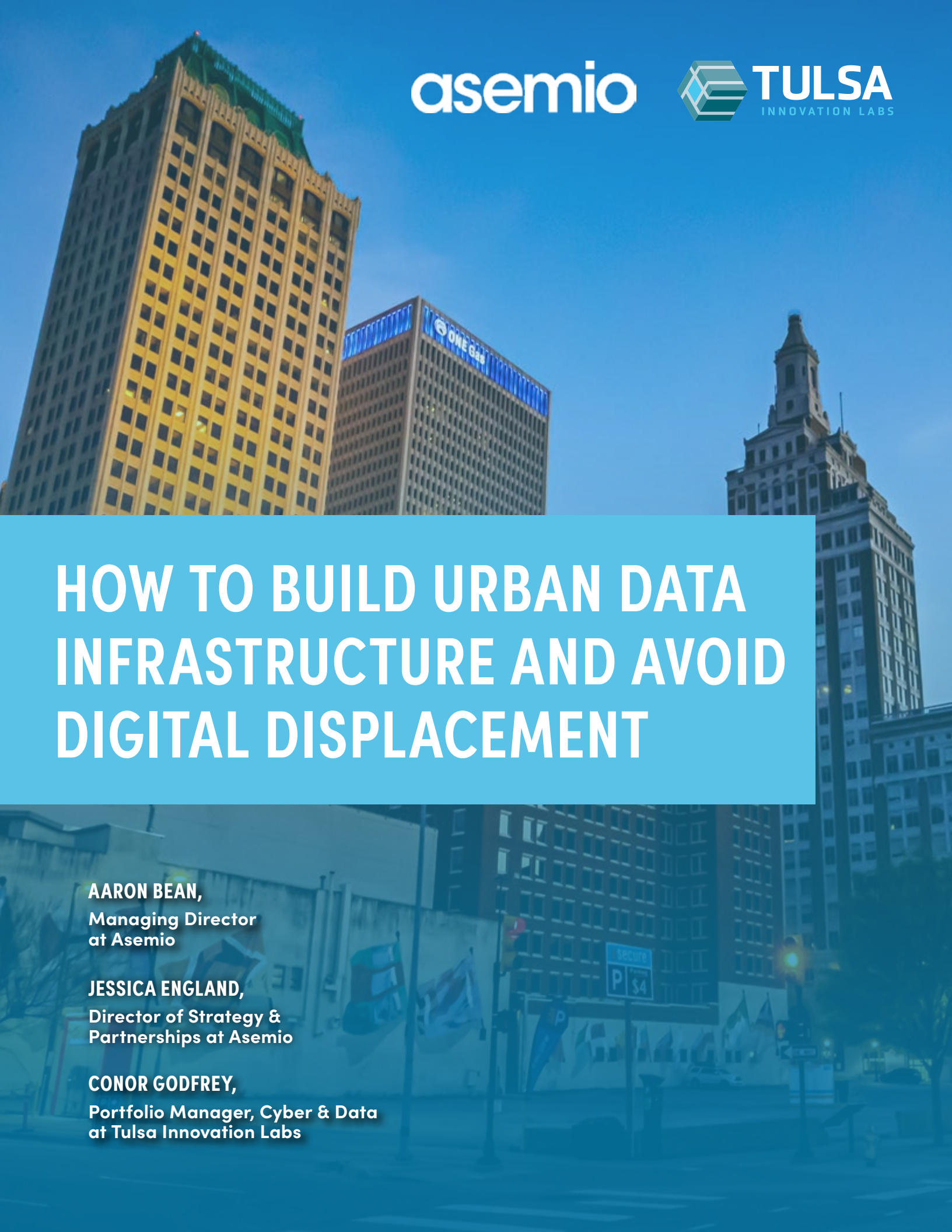

HOW TO BUILD URBAN DATA INFRASTRUCTURE AND AVOID DIGITAL DISPLACEMENT

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Cities that lay down thoughtful, forward-looking data infrastructure today will reap the economic returns that accrued to American cities like New York and Chicago that made forward looking physical infrastructure investments in the mid-20th century.

This investment would result in improved services in the short term, the growth of both traditional and new industries in the medium and long term, and if done well, the revitalization of traditionally underserved neighborhoods and populations by ensuring their inclusion in the digital economy. Municipalities may even be able to restore confidence in American institutions more generally by taking up positions on the front line of protecting citizens' data while shaping a positive digital future.

In the first half of the 20th century America's major urban infrastructure strained under the weight of population growth and technological change. In inter-war New York City, for example, most people lived within a circumscribed several block radius as traveling across town was nearly impossible. Robert Moses, the now infamous architect of modern New York, built the network of parkways, expressways, recreational parks, tunnels, and other urban infrastructure that made another century of economic vitality possible for many New Yorkers. But he did it by forcefully displacing almost a half million people, most of them Black and Brown. Moses' urban planning acolytes performed similar feats of urban engineering and displacement in subsequent decades in Washington, DC, Chicago, and even Tulsa, OK, where the 'Inner Dispersal Loop' built in the 1970s bi-sected historic Greenwood, once known as America's Black Wall Street.

The current municipal data landscape bears some resemblance to 1920s New York City. Just as successive waves of immigration led to urban overcrowding, the sheer volume of data generated today exceeds most municipalities' capacity to process, let alone use. According to one estimate, more than 2.5 quintillion bytes of data are created every day. As the democratization of the automobile changed the nature and intensity of how Americans used existing infrastructure, cities now struggle to integrate tech stacks across services and to provide appropriate policy guidance and easy to use interfaces for citizens and municipal workers.

As municipal leaders are constrained by resources, time, and politics, they must choose their investments wisely. The following categories of data investment offer maximum visibility (i.e., good politics), short and longer term economic returns, and ensure that building data infrastructure fosters a sense of place and inclusiveness where prior builds led to displacement and entrenched inequality.

Data Sharing Architecture as Important to a City's Future as Roadways Were to its Past

Imagine a city-led workforce development program that makes candidates jump through myriad hoops only to realize at the end of the long process that the upskiller was justice-involved, and the employer partner refuses to take them on. What if that same upskiller had also been eligible for a separate program that focused specifically on returning citizens, and/or provided child care vouchers to help returning citizens train for new jobs? None of these city programs spoke to each other, or to their private sector or nonprofit service partners, because they were either unable or unwilling to take on the legal (and sometimes ethical) risk of sharing sensitive personal data. In an age of ubiquitous surveillance, many partners try to mitigate data risk by simply not sharing. This imposes a time tax on community members, as inadequate connections across community systems drive up costs and reduce participation due to endless forms and layers of bureaucratic authorizations.

Thanks to significant advances in technology and subsequent cost reductions City Hall no longer has to trade privacy for insight and efficiency. There are a number of privacy-enhancing technologies (PETs) emerging that can help protect our data from prying eyes. From homomorphic encryption to "zero-knowledge" proofs, these technologies offer the possibility for an integrated virtual infrastructure that captures the latent value embedded in our community data.

Cities like Chicago, IL have used PETs to share data for improved health outcomes for over 12M healthcare patients in the CAPriCORN network; Tulsa, OK has used PETs to better understand the impact of housing and food insecurity on families with young children; and Boston, MA measures gender and racial wage gaps for Greater Boston every two years using PETs.

Cities looking to increase efficiency through enhanced virtual infrastructure should appoint or empower a chief data officer with a mandate to invest in PET and require its use between relevant city agencies. The most obvious applications for PET to improve services in the short term are in education, justice and security, and social service provision, but even more exciting are the companies and services that do not yet exist because such data sharing doesn't occur! Just think. It would have been hard to imagine Sirius XM or long haul trucking in an age when cars were playthings for the wealthy and good roads were few and far between. Cities (and states) can use their procurement power to set standards for nonprofit and private sector partners to drive the adoption of PET, thereby driving ecosystem-wide change in the scale and scope of data sharing. Much like the interstate system drove rural-urban and city-to-city connectivity, creating privacy-enhanced data environments in cities will open those places up to national partnerships with service providers, funders, researchers, and companies.

Cities could also consider funding an independent entity to establish, maintain, and enforce PET usage and information sharing more broadly, and function as the primary entry point for new public or private entities seeking access or partnership with the city's privacy-enhanced data ecosystem.

Perhaps most importantly, PET is required to ensure that we do not repeat the mistakes of America's physical infrastructure buildout by shifting the burden onto those communities who often bear the brunt of displacement. As new systems require ever more personal and municipal data to operate—think autonomous vehicles—predatory behavior will no doubt keep pace from both legal and criminal actors alike. Just as disenfranchised groups pay disproportionate fees to access financing and are far more likely to be victims of crimes, these same groups will face analogous taxes and predation on the use and/or exploitation of their personal data. Whereas well-resourced consumers might pay for better cyber protection, or could monetize their own data by selling it to advertisers or researchers, community members faced with systemic oppression will find it harder to defend against AI-powered cyber attacks and may be forced to give up personal data to access critical services out of necessity.

On a more basic level, the digital divide driven by differential access to broadband will ensure that computationally intensive services in the present, but especially in the future, will simply be unavailable for geographies without adequate bandwidth. Imagine a future where some citizens can visit City Hall in the Metaverse using a device in their home, whereas others will need to physically present themselves downtown, wait in long lines, and scramble to find documentation that PETs had already tokenized and associated with the wealthy customer's municipal avatar. Ideally, the federal governments' significant investments in broadband coming online now will dramatically shrink this particular digital divide, but new versions of this challenge will continue to crop up as requirements evolve. For example, more immersive, metaverse-like experiences will likely require more computing power closer to customers to help overcome the massive technical challenges in constantly rendering 3D worlds. City leaders will need to ensure that poorer neighborhoods (and their schools and community centers) are close enough to benefit from these new technologies, but also that servers do not become the new trash dump or power plant. It is not so hard to imagine a dystopian future in which edge computing power is housed in poorer neighborhoods—with the attendant heat and noise—while the principal users are the wealthy gamers across the proverbial or literal tracks.

KEY IDEA:

Cities can create privacy-enhanced data ecosystems that set the rules of the game for building current and future products and services.

Just as underrepresented citizens were displaced by physical infrastructure builds, their descendants will be similarly exploited and disempowered in digital age without powerful municipal leadership.

RECOMMENDATIONS:

Drive PETs adoption and usage in key city services (empower data officer to mandate and monitor PET usage).

Set minimum bandwidth accessibility standards across all neighborhoods, and identify others barriers to access.

Cities can create privacy-enhanced data ecosystems that set the rules of the game for building current and future products and services.

Evolving the "Public Works Department" to Handle Data Governance

According to Forbes, "90% of the data in the world today has been created in the last two years alone." This data comes from a variety of sources, including social media, sensors, mobile devices, and more. One of the biggest challenges facing cities is data governance. Who owns the data? Who gets to access it? And who determines how it is used and/or commercialized? Time and again companies—including municipal vendors—collect and sometimes monetize data on users without their knowledge or consent.

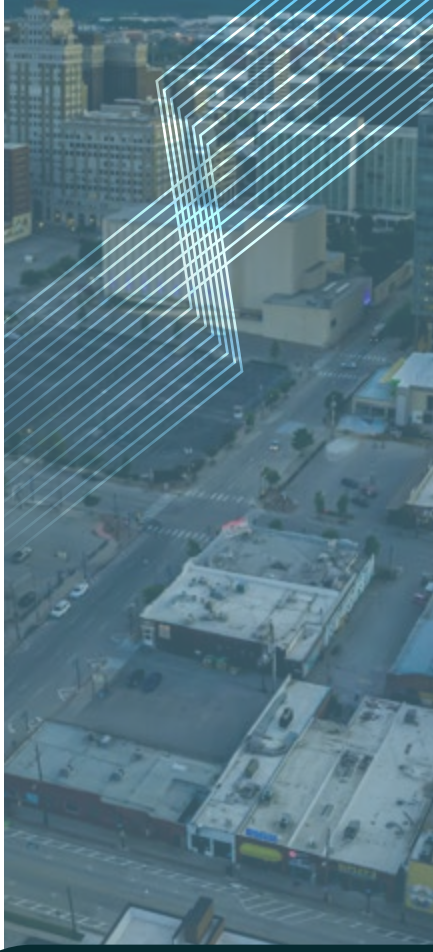
Where does the log of your face go once the red-light camera snaps the picture? Let's assume you don't want the 3rd party contractor managing the system to sell your face, geo-tag, and car make and model to an advertiser or insurance company, but you do want the city to alert you to an approaching tornado or that car thefts have been rising in the area where you parked. Better yet: if you were transporting your critically injured child in that car to a nearby hospital, maybe you are ok with sharing key medical data with emergency care providers, but want that permission withdrawn 48 hours later. The key to unlocking the potential without the drawbacks are 1) who makes the opt-in vs opt-out decisions during the system design process, 2) is there a privacy-enhanced architecture that enables anonymized (or "tokenized") data sharing in the first place, and 3) do you trust the implementers of either?

Cities should leverage their data policies to fashion attractive municipal brands that attract companies and talent, especially among the digital native generation. Branding a city as "Privacy First" can help up-and-coming municipalities communicate to their constituency that they are interested in protecting community members while simultaneously looking for ways to generate growth, making life better for all.

What does this mean in practice? It means having clear policies around who can access data and for what purpose. These policies should be easy to understand, well publicized, and established by names and faces citizens will recognize and respect (and send angry letters to when things go wrong). It means being transparent about how data is being used, and giving citizens the ability to opt out if they don't want their data collected. And it means making sure that data is being used ethically and responsibly. So far, we've seen a few cities take steps in the right direction.

The New York City Council passed a bill that regulates employers and employment agencies' use of "automated employment decision tools" in making employment decisions. And the Boston Women's Workforce Council (BWWC) combines data from 123 companies and 140,000 employees, representing $12.2 billion in annual earnings to measure gender and racial wage gaps.

These cities are not only providing a model for how municipalities can use data as an asset, but how to do so in a way that protects and champions citizen interests.



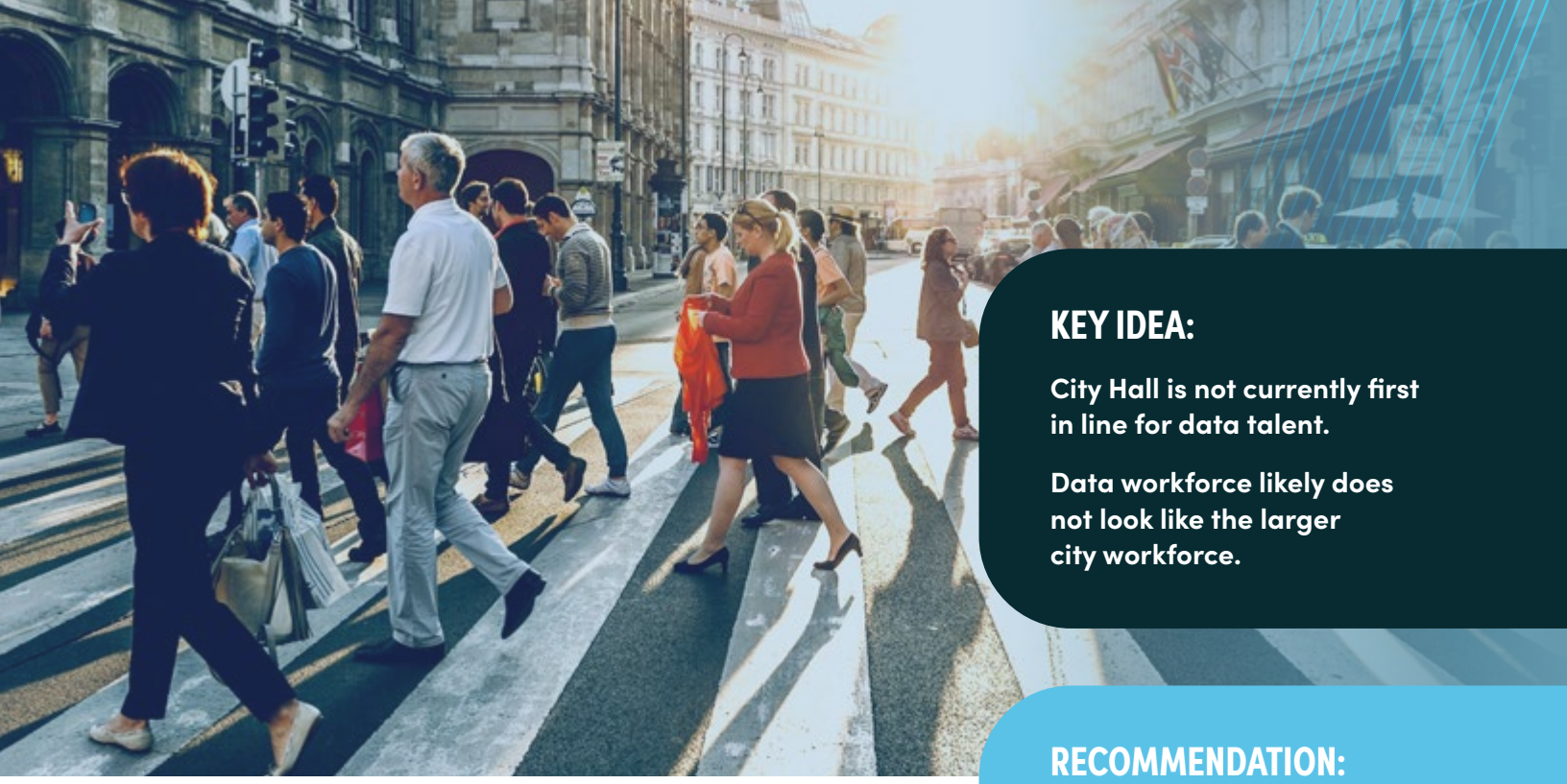
KEY IDEA:

Data privacy and security can be a branding asset for up-and-coming cities.

Forward looking opt-in / opt-out policies will create certainty for new products and service providers while protecting citizen data.

RECOMMENDATION:

Create Advisory Council to the Mayor who will solicit public comment and publish data governance principles, and make recommendations for specific policies.



KEY IDEA:

City Hall is not currently first in line for data talent.

Data workforce likely does not look like the larger city workforce.

RECOMMENDATION:

Create "City Labs" where data savvy economic developers and private sector partners can innovate and design new, data driven products and services.

Generate, Attract, and Retain a Data Savvy Workforce

Just as Robert Moses' first move was to reform the New York civil service so that he could enact and manage his infrastructural ambitions, most American cities currently do not have the data-savvy workforce necessary to plan, implement, regulate, and monitor the scale of data and technology infrastructure required to succeed over the next 50 years. Market forces are driving increased uptake for data science courses at universities and for data education more broadly, but this will not, by itself, ensure that a city's data workforce looks like its community nor that municipal governments and service providers benefit from data talent as it becomes available.

If past is prelude, the people that benefited from the prior waves of technological growth will similarly capture the value that investments in municipal data infrastructure will unlock. Stopping this cycle requires large and deliberate upskilling efforts like the Cyber Skills Center in Tulsa, OK that will specifically target under-represented Tulsans and offer 100% free access to both boot-camp style training in Data Science and Cyber as well as year-long apprenticeships in the field. In Tulsa, the first cohort received 350 qualified applications for 40 slots, with 65 percent of the applications coming from Indigenous, Black, and Hispanic Tulsans. Similarly, efforts like Holberton Software Academy in Tulsa offer income-share agreements—at far below commercial rates—to ensure that cost is never a barrier to access their 20-month software development curriculum. In Boston, the Burnes Center for Social Change located at Northeastern University is democratizing access to data driven social impact skill-building, and helping to redesign how communities shape and implement municipal decisions.

To capture this talent, cities must not only pay, but also create the type of environment where data truly drives decisions and talent has the opportunity to create and deploy exciting new products and services. Economic development spinoffs like Sidewalk Labs in New York or Tulsa Innovation Labs in Tulsa can create the environments to recruit and develop data professionals.

GET THE POLITICS RIGHT

Robert Moses and his successors acquired the power to create and destroy at a scale that eluded prior city planners because so many of their constituents saw, used, and derived immediate value from those bridges, tunnels, and highways, and because the people negatively impacted by their work had little power. Both lessons are applicable. Cities that spend time and resources on data infrastructure should do so visibly. To make investments in data infrastructure more legible to the public they should be tied to iconic services like trash pickup, lower wait-times at the DMV, and/or fewer people struggling with homelessness because social services are better targeted. Public media campaigns should tie those outcomes to data investments to help the public connect the dots.

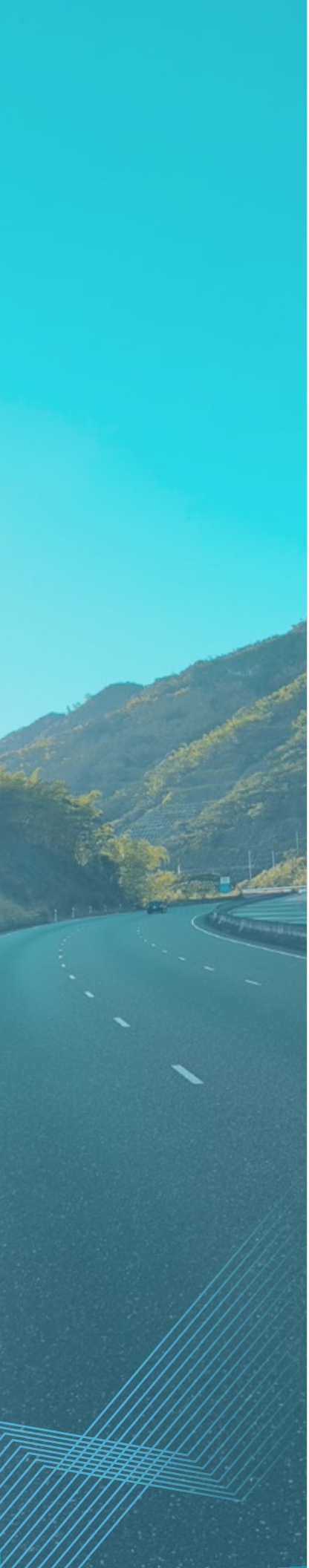
The second lesson is even more important. If all citizens are not at the table then those excluded will foot the bill one way or another. This means co-designing data infrastructure with community groups from the ground up and mitigating the risk of exposing personally identifiable information that could be used to harm communities. In Tulsa, for example, savvy community surveying using privacy-enhanced data collection revealed that a citizen's level of logistical difficulty getting to court for a hearing was the biggest predictor of the eviction process outcome. A proof-of-concept project is now being launched to use publicly-available eviction notice data to trigger physical delivery of resources like QR codes for a bus ticket and information about how to navigate the justice system once an eviction notice is received.

KEY IDEA:

Initial Data investments should prioritize visible impact even more than total impact.

RECOMMENDATION:

Focus on the most visible city problems or services that touch the most people, like driver's license renewal, trash pick-up, etc.



FAST LANE, SLOW LANE

The dynamism of specific American cities has always waxed and waned with the fate of legacy industries and secular trends both inside and beyond City Hall's control. However, how well cities lay the groundwork for a data-enabled future is both critical to determining a city's trajectory over the next 50 years and mostly within economic developers and their allies' remit.

We see American cities broadly falling into three categories over the next decade:

Data Ready cities will proactively create independent committees to suggest and monitor data usage agreements across municipal services, and use their policy and procurement power to drive the adoption of privacy-enhanced data architecture in the justice, security, health care, and education sectors at a minimum. Highly visible data-sharing use cases will transform particularly painful city services, and enable entirely new user experiences in hospitals, schools, and even the dreaded DMV, generating more appetite among citizens for data innovation. These same cities will be in a stronger position to benefit from the maturation of technologies associated with Web 3.0, and data protections and established data governance models will permit safer and faster transitions to experiences associated with the "metaverse," such as digital twins, virtual payments in immersive environments, VR/AR learning, and other rapidly improving technologies.

Status Quo cities will largely leave their data governance to "big tech," drafting off the security posture, choices, and technological development at Google, Amazon, Facebook, and their successors. This will require periodic investments and upgrades in physical and cloud based data and technology architecture, but these will keep pace with new requirements rather than drive innovation or open new possibilities. Data sharing will evolve at the speed of the broader market, and businesses in these locales are unlikely to be leaders or fast followers in the data intensive industries of the future. Existing digital divides between demographic and socio-economic groups will persist and worsen, following current trend lines, and ever more sophisticated AI-powered scammers will be an increasingly omnipresent (and graver) threat to citizens' physical and financial security.

Digital Laggard cities will fail to modernize data architecture even at the pace required for prior generation use-cases, and citizens will increasingly fall into a digital slow lane akin to drivers unable or unwilling to participate in digital tolling on highways. Citizens' municipal services will be slower and less safe, and data-savvy, upwardly mobile talent will leave, further slowing the city's development. These cities will be more frequently targeted by cyber criminal actors, and will struggle to attract employers in the digital economy.

Economic developers cannot control all the economic and technological forces that shape city development, but major investments in privacy-enhanced data architecture, cybersecurity, data governance, and data workforce, will go a long way toward deciding which cities are primed for new industries and social mobility and which cities continue to queue for tolls.

About the Contributors

AARON BEAN,
Managing Director at Asemio

Aaron Bean is a passionate social entrepreneur with a history of building systems for community good. As Managing Director of Asemio, a social enterprise headquartered in Tulsa, OK, he leads a team of technologists and consultants who are working to address complex, systemic problems facing our communities. From 2001-2007, he led technology teams focused on catalyzing the economic growth of the Cherokee Nation. Aaron left the Cherokee Nation to join Fortune 500 technology company EMC, where he developed an international growth strategy for its then-newly acquired platform, Avamar. Following his time at EMC, he joined the U.S. Peace Corps in 2009 and spent two years in Kazakhstan volunteering with people with disabilities. In 2013, Aaron co-founded Asemio, which he has grown into a national network of technology and data systems that combine science, human story, and collaborative action to improve the public health and economic wellbeing of the communities it serves.

JESSICA ENGLAND,
Director of Strategy & Partnerships at Asemio

Jessica England is the Director of Strategy and Partnerships at Asemio. Prior to Asemio, Jessica worked in healthcare IT, managing efforts funded by a $12 million federal Beacon grant for a regional health information exchange. She also worked for electronic health record giant Epic, where she managed multiple large-scale, multi-hospital implementations of medical record software, providing oversight on adherence to best practices for system implementation, conversions, and end-user buy-in. Jessica earned a Master of Business Administration from the University of Tulsa as well as a Bachelor of Business Administration and a Bachelor of Arts in English literature from the University of Oklahoma. She currently serves on the boards of the Tulsa Literary Coalition and Urban Coders Guild.

CONOR GODFREY,
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Conor is a lifelong public servant at home and abroad with over a decade of experience building diverse coalitions to achieve national security goals. At TIL, he oversees a large portfolio of infrastructure and workforce development initiatives designed to create a world-class cybersecurity and analytics ecosystem in the Tulsa region. In this role, he draws on a wealth of national security experience at the federal level spanning defense, diplomacy, and development, as well as years of promoting U.S. trade and investment abroad. Conor received a Master of Public Affairs from the Princeton School of Public and International Affairs. He is a returned peace Corps Volunteer from the Republic of Guinea, a member of the Truman National Security Project, and an adopted Tulsan. He and his wife and son relocated to Tulsa during the summer of 2021.

asemio

Based in Tulsa with team members nationwide, Asemio supports the public health, education, criminal justice, and social services sectors working to make the world a better place. Since 2013, our work has built pathways that connect people, organizations, and ideas supported by the power of technology to leave a lasting positive impact on communities through improved service delivery, actionable insights, and data-driven decision-making.

TULSA INNOVATION LABS

Recognizing that the jobs of the future are rooted in a thriving innovation economy, Tulsa Innovation Labs LLC (TIL) was founded to help build a tech hub in Tulsa that leverages the strengths of the Heartland and expands opportunities in tech. Launched in 2020, TIL developed the city's first tech-led economic development strategy, a rigorous and data-driven effort to determine the strongest opportunities for Tulsa's economy. TIL is implementing this strategy and focusing its startup, academic innovation, and talent initiatives on catalyzing five interconnected ecosystems, together called "Tulsa's Tech Niche": virtual health, energy tech, advanced aerial mobility, and cyber.