Reimagining the Resident Government Relationship

A systems approach to designing a more equitable and sustainable Chicago
A Solution-Oriented Systems Approach

Today, civic technology acts as a facilitator of government power. Focusing on how that power is wielded and expressed, we examine the civic technologies that Chicago’s government activates to police speeds, intersections, roads, and people. These infrastructures have been at the center of complex issues and inequities faced by Chicago residents.

In this report, we take a solution-oriented approach to imagining new systems embracing these complex issues through collective intelligence, civic infrastructures, and community empowerment.

Our Values

- Lead With Equity
- Democratize Data
- Engage Everyone
- Shift From Fining Citizens to Fair Fee Structures
- Improve Chicago’s Environment
- Promote Community Safety and Quality of Life
The Current State

Chicago's Resident Government Relationship Today

For years, Chicago’s roads have been fertile ground for inequities. While metro lines only go so far, they’re directed towards downtown and the city’s core. Residents living in the South or West side are forced to commute by car and that’s where a number of problems start. Fines and fees make it extremely expensive to own a car in Chicago. Citations and tickets can quickly pile up, and for the working class, which is majorly BIPOC and Latinx communities, the price tag can be detrimental. One fine for a low-income resident can snowball into thousands of dollars, garnished tax refunds, vehicle impoundments and a driver’s license suspension. Many residents have resorted to declaring bankruptcy as a way of relieving the crushing weight of debt: “Parking, traffic and vehicle compliance tickets prompt so many bankruptcies the court here [in Chicago] leads the nation in Chapter 13 filings” (Source). What causes these large amounts of tickets? Two elements work together as a force in fines and fees in Chicago: road infrastructure and civic technology.

Wide, four-lane or more roads with few pedestrians feel like highways to drivers, and it’s likely they’ll speed up. In addition, intersections off of highways or expressways are common areas for drivers to continue the high speeds they held before. Both infrastructures are common in Black neighborhoods. We call them historically neglected neighborhoods - communities on the South and West Sides that have been disinvested or historically marginalized by the government. The absence of basic amenities like grocery stores or health service providers within walking distance, sidewalks, crosswalks, and green spaces force residents into their cars and speed drivers up. ProPublica Reporters found that out of the 10 speeding cameras that issued the most tickets between 2015 to 2019, a majority of them were in Black neighborhoods. Of the 10 red-light cameras that issued the most tickets, seven of them were in intersections within a block of an expressway, six of them were in majority Black neighborhoods.

From these locations, we can infer who was ticketed the most: “households in majority Black and Hispanic ZIP codes received tickets at around twice the rate of those in white areas between 2015 and 2019” (Source). Civic technology and road infrastructure work in tandem to make fines and fees a dominant power in the lives of low-income residents: “In 2007, an estimated 1,000 Chapter 13 bankruptcies included debts to the city, usually for unpaid tickets, with the median amount claimed around $1,500 per case. By [2017], the number of cases surpassed 10,000, with the typical debt to the city around $3,900. Though the numbers of tickets issued did not rise during that time, the city increased the costs of fines, expanded its traffic camera program and sought more license suspensions” (Source). The oppressive power of camera programs and their locations are only amplified by government norms like unaffordable payment plans or a civic system dependent on fines and fees for more than a tenth of its budget (Source). The result? A punitive and oppressive relationship between Chicago government and its residents most in need.

To learn more, visit:
The Chicago Metropolitan Agency for Planning Recommendations
ProPublica’s Series: Driven Into Debt - How Tickets Burden the Poor

The Current State
Inequities in Civic Technology

When former mayor Richard M. Daley ushered in Chicago’s red-light cameras nearly two decades ago, he said they would help the city curb dangerous driving. But for all of their safety benefits, the hundreds of cameras that dot the city have come at a steep cost for BIPOC and Latinx drivers.

Though automation may provide advantages to agent enforcement, speed cameras do not eliminate bias. The volume of automated tickets issued, the location of cameras, and the structure of fines, fees and forfeitures in fact reinforce racial and economic inequities. A study conducted by the University of Illinois Chicago shows that the spatial distribution of tickets per household shows predominantly Black and Latino areas receive a higher number of tickets per household as compared to other parts of the city. [Source]

Parking enforcement and fines are a disproportionately high financial burden for low-income households. Moreover, data on traffic safety enforcement indicate that BIPOC residents are more likely to receive citations than any other race. These practices go far beyond the pandemic ticketing pause, and undermine trust in local government and law enforcement.
Reframing System Goals

Shifting power dynamics towards community decision-making to improve Quality of Life for all
What Would a Future Look like if...

...We Designed Civic Infrastructures to be Sustainable and Anti-racist?
...Actors were Held Proportionately Accountable for Actions?
...Resources were Equitably Redistributed?

Targeting Interventions Towards an Equitable and Sustainable System

Our goal is to envision a future where Chicago is a leader in providing all residents a healthy, affordable, and thriving quality of life. A future where Chicago creates an empowering society through equity-driven civic infrastructures, the fair use of data, and an environmentally-sustainable built environment.
Meeting community members where they are on daily trips and inviting them to engage with the City in a variety of ways, requiring different levels of detail and time commitment, is vital for Cities to understand and serve the needs of all residents.

Engage Everyone
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Shift from Fining Citizens to Fair Fee Structures
Create adaptive rule systems that generate value to all actors utilizing the infrastructure. Collect fees from individual and corporate actors proportional to the value provided.

Improve Chicago’s Environment
New system solutions should lessen environmental impact on local communities, as well as prioritize new forms of green infrastructure for the holistic health of residents.

Key Values

Engage Everyone
Meeting community members where they are on daily trips and inviting them to engage with the City in a variety of ways, requiring different levels of detail and time commitment, is vital for Cities to understand and serve the needs of all residents.

Lead with Equity
Consider the needs and means of residents from every neighborhood and what all possible consequences might be from new products and services before implementing them into the lives of people whom they could unintentionally harm or inconvenience further.

Promote Community Safety and Quality of Life
New infrastructures improve the day-to-day lives of residents through better-built environments, policies, and safety measures that eliminate bias.

Democratize Data
Data is to be mutually beneficial for City Government and residents, built on trust that the government will not abuse the data or their power.

Reframe System Goals

Reframe the goal
Define values

An equitable & sustainable Chicago

Sustainable Solutions Workshop | Spring 2022
How to Get There

**Collect**
Track data on the flows of personal and commercial traffic to measure and organize where interventions are most effective.

**Decide**
Provide, enable, and support community-led decision-making with community hubs and AI technology.

**Invest**
Invest time, opportunities, and direct finances to the growth and resiliency of communities.

Reframing System Goals

- **An equitable & sustainable Chicago**
- Reframe the goal
- Define values
- Roadmap strategies
Strategies

Embodied Goals in Context

In order to realize our goals, we’ve created strategies for how to achieve them through technological, social, and financial infrastructures. In order to manifest these strategies and their overlapping impacts, we’ve placed each in the context of an intersection.

The figure to the right exemplifies a hypothetical, future intersection in Chicago redesigned to include our speculative infrastructures and fulfill our goals. Each strategy is organized by its point of intervention in relation to data and resources: data collection, data-driven decision-making, and reinvesting data and resources in communities. The following three sections will detail these strategies and collectively create a new, equitable, and sustainable vision for Chicago.

![Image of an intersection with various strategies highlighted]

- Adaptive Curb Management
- Community Asset Map
- Bus Stops as Civic Centers
- Adaptive Traffic Management
- Infrastructure Deficiency Detection + Prioritization
- Enterprise Accountability Tax
- Equity Fund
Collect

Strategies

Adaptive Curb Management

Adaptive Traffic Management

Enterprise Accountability Tax
To intervene in a system, you must be able to understand system dynamics, and measure what matters in order to justify and quantify the change you wish to make. The City of Chicago’s current data sets don’t cover the wide variety of residential and commercial driver behaviors that affect the level of safety on city streets. More robust and comprehensive data collection, aggregation and organization methods can open the door to new possibilities in how street safety is not only measured, but managed.

Adaptive Traffic Management

What if traffic management systems prioritized community safety and wellbeing in an adaptive and equitable manner?

Enterprise Accountability Tax

Corporations utilize heavy and high polluting vehicles to do business in Chicago at all times of the day, but evade all city taxes. By measuring vehicle impact on infrastructure and the environment, we’re creating pathways to measure road damage and greenhouse gas emissions as a more equitable civic revenue stream.

Adaptive Curb Management

Without dedicated spaces, delivery vehicles find the need to double park or inconvenience resident’s right of way for short-term deliveries. What if delivery vehicles were incorporated into a system that ensured parking availability and limited the risk of parking violations?
Adaptive Traffic Management

**Problem**

Chicago traffic lights operate on a pre-scheduled system of time-based patterns, and point-based sensors that control individual intersections. Private-sector technology companies have created navigation systems that scrape data from and optimize traffic routes for individual drivers, but are just starting to take system-wide efficiencies, air pollution management, and the safety of all road users into consideration.

**Infrastructure**

If 360º cameras and sensors were embedded in the traffic management system, cities could collect much more sophisticated data about the behavior and consequences of road users on streets, through communication with Connected City Stickers in each vehicle.

**Interaction**

If the goal of this system were increased wellbeing for residents, then this technology could be used in order to prioritize safe crossings for the most vulnerable road users, by scanning who is approaching an intersection and coding them according to the speed at which they are perceived to be able to cross the intersection. These cameras and sensors could also be used to decrease local air pollution or CO2 emissions, by creating “green waves” for high polluting vehicles to move efficiently through high density areas at safe speeds, diverted away from proximity to key public facilities like hospitals and schools if possible.

**Expected Outcome**

Vehicles with a particularly high amount of noise and air pollution could be re-routed from streets with schools during times of the day when students are entering/leaving the building to reduce the amount of particulate matter they might have to breathe, and residents like the person in a wheelchair crossing the street in the rendering to the right would have a more relaxing experience knowing they’d be able to make it to the other side of the street safely.
Enterprise Accountability Tax

Problem
Growing fleets of large enterprise vehicles, frequently used on city streets, not only cause increased wear on roads, but also generate large amounts of pollution that disproportionately affect the health of residents who breathe that city air all day. Cities need to be more equipped to gain revenue for road improvements and sustainable transportation updates proportionally from those who use roads the most.

Infrastructure
Each vehicle’s plate number must be registered with the city, even if they are parked outside of city limits overnight, so as their Connected City Sticker is tracked through the Adaptive Traffic Management system throughout the day, the pollution emitted from each vehicle can be traced back to their annual report of miles driven and CO2 emitted to inform proportional road wear and pollution taxes to the income earned from these delivery services.

Interaction
When enterprise vehicles move throughout cities, they are tracked and coded with the 360° cameras and sensors so their miles traveled within city limits and approximate greenhouse gas emission contribution on city streets is recorded for annual tax purposes.

Expected Outcome
These taxes can ensure that cities are able to cover the costs of road maintenance and investment in user needs from street infrastructure, without reliance on the current inequitable fines and fees system that is in place. With this alternative revenue stream that taxes the highest polluters, with the heaviest vehicles, most miles traveled, and most revenue earned, the city of Chicago could be relieved of the need to police streets to enforce fines as a means of financial income.
Adaptive Curb Management

Problem
Today, many delivery vehicles are registered outside of the city to avoid paying their fair share of fines and fees, and once they are within city limits they often park in spaces marked for residents and don’t pay meters like residents in high-density areas have to. These vehicles can also be found idling in the middle of busy city corridors, blocking moving traffic while drivers run in and out of buildings—under pressure from tight timelines and delivery demands.

Infrastructure
Capturing delivery vehicles’ use of city roads would enable the city to make more informed decisions about how to regulate their use and mitigate their disturbance to other road users within city limits.

Interaction
Through the same 360º camera and Connected City Sticker integration mentioned in the previous digital services, a delivery vehicle can be ushered towards the closest parking spot to their destination that is available and reservable for them to hold for the amount of time that the delivery will take. The camera identifies underutilized parking spots and the Connected City Sticker system adaptively allocates them to delivery vehicles throughout the day based on demand, encouraging or dissuading delivery at different times of the day based on other factors (rush hour, children being let out of school, etc.) in order to mitigate the effect of this service on other quality of life goals, like road safety and air quality.

Expected Outcome
With the 360º camera and Connected City Sticker integration tracking the flow of delivery vehicles within city limits, the pressure on delivery vehicle drivers to find legal parking when needed will be relieved, and the current frustrations and safety concerns that local residents currently feel towards these vehicles will be mitigated.
Decide

Infrastructure Deficiency Detection + Prioritization

Bus Stops as Civic Centers
For marginalized communities, decision-making power can often be out of reach. Town hall meetings and forums can be inaccessible or even costly for many. In our speculative future, communities receive accessible and impactful decision-making power. What they need is provided expediently, without red-tape, long approval processes, or unnecessary bureaucracy. By using AI technology to support equitable decisions, empowered communities can create new realities.

Bus Stops as Civic Centers
By redesigning bus stops to be community participation hubs, we’re meeting citizens where they are to learn where they want the community to be.

Infrastructure Deficiency
Detection + Prioritization
With Chicago’s 311 hotline, you can report a broken pothole or debris in the bike lane. But where’s the detection of neglected neighborhood roads? Aspects like driver difficulty due to road infrastructure, lack of pedestrian density, vacant lots, and sidewalk availability will be measured with AI to redistribute resources to the communities that need them the most.
**Decide**

**Bus Stops as Civic Centers**

**Problem**
Traditionally communities have been excluded from the decision-making process in systems that govern how and where resources and amenities are allocated. In order to create a more equitable and reciprocal relationship between residents and government, we need to include community voices in an accessible way.

**Infrastructure**
Interactive panels at bus stops, with a scale of opportunities for feedback through a slider of reactions or more detailed surveys, empower residents to give feedback to the City mid-journey, when they might have the time to spare waiting for the bus. Connection to 311 services would also allow residents the convenient opportunity to engage with more personal data, or register to vote.

**Interaction**
Community residents would tap a button to vote for their satisfaction levels and most pressing issues in the neighborhood and/or fill out a longer format survey if they are able to take the time to provide more detailed feedback. The residents will then be able to see the statistics of overall voting update live and see issues, or most-voted areas for local improvement that are trending at the top.

**Expected Outcome**
The collected voting data, which does not include personal demographic data about residents, will be brought to the Local Committee where it will inform where resource allocation is prioritized (i.e. building out or repairing a sidewalk, cleaning up a community park, or investing in a new fresh food market in the middle of a food desert). Since these new opportunities for civic dialogue are placed in an open, public space, they will likely also increase conversation within communities about the potential for improvements, and increase democratic participation overall.
The large number of infrastructural needs in marginalized communities have been deprioritized and slow to fulfill. To understand their requirements, a feedback loop based on data can provide real-time status of road infrastructure. However, there needs to be large amounts of real-time data collection to find usage patterns, as well as data analysis to find the needs.

The proposed solution is an Artificial Intelligence system that studies a video feed from the 360º camera at every intersection. Its purpose will be to understand road use and infrastructure. It makes the decision based on several layers of data starting from equity map of the city down to pin pointing the exact issue that needs attention or resources and uses deductive reasoning to do so.

The primary mode of interaction with the AI system will be through an online dashboard for residents and the government. The dashboard will show issues detected by the AI and allocate resources, prioritizing historically neglected areas. For the government, it can show additional statistics and insights of the city’s infrastructural needs.

The aim is to prioritize equitable distribution of resources based on realtime requirements in which most marginalized communities are in focus without human bias. Expected outcomes are equal access to all city services, accountability in governance, and most importantly a better quality of life.
Community Asset Map

Equity Fund
‘Building community’ is like planting a seed. Watering it now is expecting growth later. Investing in communities now is an expectation of future growth and prosperity. Too often, marginalized communities are disinvested and deprioritized. Resources always seem out of reach, or if they are presented - they’re scarce. We believe investing in a community is a wholesome practice, encompassing financial, social and human investment. It’s a ritual that meets a systemic issue with a systemic answer. Investing time, opportunities, and directed finances to the fruition and growth of communities bloom into equitable, sustainable spaces for all.

**Equity Fund**

Through a fund financed by the Enterprise Accountability Tax, resources will be redistributed to neglected communities based on the votes of a representative committee.

**Community Asset Map**

Asset mapping is a great way of promoting community ownership and empowerment. Through a public and interactive asset map, residents will always know the power they share.
Invest

Equity Fund

Problem
Without allocating resources to the eradication of inequities, those inequities will still stand. To confront the historical injustices of BIPOC and Latinx residents of Chicago, a team dedicated to uprooting wrongs and funding to back their efforts is needed.

Infrastructure
The revenue generated by the Enterprise Accountability Tax will be pooled into an Equity Fund. This fund will finance projects and opportunities in historically neglected neighborhoods.

Interaction
Community members from disinvested neighborhoods are voted as representatives of these neighborhoods. They will form a committee that determines how funds are applied to local development projects.

Expected Outcome
A platform to long-lasting, investments in community-led, equity-centered initiatives.

A portion of this city-wide tax will be automatically allocated into the Equity Fund. Creating greater access to capital for marginalized communities wish to realize.

The fund will be focused on supporting the speculative futures historically marginalized communities wish to.

Local stakeholders from marginalized communities, civic groups and community activists will form a committee to lead decision-making efforts.

Funding will be applied to community-voted physical infrastructure improvements, housing grants for community members, and urban farming initiatives. Employment opportunities are provided for residents who would like to lead each effort.
Community Asset Map

**Problem**
It’s difficult for residents to have a big-picture view of what is happening in a community and what assets, intangible or tangible, can be wielded.

**Infrastructure**
Using a touch screen dashboard, residents would have the ability to view a dynamic, interactive community asset map that outlines the cultural, human, and social capital the community shares. In addition, the dashboard will also track the status of funding, initiatives, and opportunities in the community.

**Interaction**
While waiting for the bus and discussing the future of the community with others, residents would touch the dashboard to read about current projects. If they have or know of an asset that should be added, they’ll record a voice message that will be automatically transcribed/reviewed for language and added to the map.

**Expected Outcome**
Publicly inventorying the strengths and resources of historically marginalized groups, could be transformative for how they address themselves and their power. With this map, residents can view an explicit outline of assets they can utilize to innovate, mobilize, and build their community.
Thank You.
Appendix

The following pages include our process, methods, additional renderings and details of our project work.
Design Through Agile Experimentation

Prototypes Round 1  Prototypes Round 2  Prototypes Round 3  Panel Discussion & Prototype Fair

**DISCOVER**

**Context & Agents**
Understanding the current ecosystem for Fines and Fees in Chicago through an evaluation of Red Light Cameras, Speed Cameras and Parking Meters.

**DETERMINE**

**Data & Resources**
Synthesizing previous prototypes and identifying key data systems and resources that might address and inform the public.

**DEVELOP**

**Equity & Sustainability**
Re-center the systems and core principles of Equity and Sustainability that will support BIPOC and underprivileged communities.

**DELIVER**

**Synthesis & Presentation**
A culmination and presentation of work conducted over the past 14-weeks by ID students, addressing the complexity of a future, equitable system.
Components

Physical Computing
Physical computing with Arduinos to rapidly prototype and simulate the current issues and inequities in the infrastructure of Chicago, and how they might be addressed.

Data Flows
Identifying the flow of information, and how they can be transformed into transparent, actionable insights for the public and the City of Chicago.

Community Equity Fund
Reimagining infrastructures to collect, distribute and democratize data, creating new revenue streams for the city.
Final Prototypes

Adaptive Traffic Management

Made from recycled materials, with a 360° camera and embedded air quality and road safety sensors.

Connected City Sticker

Connected City Sticker is tracked through the Adaptive Traffic Management system.

Bus Stop as Civic Center

Immersive bus stop experience, enabled with voting system and accessible community and mobility information.

Accessibility to give the city feedback on pain points in resident journeys.
Anatomy of Infrastructure

The anatomy of infrastructure is a systems tool that allows us to frame our desired state with a prescriptive lens. Our proposed goals at the center, show that we are building toward a Financially Stable, Racially Equitable, and Data Enabled system.

In order to achieve these goals, we believe that we need to enable the 6 principles listed in the impact section. Offering varying forms of community contribution, engagement, opportunities, and shifting governance systems from fines to fair fee structures, we believe we can build a new vision for Chicago.

In the affordances and agent section, there are more specific ways to design the components of our system from the micro level, like integrating delivery vehicles to using connected city stickers and voting systems.

Lastly, the key on the right offers insight into the eight capitals used to structure our thinking.