Citizen Engagement to Transfer Innovation to Regional Development

A survey project to identify citizen needs in small and midsized communities.

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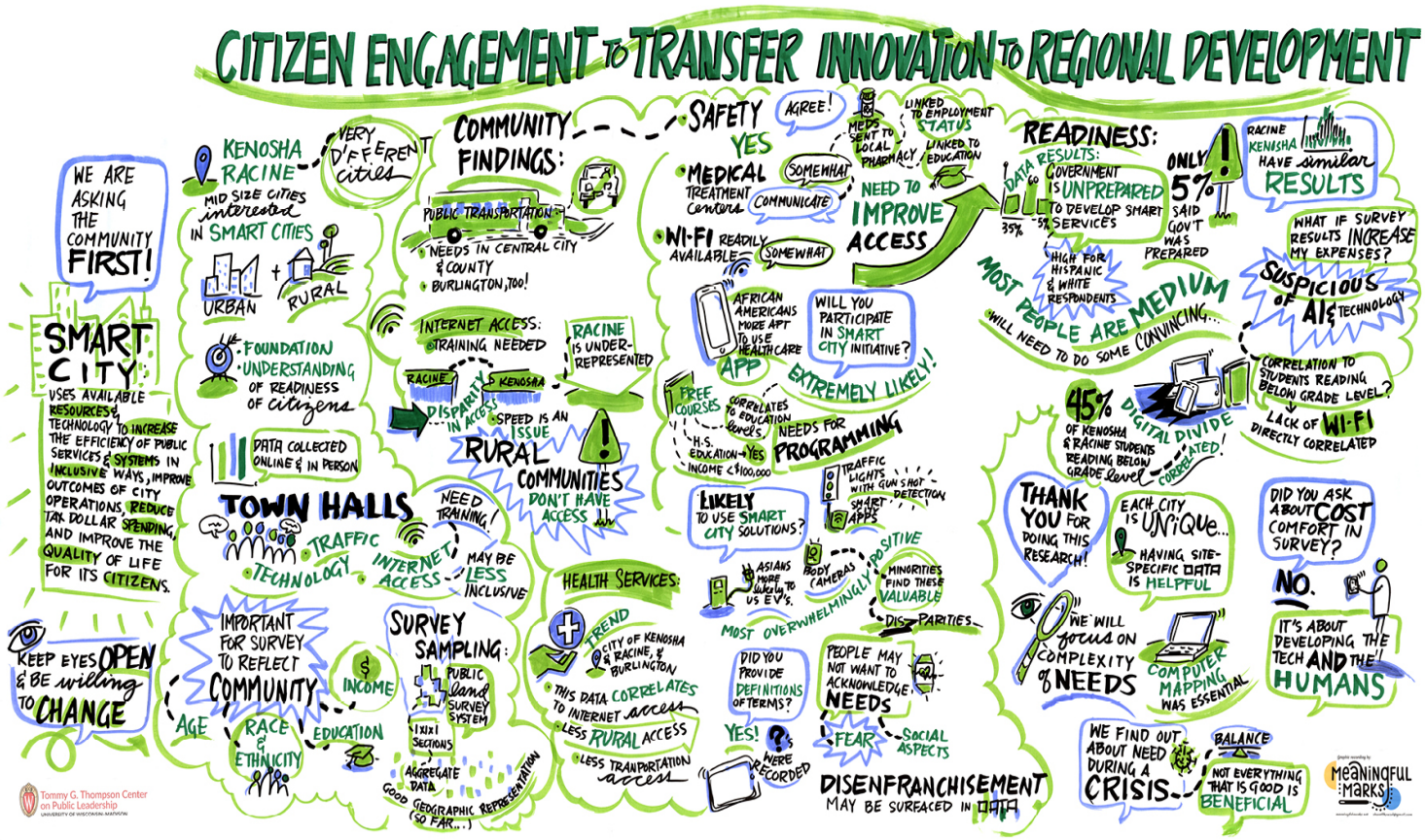

The Smart City Challenge

In the United States and across the world, smart city development has proceeded in two phases. Initially, private companies promoting technology dominated the activity, resulting in the insertion of isolated technological products that were not strategically embedded in the dynamics of city life. (Townsend, 2013) While this was an important first move to introduce, and gain acceptance for, the innovative changes that technology might offer, it became apparent that the technology needed to be more thoughtfully embedded into the larger governance relationship with its citizens. With this move to the social and political consideration of citizen engagement and wellbeing, the second phase placed more attention on equity, inclusivity, resilience, and responsiveness across the communities. The technology needed to be adopted within a larger urban development framework, made accessible to citizens, and integrated/connected within an analytic process. For the sustainability of smart cities, citizens must directly contribute to the formulation of policies and urban development.

The triple helix model combines the resources of universities, industries, and governments of civil society. As the smart city movement evolves across the world, progressive leaders are focusing on a new quadruple helix model where citizens are embraced as partners and are an integral fourth agent. With citizens as partners, the silos of universities, industry, and government begin to break down as all dimensions within the quadruple helix work collaboratively to drive modernization and transformation for the betterment of the city as a whole. A smart city is not simply a city that has integrated more technology; the goal of a smart city is to enhance the quality of life of its citizens through advanced technology that allows for a bottom-up policy approach, rather than a top-down approach dictating passive citizen engagement. Local development can take a qualitatively different path and integrate with the social and political well-being of citizens. They are the knowledge base when it comes to characteristics and problems within areas of the city and must not be excluded from the policy decision-making process.

Citizens in a smart city desire collaboration and participation in accordance with the culture of their communities. The quadruple helix (Arnkil et al., 2010; Cavallini et al., 2016; Borkowska and Osborne, 2018) provides an elevated and macro level perspective on the actors in a smart city; when unpacked it demonstrates a complexity and variability within cities depending upon the urban culture. Smart cities are difficult to define because of these characteristics. Technology is neutral; different cities manifest different combinations of actors, agendas, capacities, and values which will affect the way in which the technology is prioritized, utilized, and integrated across services and policies. So as smart cities mature, it becomes apparent that they are not unique social or political forms; rather, they represent the next stage of urban development in a larger framework of governance and engagement. This nuance of need must be understood from the citizen participant perspective.

Even while citizen engagement has been touted as one of the benefits of smart cities, little work has been done on how citizens can be engaged and in what capacity. The quadruple helix suggests centricity of citizen involvement in smart city culture, but little work has been done on how well citizens are engaged in the smart city decision making framework, and how that process depends upon existing institutional logic and city culture. This is especially true at the very beginning of smart city initiatives; most of the decision making occurs in the elite circles of boardrooms and government offices.

In addition to the relationship characteristics of actors, exogenous factors such as economic capacity, experience with public-private partnerships, and population characteristics are relevant. In the United States, emergent smart cities were large population centers with strong economies. With the increasing interest in technologically enabled change, these smart cities are being joined by smart regions, smart counties, and smart states. The diversity in the political units utilizing technology to become smarter suggests it is necessary to understand communities in ways that balance the residents needs with the readiness of the community, businesses, and government.

The main goal of this pilot project was to establish a foundational understanding of the readiness of two communities in southeast Wisconsin- Racine and Kenosha. Both communities have populations under 100,000 and are considering smart city technology developments and innovation neighborhoods to stimulate economic and housing development. There is currently little to no research on smaller communities who wish to implement smart solutions for their citizens, and an accompanying lack of research on whether these solutions are truly effective for their citizens. (Suzic, et al 2020)

Additionally, Borghys et al (2020) suggest that governments prefer to be participants rather than conveners. And, when efforts are made to convene, these are limited to idea generation, rather than practical discussions of needs and capacities. A notable exception to this is Connect 313 in Detroit, which actively engages community neighborhoods and residents in decision making regarding digital inclusion. We propose to build on this model to begin a strategic long-term effort to include our local citizens in a forward-thinking smart and connected city development.

Finally, there is a gap between data engagement and data availability. Some city governments in larger urban areas often achieve the latter through open data platforms allowing individuals to access 'big data'. However, there is very little consistent evaluation of its usability and/or effectiveness. (Spil, et al, 2017) In smaller size communities, where being smart and connected is not easily understood terminology, data is considered a tech playground, that is, data collection because we CAN. How to go about using the data effectively has yet to be addressed in many municipalities. Further, the challenge of inclusiveness in data contribution, data use, and data engagement is still largely unmet. (Saunders and Symon, 2016)

The importance of community engagement

Community needs that can be impacted by connective and smart technology require a nuanced data set that is sensitive to variation among the population. Traditionally, community research has tended to aggregate community descriptions to provide a description of the overall demographic. With the onset of artificial intelligence, personalized data response, and dynamic response computing, collected data needs to be more sensitive to location, distribution, and the complexity of needs in the community. Smart technology has the power to be responsive, inclusive, and adapted to the needs of the community in order for them. Yet, in order for citizens to have agency, they must be partners in prioritizing needs, and the ways in which they are met. Arnstein (1969) suggested that citizen engagement moves from passive to active; to progress to a more active role, it is vital that the opportunity be provided to participate in the identification of community needs. Addressing the Arnstein gap requires a prioritization of public involvement beginning with an understanding that spatially distributive justice may not be the best approach to deliver complex services to areas with variable needs; access to appropriate services through structured public involvement may be a better solution. (Bailey and Grossardt, 2010). To accomplish this, we utilized GIS mapping with a community survey, to better understand community needs and community preparedness across the two counties of Racine and Kenosha.

Citizen input is important in all smart city innovations, but it is vital for small to midsized cities. The need for prioritization, and an accurate identification of need is necessary for all municipalities that have limited budgets, and limited room for error. Funding growth and innovation are possible while combining federal funds and public private partnerships, but these initiatives require a commitment to community engagement, and it starts with asking that community for input. In small to midsized legacy[1] cities, this is even more important since the civic capacity of the citizens to participate meaningfully in technological participation platforms needs to be assessed. And survey engagement is the first step towards increasing civic capacity. (Gordoni and Schmidt, 2010)

Research project design

With support from the Tommy Thompson Center on Public Leadership and Service, UW Parkside conducted a community survey across Racine and Kenosha Counties in Spring 2023. There were two teams of researchers:

Research Team 1.

Research Team 1 (the GIS team) consisted of a co-PI and three undergraduate student research assistants. The students were advanced GIS students pursuing either a GIS Certificate or GIS Minor. UWP has a strong GIS program housed in the College of Social Sciences and Professional Studies' Geography and Anthropology Department.

Research Team 1 members were tasked with all Geographic Information System aspects of the project. All student research assistants on Research Team 1 participated in conducting the survey with Research Team 2.

[1] Legacy cities are characterized as older, post industrial cities that have experienced a decline in population and economic development

The first task of the team was to design a sampling methodology that would provide for anonymity and aggregation of survey respondents, while also allowing for cartographic visualization (Geovisualization) and analysis of survey results. The team chose to utilize Public Land Survey System (PLSS) sections for these purposes. In addition to the utility of this grid for anonymity and aggregation of survey responses, the PLSS grid system within the study area is related to both historic land development and government administration at the sub-county level. Each PLSS section covers an area of approximately one mile. The survey area has 635 sections covering the entire project study area (Kenosha and Racine Counties). Each section was given a sequential number ("grid code").

An ArcGIS Online (AGOL) Web Application was designed and created utilized existing PLSS section data. The app was shared to the public to be used in the survey for data collection. The app was referred to internally as "PLSS Web" app and can be found here: https://shorturl.at/yBGN1

A link to the app was embedded in the digital survey and allowed survey respondents to either visually identify which section they resided in by panning and zooming to their home location, or survey respondents could enter their address into a search box to identify the section of their residence. No address information that was entered into the app search function was saved or logged in any way.

Following the results of the survey, Research Team 1 integrated the survey results into GIS for mapping, cartographic visualization, and analysis. The survey results were first exported from Qualtrics software. Survey questions were recoded into simplified attributes (aka field names) and survey results were recoded and summarized. These tasks were accomplished through a combination of SSPS and Microsoft Excel software. Survey results were then integrated into GIS as a table and joined to an existing section data layer utilizing section grid codes. Survey results were summarized and symbolized utilizing a natural breaks classification to achieve consistency for cartographic purposes.

Existing data sources were also gathered from a variety of online and local government sources to provide a foundational display of equity gaps in economic development as well as access to services.
Research Team 1 generated a series of cartographic products displaying the survey results for a subset of survey questions. In addition, a select number of survey results were overlaid onto existing data related to transportation, medical facilities, and internet access.

Research Team 2.
Seven student researchers were entrusted with visiting public spaces to collect survey responses. A loosely stratified sampling strategy was adopted to improve the likelihood of geographic representation. Students collected citizen input at locations of need such as grocery stores, gas stations, pharmacies, public parks, and the like. Public places were stratified across both counties of Racine and Kenosha based on demographic variables such as population density, income, & race to reach the resident base. This team also verified the representation of the survey sample to the general population in southeastern Wisconsin.

Geographical Scope of the project

Racine and Kenosha counties both represent the urban rural divide described by Kathy Cramer (2016). Cramer suggests that party ideology is less important than 'rural consciousness', a set of values coinciding with geographical boundaries that is complex and multi-layered. Simple partisanship does not capture this fundamental identity. Prior to smart city technology, this significant difference was difficult to accommodate, and was compounded by the diversity of governments in this space. Our research used GIS mapping techniques to place survey responses in appropriate relationship to urban/rural, different economic status, and existing service maps so that we were able to identify diverse community needs, service gaps, and potential solutions. Satisfactory coverage of southeastern Wisconsin was facilitated by ensuring that survey collection took place in all cities/villages/townships in
Racine and Kenosha Counties. Figures 1 and 2 provide the distribution of responses across southeastern Wisconsin, with a key to the towns and villages that are represented in the survey in addition to the major cities of Kenosha and Racine. Locally, I94 is considered the dividing line between the urban and rural areas.

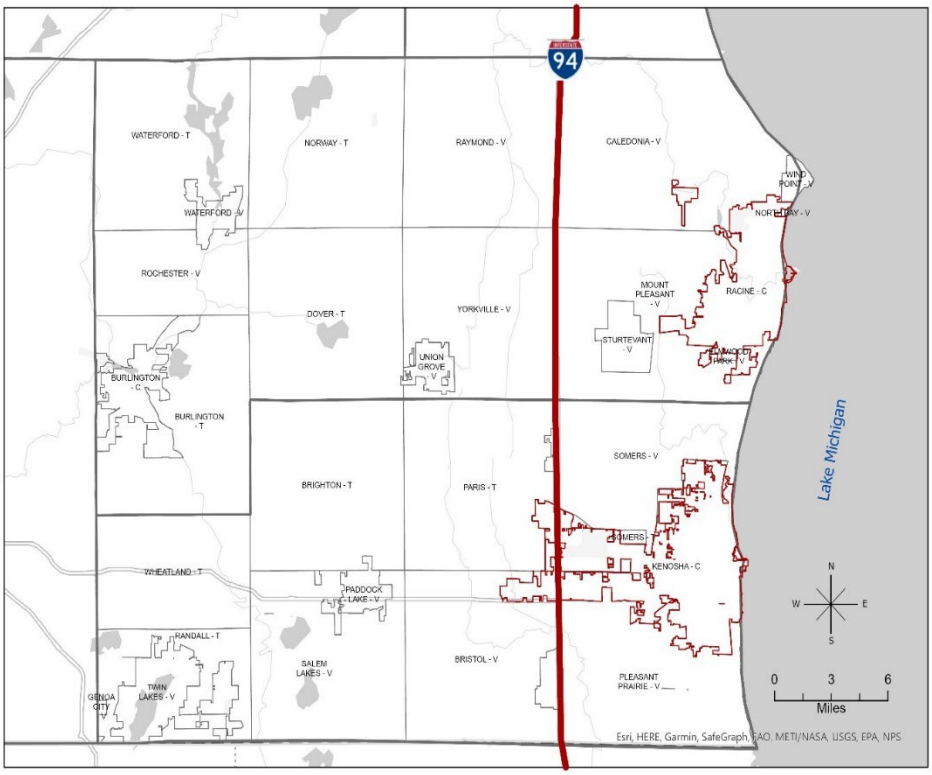

Figure 1. Cities, Townships, and Villages in Racine and Kenosha Counties

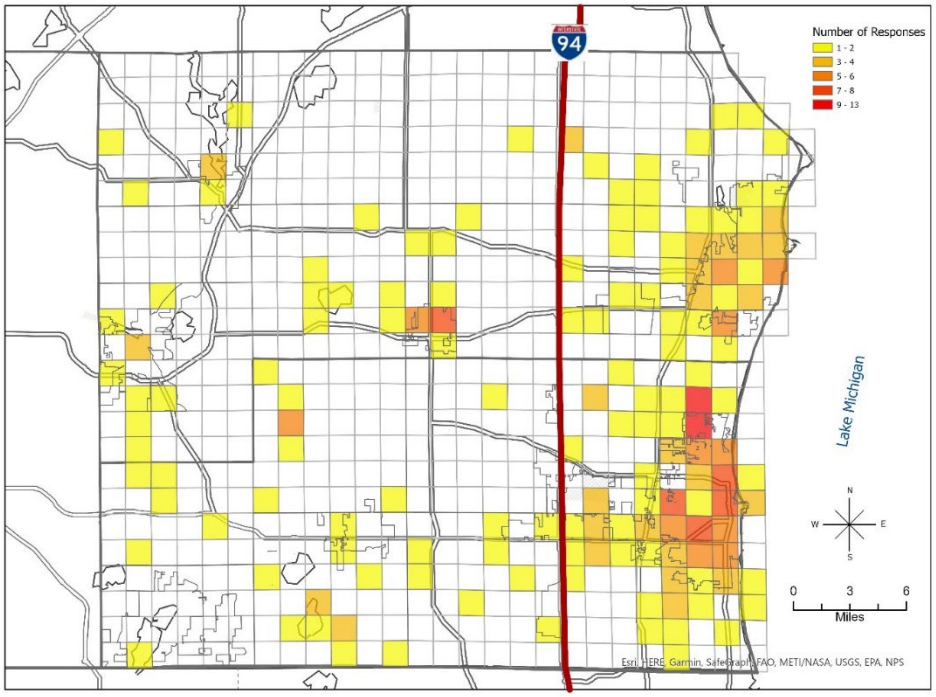

Figure 2. Geographic distribution of survey responses

Smart city research emphasizes that the increased capability to manipulate big data results in an increase in well-being that is based on individual or group needs, rather than a macrolevel assessment of community needs. Researchers at Cornell Tech identify four objectives of using big data to improve healthcare: Prevention, Prediction Personalization, and Participation. To accomplish this, smart city engagement must be predicated on detailed knowledge of specific

populations in the community. Wunderlink, Sloan, and Davis (1996) identify population shifts important for the provision of health services, including an aging population, shifts in ethnicity and family patterns, and increasing poverty. We can extend their argument to the provision of all public services. Table 1 suggests the differences that are present in southeastern Wisconsin.

Table 1. Population distributions on key demographics

	Southeast Wisconsin	Kenosha County	Racine County	Urban (east of I94)	Rural (west of I94)
Non-Single parent household	73	73	73	68	77
White	55	59	46	48	62
African American	13	9	18	12	10
Hispanic	11	12	15	17	11
61+	16	17	15	13	19
Married/Single	46/39	49/39	47/41	50/35	42/43
Poverty level or below (FPL)	14	15	12	14	13

We can see from the simple
breakdown based on county/city, and urban/rural, that there are some significant differences in the population between counties, and between rural and urban areas. If we use GIS mapping, we see that there is noticeable clustering of groups, which can help in the provision and prioritization of services, eliminating guesswork in determining need. Figure 3 provides a detailed distribution of individuals aged 61+, suggesting that services specifically targeted towards the elderly should be prioritized in the City of Racine (near Lake Michigan), the City of Kenosha (also near the Lake but with a wider range westward), and the township of Burlington.

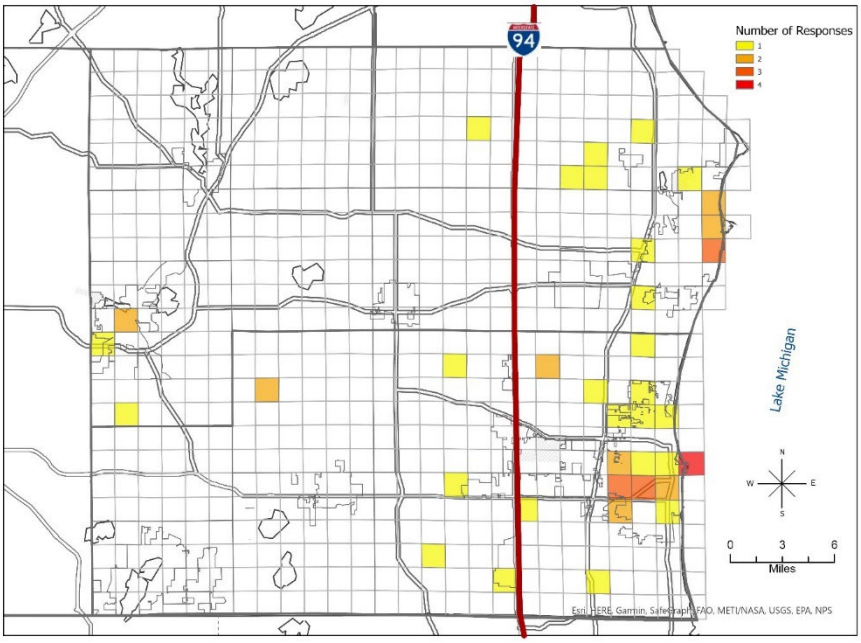

Figure 3. Distribution of individuals aged 61+

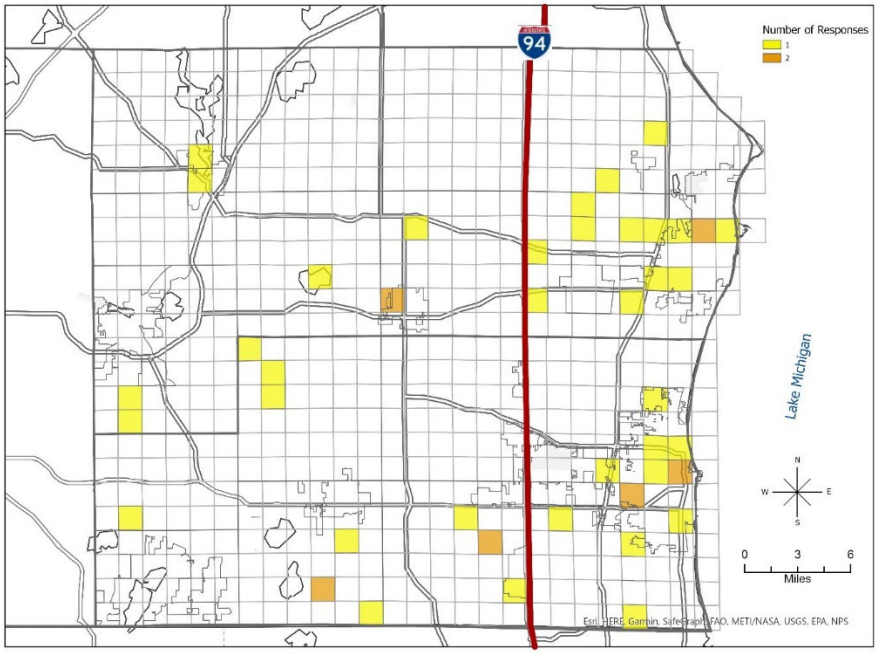

Figure 4. African American respondent distribution

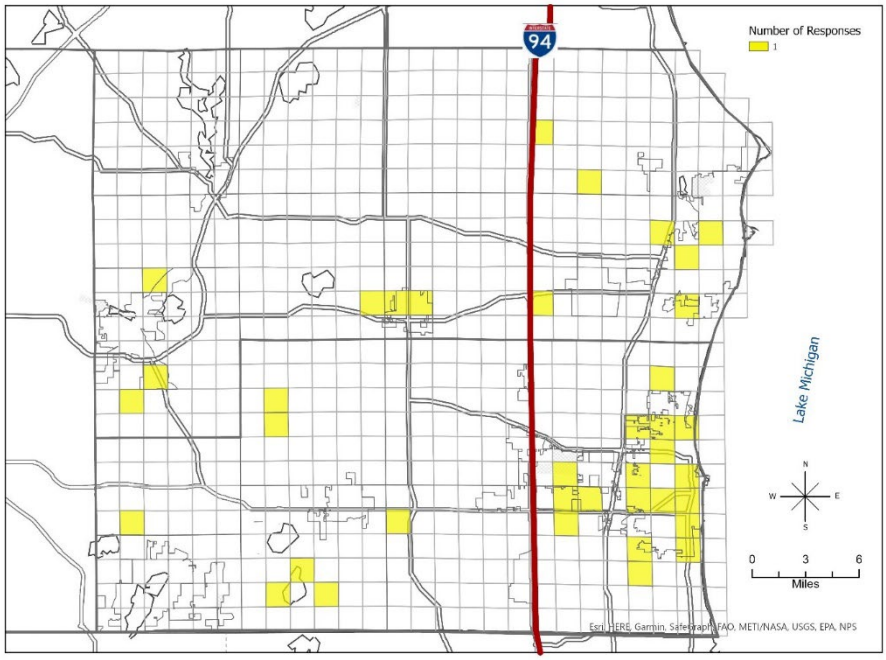

Figure 5. Hispanic respondent distribution

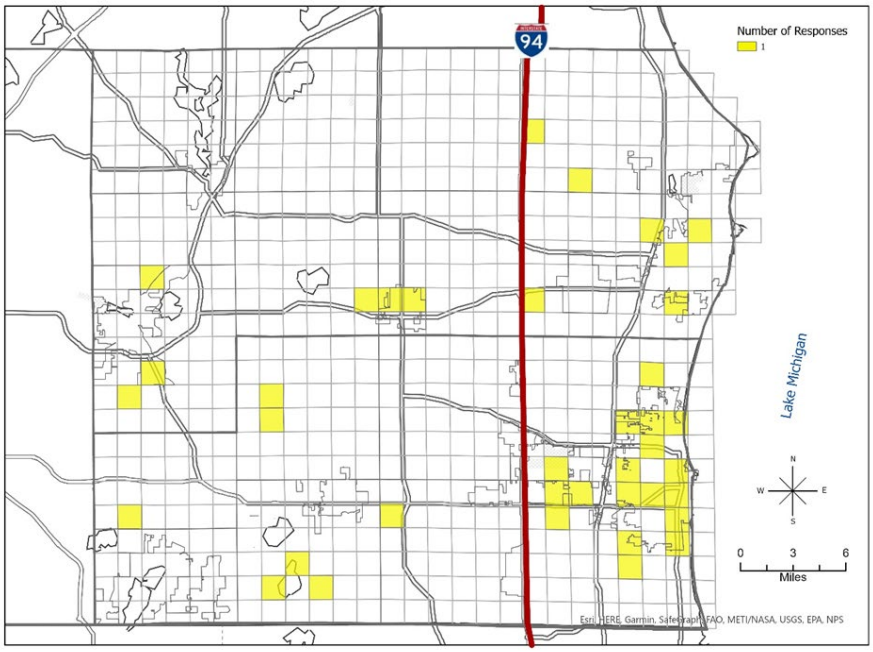

Figure 6. Respondents with income < 15,000

Figures 4-6 also demonstrate the value of geographic context for decision making. Details regarding demographic distribution across southeastern Wisconsin are useful to guide policy choices and prioritization for local governments. Figures 4-6 illustrate that, while African Americans are sparsely represented west of I94, Hispanics are more evenly represented across the rural and urban sectors of the counties. Those individuals with income less than 15,000 are concentrated in Kenosha, east of I94. While these demographics are only illustrative, they point to a need to disaggregate data regarding populations at the local level, to allow for more targeted services.

Local governments have different approaches to smart city initiatives used for economic development; the differences are at least partially based on the political motivations of government officials. County and city government structures are also structurally different in that counties are considered the administrative arm of the state, and do not have home rule that is based in the legislature, as do cities.

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The View from the Top- Local government priorities in smart city development

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Racine City

In 2019, the City of Racine decided to pursue smart cities initiatives, competing for, and winning, a north American smart city designation from the Smart Cities Council. Since then, the city has taken steps to reduce pollution and improve

citizen well-being by purchasing the largest fleet of electric buses in the state. “Once all 13 zero-emission transit buses have replaced their diesel counterparts, the City of Racine will reduce its carbon footprint by approximately 922 tons annually,” states Trevor Jung, the Director of Transit and Mobility. [2]

The Information Technology and Police departments have collaborated on police camera upgrades, including license plate recognition software and crime detection audio sensors. Finally, the finance department, among others, has moved to a convenient and secure electronic platform to pay for public services.

Multiple projects include creating and maintaining maps of free WiFi locations, maps of beach locations and conditions, and moving some city services to the webpage to reduce the need to physically come to City Hall for assistance. An ambitious project is the development of an autonomous vehicle slated to be available in the coming years for point-to-point shuttling.

The biggest challenge identified by Chief Information Officer, Adele Edwards, is the closing of the digital divide, which requires power, internet access, a suitable device, and training. As an example of the difficulty facing the city, Edwards notes that 17% of Racine does not have broadband access; closing that gap has been shown to increase employment and student performance, with potential impact on crime.

Racine County

Racine County, in contrast to the City of Racine, and perhaps in alignment with the different responsibilities of county government, is highlighting public and cyber security. Jonathan Delagrave, Racine County Executive, cites 3 goals in relation to smart city initiatives: a focus on Cybersecurity and disaster recovery, empowering the county and associated municipalities to operate secure IT systems and networks, while keeping ahead of evolving cyber threats; innovative technology that will transform the workplace and increase access to services by enabling end user capabilities through access to data and services anywhere, anytime; the establishment of a service delivery model for continuous business process improvement that enables transparent, data-driven decisions and rapid delivery of high quality capabilities**.**

An example of public security is found in the supervision and monitoring of water bodies. The 2022 State of the County address notes that water security is a priority, and will include Remote-control buoys controlled by lifeguards, life-saving drones, and homing beacons to notify the public of water conditions. Safety in county detention centers is also of note, with the introduction of through-body scanners in the County Jail to reduce the threat of weapons, drugs, and other paraphernalia being introduced into the detention center.

Kenosha City

Tim Casey, the Director of City Development, highlights the Kenosha Innovation Neighborhood, an innovation-centric, community-based, mixed-use Master Plan organized around creating a regional destination connected by a strong urban fabric. The master plan incorporates 20-acres of public green space, a well-connected street grid that promotes multi-modal access, and a range of development opportunities that could include over 1 million square feet (about the area of Chicago's Millennium Park) of innovation-focused office, medical, institutional, and commercial space, and up to 1,300 residential units. The plan and design guidelines provide a framework to guide development to meet the goals and objectives identified by the community, aligning with many of the design principles of smart city growth- mixed land use, compact architectural design, walkable neighborhoods, multimodal transportation options, and sustainability.[3] The Neighbourhood is a part of the city-wide fiberoptic network that will support affordable high-speed internet and Smart City applications that more efficiently manage a wide range of services, from public works to e-health. The project will make Kenosha a FiberCity™, home to SiFi Networks’ trademarked universal fiberoptic network.

Kenosha County

[2] https://racinecountyeye.com/2022/08/17/electric-bus-city-of-racine-3-8-million-grant/

[3] https://tomorrow.city/a/smart-growth-principles-and-examples

Kenosha County's approach to smart initiatives is like Racine County, suggesting that form follows structure. A strategic IT plan includes activities to ensure County information assets are secured and privacy protected, to deliver timely and effective responses to customer requirements, establish a technology governance structure including a framework for evaluating emerging technologies and their potential to improve efficiency and cost effectiveness.

As the county is responsible for multiple jurisdictions, broadband expansion is a priority. On February 1, 2023, County Executive Samantha Kerkman issued an executive order forming a committee tasked with enhancing efforts to improve access to broadband internet service throughout Kenosha County, particularly in areas that are now underserved by high-speed internet providers. The Kenosha County Community Broadband Advisory Committee's mission includes providing critical input on developing a comprehensive plan for facilitating broadband development and delivery. The committee will generate informed recommendations to local, state and federal legislators, community leaders and private organizations.

Survey methodology

Survey design was based on a loose stratified sampling according to geographic area using the PLSS grid app described earlier. In-person interviews were conducted at public locations like grocery stores and gas stations across the PLSS grid. Although households might have made the stratified sampling more accurate, for reasons of interviewer safety we decided to eschew that approach. Individuals could also take the survey online.

Prior to survey development, 2 Town Halls were held to help identify research priorities. (Etchegary, et al, 2017) The general public was invited to attend, as well as representatives from local government. The town halls were open to both county and city residents. Following presentations from local government on current smart initiatives, participants were asked to identify and prioritize needs, and whether they believed smart technology could be used to meet those needs. Participants were also asked to identify potential barriers to using technology-based services. A summary of comments is presented here:

Topic	Racine	Kenosha
Government Access	Easily accessible information; technology training and local public sites (libraries, community centers); online access to services	Technology training to access information
Transportation lines	Transportation access east to west; transportation between Kenosha and Racine	Access to the City from the Freeway to the west
Multimodal transportation	Opportunities for share ride via apps	
Safety/Security		Technology (drones) to monitor vehicle accidents/hit and runs; dynamic traffic signals to accommodate traffic density; neighbourhood safety (foot patrols)
Quality of Life	Provide an Engagement platform for citizen engagement on services and events;	Enhance quality of life through increased use of lakefront; improve the social lifestyle

We can see that transportation is a common concern for residents of both communities. Interestingly, both town halls reflected a need for more connectivity between the two cities, as well as a need for East-West transportation routes. Racine and Kenosha have been described as legacy communities and have a historical record of competition, sometimes bitter and hard fought. John Buenker suggests that this rivalry has led to a lack of cooperation and some missed opportunities.[4] Whether the two city governments recognize this or not, the feedback from the town halls seems to

[4] https://emke.uwm.edu/entry/kenosha-county/

indicate that citizens would like cooperation and connection to move forward. Such connectivity is in line with smart city initiatives that typically require connectivity across services, exchange of information and data, and an expansion of end user participation. (Embarak, 2021)

The study used a cross-sectional survey research design to gather citizen input. The study was approved by the authors' institutional review board. An e-survey was developed after a thorough review of the literature and considering the feedback from Townhall participation. The instrument had six sections with Likert-type questions to gauge citizen needs, priorities, engagement, probable usage, implementation, and perception of smart city initiatives. There were demographic questions and a question to discern the Public Land Survey location code.

The survey was transcribed to be taken in either English or Spanish. The instrument was designed based on a review of the literature on citizen needs in mid-sized communities and feedback from town hall meetings in Racine and Kenosha. The survey could be completed on any device by clicking a link or scanning a QR code. Student researchers visited public places and stores to solicit survey participation by having willing respondents respond on the student provided devices or on their own devices. The survey link was also available publicly on the institution's website and shared through an email link to all stakeholders. The survey was completed by 409 respondents. The survey consisted of a combination of multiple-choice and Likert-type questions. The data was exported to IBM SPSS 28.0 to run analysis.

Analysis

Univariate distributions of the variables are included here. The demographics of respondents in the sample are representative of the actual population of the region. There were some segments of the population that were misrepresented in the sample: 1. The 18-21 age group was underrepresented, as was the percentage of white respondents. 2. Respondents with post-secondary degrees were overrepresented in the sample.

Table 2: Demographic Characteristics

Age	**N**	**%**
18-30	127	31.2
31-40	79	19.4
41-50	83	20.4
51-60	48	11.8
61-70	55	13.4
71-80	10	2.5
Above 80	2	.5
Prefer not to say	3	.7
Total	***407***	***100.0***
Gender	**N**	**%**
Male	157	38.5
Female	226	55.4
Non-binary	8	2
Prefer not to say	17	4.2
Total	***408***	***100.0***
Race/Ethnicity	**N**	**%**
White	225	**55.1**
Hispanic / Latinx	55	13.5
African American	44	10.8
Native American	10	2.5
Native Hawaiian/Pacific Islander	1	.2
Asian	35	8.6
Multiracial	19	4.7
Prefer not to say	19	4.7
Total	***409***	***100***
Marital Status	**N**	**%**
Married	186	45.8
Widowed	6	1.5
Divorced	31	7.6
Separated	4	1.0
Single	161	39.7
Prefer not to say	18	4.4

Total	***406***	**100**
Education Level	**N**	**%**
High School and Less	*86*	21.2
Some College	*105*	25.9
Bachelor's Degree	*112*	27.6
Graduate/Professional Degree	*103*	25.4
Total	***406***	**100**
Income Level	**N**	**%**
Less than $15,000	56	14.0
$15,001-$30,999	5962	15.5
$31,001-$50,999	2888	22.1
$51,001-$75,999	1895	23.8
$76,000-$100,999	1652	13.0
$101,000-$150,999	25	6.3
$151,000-$200,999	13	3.3
Over $200,000	8	2.0
Total	***399***	***100***
Employment Status	**N**	**%**
Employed Part-Time	85	20.8
Employed Full-Time	242	59.2
Retired	35	8.6
Retired but employed part-time	6	1.5
Not Employed	20	4.9
Seeking Employment	6	1.5
Prefer not to say/other	14	3.5
Total	***409***	***100***
Housing Status	**N**	**%**
Homeowner	208	51
Single Rental	95	23.3
Multifamily Rental	47	11.5
Shelter	8	2.0
Prefer not to say/other	50	12.3
Total	***409***	***100***
Language Spoken at Home	**N**	**%**
English	343	84.5
Spanish	37	9.1
Other	26	6.4
Total	***409***	***100***
Mode of Transportation	**N**	**%**
Own Car	360	88.9
Carpool	16	4.0
Public Transportation	10	2.5
Bicycle	7	1.7
On Foot	3	.7
Uber/Lyft	7	1.7
Other	2	.5
Total	***409***	***100***
Single Parent Household	**N**	**%**
No	298	73.6
Yes	107	26.4
Total	**405**	**100**
Number of People in the Household	**N**	**%**
1-2	163	40.0
3-5	209	51.4
More than 5	25	6.1
Prefer not to say	10	2.5
Total	***407***	***100***
Length of Time in Current Residence	**N**	**%**
Less than a year	32	7.9
1 to 3 years	101	24.9
4 to 5 years	96	23.6
6 to 10 years	54	13.3
More than 10 years	123	30.3
Total	***406***	***100***

Smart City Needs

The majority of the respondents somewhat or strongly agreed with the smart city needs statements. On a scale of 1 to 5, 6 of the 7 items had a mean score above 3.5 with 3 items exhibiting a score above 4.0 demonstrating agreement with the statements. One notable exception is the item "Housing is affordable where I live" where the mean was less than 3.29 (Table 3). People for the most part feel safe, confident in their medical centers' communications, and have readily accessible Wi-Fi and internet. On the item "Wi-fi and Internet is readily accessible to me," the Digital Divide was apparent in 13.6% of the survey participants which warrants further investigation for mitigation. Expanding on the WiFi topic, Figure 7 combines the location of those respondents who found public WiFi important with the availability of hotspots in the area. While there is some correlation between identified importance and public WiFi in Racine County, especially in the city of Racine; there is room for improvement in Kenosha city and county. WiFi, and IoT in general provides the foundation for smart city development. It is not simply about expanding public access; it also provides opportunities for data collection, increased location awareness, and economic development.

Table 3: Smart City Needs – Please rate your agreement with the following statements

Scale – 1=Strongly Disagree 5=Strongly Agree	I feel safe where I live	Housing is affordable where I live	I can pay for city services easily with any payment method	My medical treatment centers communicate with each other well	I am easily able to have medications sent to my local pharmacy	My garbage and recycling is collected when needed	Wi-fi and Internet is readily accessible to me
	N=407	**N=404**	**N=406**	**N=404**	**N=405**	**N=404**	**N=406**
Mean / **SD**	**3.98** / **1.04**	**3.29** / **1.25**	**3.61** / **1.12**	**3.64** / **1.12**	**4.24** / **.96**	**4.29** / **.89**	**4.26** / **.97**
Strongly Disagree	3.2%	9.4%	4.9%	5.0%%	2.0%	1.2%	2.2%
Somewhat Disagree	9.1%	22.8%	13.8%	11.9%	4.9%	4.7%	6.2%
Neither Agree nor Disagree	8.6%	13.9%	18.7%	20.8%	9.9%	7.9%	5.2%
Somewhat Agree	45.0%	37.4%	40.1%	39.4%	33.6%	35.6%	36.2%
Strongly Agree	34.2%	16.6%	22.4%	23.0%	49.6%	50.5%	50.2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

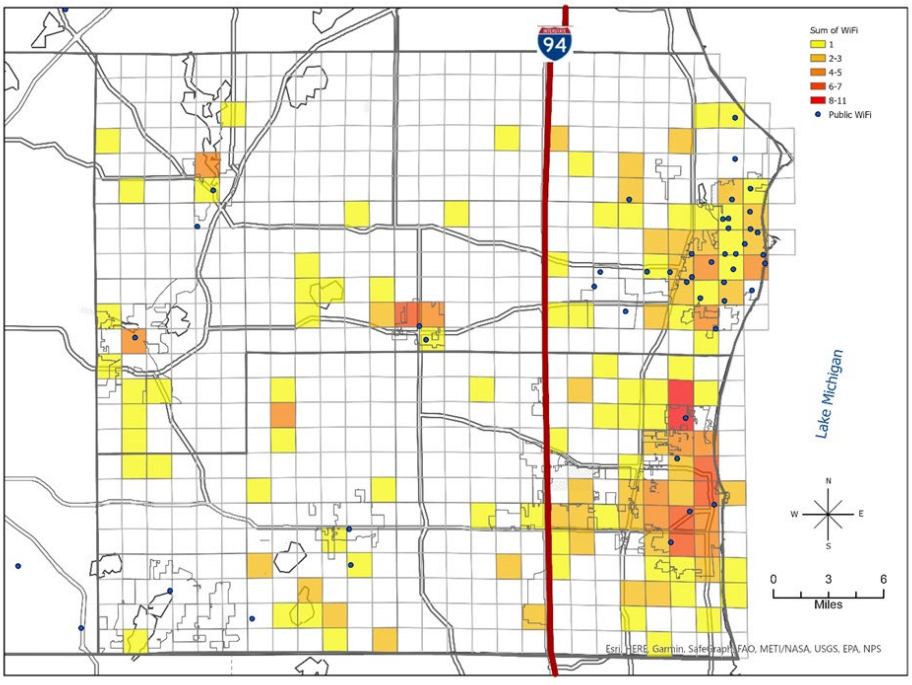

Figure 7. Public WiFi is Valuable and Public WiFi Locations

Smart City Priorities

Generally, survey respondents are open to using online apps especially if they are geared toward improving access to medical center/paramedic services, social services, monitoring home energy consumption, or water use (Table 4). Previous research has found a significant (and expected) negative relationship between age and willingness to use apps; this is the only demographic factor that was found to be significant. Something that will be important later in this report is that trust in government competence had a positive significant relationship to app use. (Hou, et al, 2020)

Table 4: Smart City Priorities – How likely would you be to use online apps for the following purposes?

Scale – 1= Extremely Unlikely 5=Extremely Likely	Providing accessibility for those with disabilities **N=407**	Connecting isolated seniors **N=406**	Improving access to hospital/paramedic services **N=407**	Accessing social services **N=405**	Monitoring energy consumption at home **N=406**	Monitoring water use **N=405**
Mean / **SD**	**3.62** / **1.16**	**3.61** / **1.17**	**3.96** / **1.06**	**3.96** / **1.04**	**3.93** / **1.1**	**3.87** / **1.17**
Extremely Unlikely	7.4%	6.7%	4.4%	4.0%	5.2%	6.2%
Somewhat Unlikely	9.1%	11.3%	6.9%	6.4%	5.9%	8.1%
Neither Likely nor Unlikely	20.9%	21.9%	11.1%	13.1%	15.0%	13.6%
Somewhat Likely	39.1%	34.5%	43.7%	43.0%	38.4%	36.5%
Extremely Likely	23.6%	25.6%	33.9%	33.6%	35.5%	35.6%
Total	100%	100%	100%	100%	100%	100%

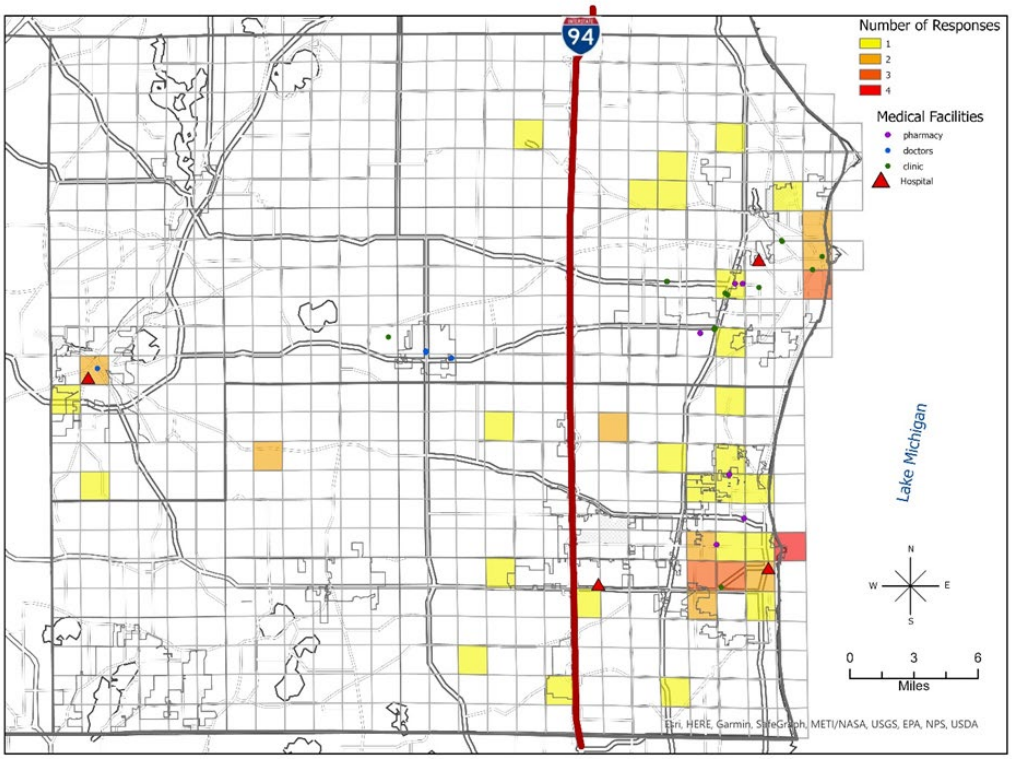

Figure 8. Age 61+ and Locations of Medical Facilities (Hospitals, Clinics, Doctors, and Pharmacies)

Respondents were most likely to use an app that increased access to hospital and paramedic services. Figure 8 presents the spatial relationship between seniors and medical facilities throughout southeastern Wisconsin. As we move west from the lake, there is a dearth of medical facilities, most marked west of I94. With this distribution in mind, the development of an easy-to-use app for seniors throughout the counties might facilitate access to needed medical services.

Smart City Engagement

Overall, respondents seemed to be interested in engaging in smart city initiatives with over 60% expressing interest in participating in the planning process, developing skills or being trained, and having a dedicated municipal office. A large majority (over 70%) responded favorably toward having a dedicated smart city website to share concerns, open forums or town hall to discuss projects and proposals, using mobile apps to report outages, and having online polls to solicit citizen input/feedback. Having free computer literacy courses was the least popular item chosen by 52% of the respondents with the lowest mean of 3.21 (Table 4). Nonetheless, this should not be overlooked, as it is foundational for any initiatives that are based on information connectivity.

Table 4: Smart City Engagement – How likely would you be to use or participate in the following smart city initiatives?

Scale – 1= Extremely Unlikely 5= Extremely Likely	Free courses in computer literacy **N=406**	Training and skill development **N=405**	A municipal office dedicated to smart cities initiatives **N=406**	A website to share concerns **N=406**	Open forum/townhall to discuss projects, proposals, and plans **N=405**	Participation in the planning process **N=407**	Use of mobile apps to report service outages **N=407**	Online Polls **N=403**
Mean	**3.2**	**3.54**	**3.59**	**3.91**	**3.74**	**3.63**	**4.13**	**4.0**
SD	**1.3**	**1.13**	**1.1**	**1.04**	**1.03**	**1.08**	**.98**	**1.04**
Extremely Unlikely	16.0%	7.4%	5.4%	4.9%	3.2%	4.2%	3.9%	4.2%
Somewhat Unlikely	14.3%	10.9%	11.8%	5.7%	10.1%	12.8%	3.4%	6.2%
Neither Likely nor Unlikely	17.2%	20.7%	21.2%	12.8%	19.5%	20.6%	8.6%	9.9%
Somewhat Likely	37.2%	42.7%	41.9%	46.8%	43.5%	41.0%	44.2%	45.2%
Extremely Likely	15.3%	18.3%	19.7%	29.8%	23.7%	21.4%	39.8%	34.5%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

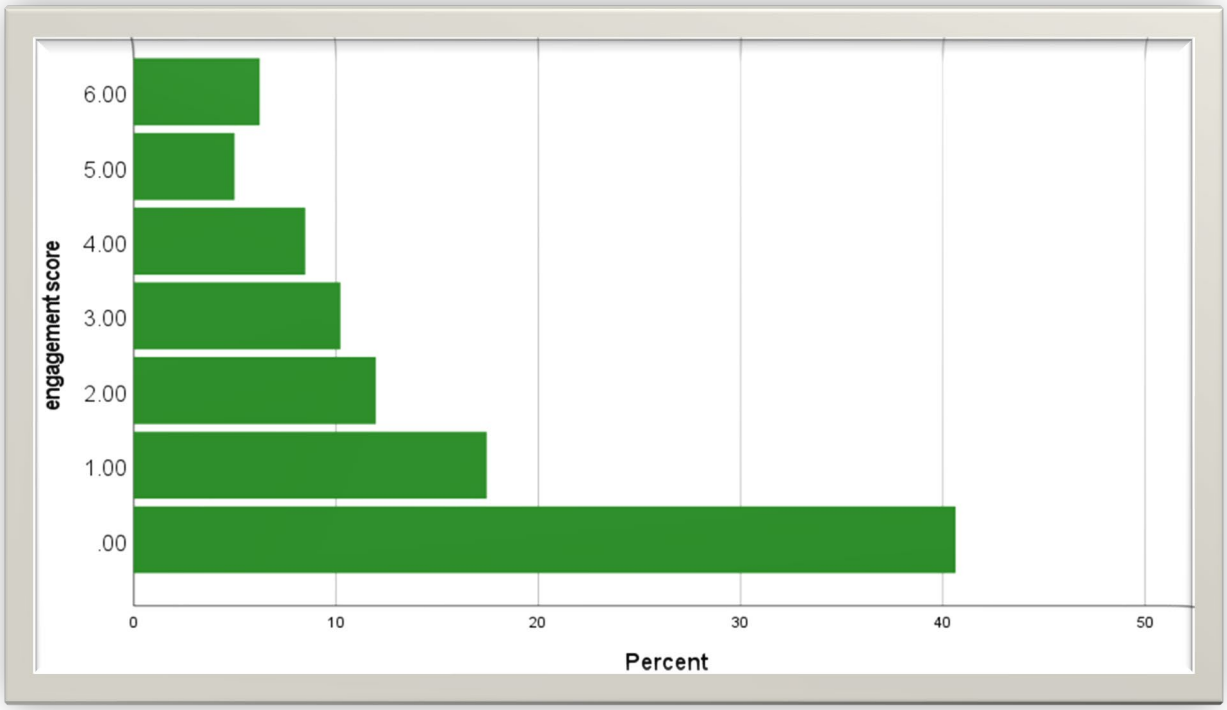

Figure 9. Cumulative Engagement Index distribution.

An additive citizen engagement score indicates that even though individual engagement opportunities might be attractive to citizens, an overall willingness to engage across the board, requiring more time and commitment, is not prevalent among the majority of citizens. Of the 6 questions used in the additive engagement index (dedicated municipal office, website, open townhalls/forums, active planning, app usage, and online polls, 11.2% indicated high engagement willingness (scores of 5 or 6), 18.7% indicated moderate engagement (scores of 3 or 4), and 29.5% indicated low engagement (scores of 1 or 2). More work needs to be done here, as this additive score does not capture the variation in difficulty among the forms of participation. And it is worth noting that even though the willingness to engage is high within each univariate measure, given the variance in the index, it is likely that different individuals are choosing unique forms of participation.

SMART CITY USAGE

A large majority of survey participants (over 70%) are somewhat or extremely likely to use transportation mobility apps, or apps for monitoring water and energy usage. Electric vehicle charging stations were the least popular of these initiatives reporting the lowest mean of 3.38 and having access to more public Wi-Fi services was the most popular choice (80.6%) with the highest reported mean of 4.14 (Table 5). Electric vehicle charging stations were received with the least enthusiasm; respondents can be assumed to reflect a relative lack of interest in electric vehicles on the state level in 2023 (no EV credit, less than 1% electric vehicles statewide).

Table 5: Services to Implement Smart City Initiatives – How likely would you be to use each of the following smart city solutions?

Scale – 1= Extremely Unlikely 5=Extremely Likely	Transportation mobility apps supporting multiple travel modes **N=407**	Electric vehicle charging station **N=406**	Water and wastewater detection (smart meters, automated leak detection, etc.) **N=407**	Public Wi-Fi **N=406**	Smart meters, solar panels, etc. **N=401**
Mean / **SD**	**3.84** / **1.18**	**3.38** / **1.42**	**3.94** / **1.0**	**4.14** / **1.13**	**3.97** / **1.06**
Extremely Unlikely	7.4%	18.5%	3.2%	5.7%	4.2%
Somewhat Unlikely	7.4%	8.6%	5.7%	4.9%	5.7%
Neither Likely nor Unlikely	12.5%	13.5%	16.2%	8.9%	15.2%
Somewhat Likely	39.3%	34.7%	43.5%	31.3%	38.2%
Extremely Likely	33.4%	24.6%	31.4%	49.3%	36.7%
Total	**100**%	**100%**	**100%**	**100%**	**100%**

Willingness to use transportation apps overlapped with existing public transportation in urban areas of Kenosha and Racine. Yet, a number of respondents who were willing to use transportation apps, able to support multimodal transportation options were in areas unserved by the existing routes. The Jobs Center of Wisconsin recognizes transportation as a major barrier to workforce development in 2023, ironic since the I94 corridor in southeastern Wisconsin continues to attract industrial development. In the corridor, there has been 466MM of industrial development in Racine County since 2018, and 2.5 billion in Kenosha County since 2013.[5] With little or no public East-West transportation available in both counties, multimodal transportation apps could facilitate employment opportunities.

[5] Wangard Partners Inc. Southeast Wisconsin: Magnet for Investment, Development, and Continued Growth, https://rcedc.org/wp-content/uploads/2021/08/EBOOK-94-Corridor-Infrastructure-v1.6-compressed.pdf
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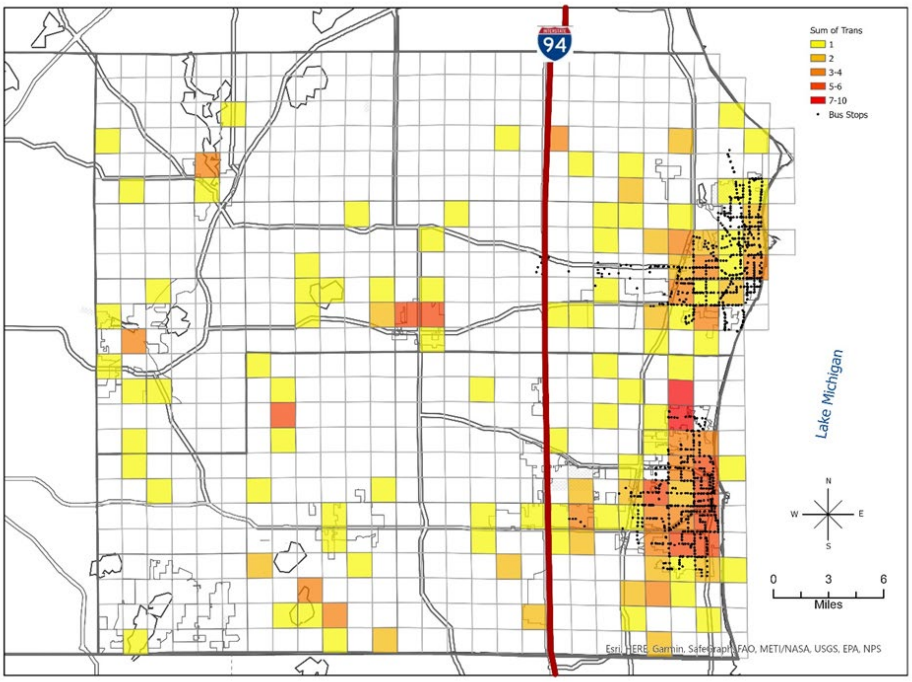

Figure 8. Likely to Use Transportation App and Bus Stops (Cities of Kenosha and Racine)

Smart city implementation

An overwhelming majority responded affirmatively to smart city implementation initiatives with the highest value placed on the "Creation or expansion of public wireless" (58.3%) with "Policing and body cameras" being a closed second (54.9%), and "Motion enables streetlights" being the third most valuable (54.9%).

Table 6: Services to Implement Smart City Initiatives – How valuable are each of the following smart city solutions?

Scale – 1= Not Valuable 5= Very Valuable	Policing and Body Cameras **N=407**	Traffic Lights with Gunshot Detection **N=405**	Smart Parking Meters and Digital Payment Options **N=406**	Motion Enabled Streetlights **N=406**	Wearable Devices to transmit emergency health information **N=407**	Creation or expansion of Public Wireless **N=403**
Mean **SD**	**4.35** **.93**	**4.17** **1.0**	**4.17** **1.13**	**4.36** **.91**	**4.09** **1.04**	**4.38** **.89**
Not Valuable	2%	3.2%	5.7%	2.5%	4.2%	1.5%
Somewhat Valuable	3.7%	2.7%	4.7%	3%	2.9%	2.5%
Neutral	9.1%	15.6%	8.6%	5.9%	16%	11.2%
Somewhat Valuable	28%	30.6%	29.6%	33.7%	33.9%	26.6%
Very Valuable	57.2%	47.9%	51.5%	54.9%	43%	58.3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

The spatial distribution of the latter two implementation options, both involving public safety, was consistent with the original concerns presented in the Kenosha Town Hall. Respondents in the urban area of Kenosha were more concerned with safety than those residing in other locations. Those west of I94 also demonstrate less concern for public safety with the exception of Union Grove in Racine County.

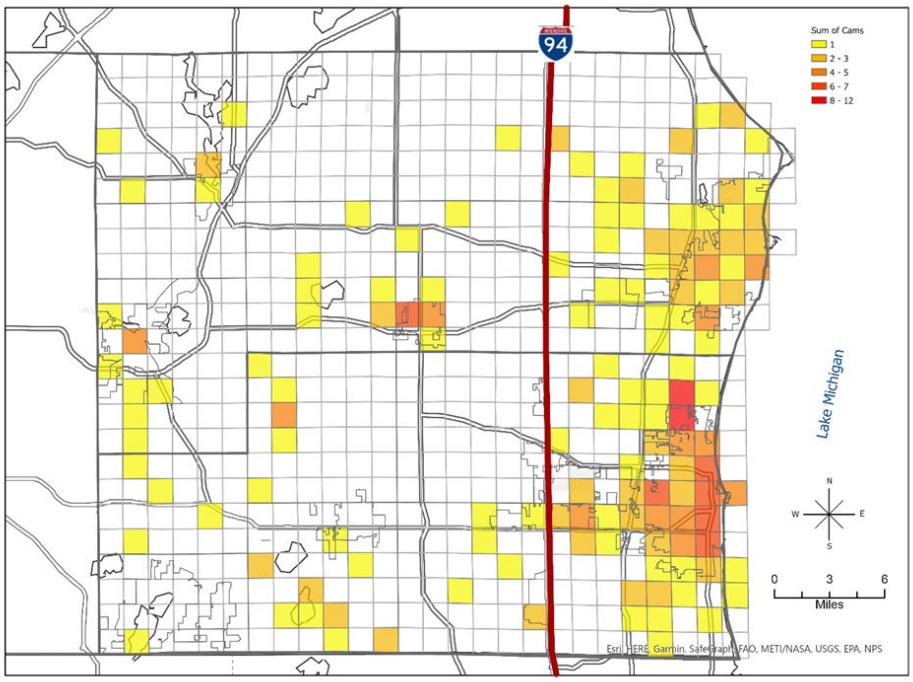

Figure 9. Policing and Body Cams are Valuable.

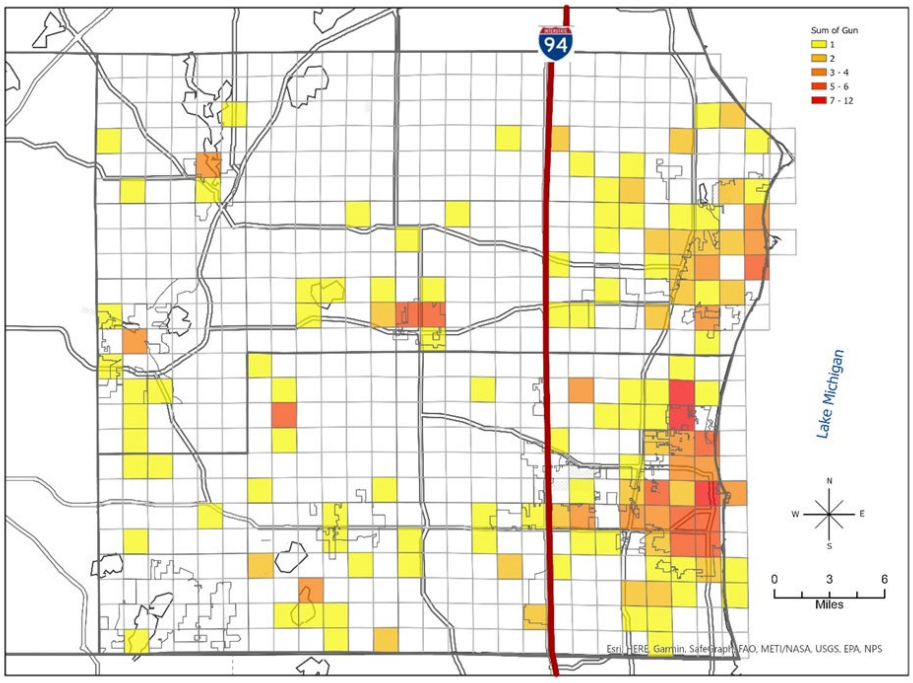

Figure 10. Traffic lights with gunshot detection are valuable.

Smart city perceptions of local government capacity

Respondents were asked to evaluate their local governments in terms of their confidence in leaders to implement smart city initiatives**. How would you rate your local government's ability to help develop/shape the necessary components that contribute to "smart government" and services?**

There are two approaches to understanding the level of synchronicity between local government and citizens. First, we can compare the correlation between consumer needs and government programs. Ideally, the programs and initiatives of governments will align with the needs identified by citizens. In the table below we compare a selection of initiatives highlighted through interviews with city officials in Kenosha and Racine with survey questions related to those initiatives using respondents only from appropriate city area.

Table 7.	City of Racine (transportation, wifi access	City of Kenosha (e-services, wifi access /fiber installation)
How likely to use transportation multimodal apps	30 % extremely likely	
How likely to use electric vehicle charging stations	30 % extremely likely	
How likely to use e-services (social)		35% extremely likely
How likely to use public wifi	52% extremely likely	54% extremely likely

The emphasis of both city governments on increasing access to public wifi appears to be well aligned with the identified needs of their citizens. There is less alignment between Racine's emphasis on transportation and the likely usage of transportation related initiatives, although the questions are not necessarily directly attuned to the city's priorities. The same can be said for Kenosha's identification of increasing access to services through online platforms; only 35% reported a willingness to use such platforms.

The second approach determines the level of confidence citizens have in their local leadership to implement smart city programs. Smart city leadership has been linked to a new public management model for local governments that represents a paradigmatic shift to complex decision making, involving multiple actors in the public and private sector and is cost effective and customer focused. (Grossi, et al 2020) We suggest that this model of leadership is important to develop, but that it is even more important that citizens are aware of this approach in their local government. For citizens and governments to work together, it is important that the government has public trust. Unfortunately, our study indicates that most respondents believe their local government preparedness for smart city implementation is lacking. Only 5.2% of respondents believed the government was very prepared to deploy smart city initiatives. Even though our interviews with local leaders indicated a great deal of activity in this area, citizens remain unaware or unconvinced.

Broken down by race/ethnicity, people of color have more confidence in their local leaders; 8% of white respondents felt that the local government was very prepared compared to 24% of Hispanics and African Americans.

Table 8 – Citizen Perception of Government Preparedness Toward Smart City Implementation		
Scale	**N**	**%**
Unprepared	134	33
Somewhat Prepared	251	61.8
Very Prepared	21	5.2
Total	**406**	**100**

Conclusion

This survey is the first to be done on midsized communities in Wisconsin and, although limited in scope, allows some significant suggestions to be made for the future of smart city planning in southeastern Wisconsin. As mentioned at the beginning of the report, small towns, cities, and rural areas can and will become smart;

however, the approach that is taken should be well planned in terms of community priorities, willingness to participate, and financial capabilities. This survey provides a snapshot into the southeastern Wisconsin communities and provides some insight into what citizens are prioritizing, and how willing they are to participate in change.

Citizen perceptions of local governments' abilities to spearhead this change were surprisingly low. This is an area that governments should address in order to build trust between them and the citizens they serve. From our interviews with government leaders, it was apparent that they were focused on smart initiatives to increase the well-being of the community. More work might be done to determine the level of community awareness of government activities.

We found that some of the common perceptions regarding preparedness of communities might be in error. It is imperative, especially in legacy postindustrial cities, that a community develops resiliency in the face of a changing context, whether it be rural or urban. Bec et al (2018) find that there is a negative relationship between resilience and perceptions of change. Couple this with assertions that small towns and urban areas are conservatively predisposed, we would expect that citizens have a noticeably negative view of smart city initiatives. However, in this study we have found that this is simply not the case. Overall, the respondents reacted positively to the potential implementation of smart city initiatives. The variation over the responses regarding both willingness to participate in smart initiatives as well as participate in the preparation, planning, and implementation of these initiatives indicates that there is a great deal of opportunity for government and local stakeholders to garner support and build enthusiasm. William Anderson (2018) calls for a move beyond 'out of the box' thinking to 'no box' thinking; this removes the boundaries and the labeling of those who are on either side of those boundaries.

Finally, it introduces an approach that encourages understanding and utilization of diversity across communities and neighbourhoods, with the result that services might need to be tailored to the specific needs of groups, even in smaller communities. Smart towns and rural areas have unique needs based on, but not limited to, demographic characteristics. Further, it would be a mistake to assume that these areas are homogenous. Indeed, in southeastern Wisconsin the variation between villages towns and cities is stark. As such, municipal decision making regarding smart initiatives must be aware of citizens, groups, and other stakeholders and include them as 'problem adjusting factors' when considering what, where and how an initiative should be implemented. (Hosseini, et al 2018)

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