Smart City

City of MEMPHIS
Fellow Memphians,

City of Memphis government is a data-driven government. From every corner of our city, people want safer neighborhoods, more activities for our young people, and city services that meet the needs of their daily lives. Memphis has momentum. That fact is undeniable. We have seen billions invested into our city for economic development, more Memphians are working today than in 2016, and we have made significant strides in the delivery of core city services. We have been able to do these things, in large part, because of our use of data.

Since 2016, the importance of using data for determining when and where we need to focus our efforts cannot be overstated. Whether it is how we operate our animal shelter, answer 311 and 911 calls, or how we fill potholes, it all gets measured. It is as simple as the old saying, “what gets measured—gets done”. At the City of Memphis, we take that message to heart.

Our mission is “working to improve the quality of life for all Memphians, every day”, and we do it all based on data. I am so excited about what the future holds for our city and look forward to our continued improvement at the City of Memphis.

Sincerely,

Jim Strickland
Mayor
What is a Smart City?

The term “Smart City” is used to describe how many cities around the world are using technology and digital information to enable everything from sustainable infrastructure to free access to the internet in public spaces. While there are many examples of how technology can be used to improve the lives of citizens, there is much more to being smart than just implementing new technology.

To be truly smart, a city must continuously work to create a sustainable ecosystem where data and technology are used to improve the relationship between citizens and government, enable social innovation, improve the quality of life across communities, and deliver efficient and effective services to citizens.
A Unique Memphis Vision

Memphis is a vibrant city in an important stage of transition. City and community leaders are making important decisions on how Memphis will grow and prosper every day. Memphis has a mission to be Brilliant at the Basics and deliver reliable, responsive, high-quality services.

As Memphis celebrates its 200th year as a city in 2019, we have a simple vision for our third century:

- We will build up, not build out.
- Our growth will be anchored on the strength of our core and our neighborhoods.
- Our growth will enable opportunity for all Memphians.

These principles dictate every decision we make every day at City Hall. Our cultural values are innovation, accountability, collaboration, and service.
The goal of our Smart Memphis strategy is to create a uniquely Memphis approach for using data and technology to address today’s challenges and create opportunities for the future. A Smart City brand offers a compelling value proposition to attract investment and enhances quality of life using connected technologies and data to develop a vital and resilient economy.

A Smart Memphis Strategy will serve as a living document that...

- Evolves with the rapid pace of technology and changing citizen’s expectations
- Promotes an engaged and collaborative partnership among citizens, business, academia, and government

The strategic framework has been built and instituted in a way that transcends election cycles and rapidly evolving technologies through transparency and public engagement.

The Goal: Sustain the Smart Memphis mission and strategy well into the future.

In Memphis, we believe the time has come to fundamentally rethink the underlying operations, processes, and culture that make up the business of city government. Instead of designing our future based on today’s expectations, we are focused on a digital reinvention that can address the moving target of rising citizen expectations well into the future.

“Memphis is a city whose originality and soul has changed the world, and continues to change it.” – Mayor Jim Strickland
Our vision of a Smart Memphis will:

- Improve citizen interactions and engagement for greater trust in government
- Improve the decision-making ability of our City for maximum impact and leaner operations
- Attract and retain the workforce of the future

In short, the time is now to think big, create immediate value, and innovate quickly.

Our strategy for a Smart Memphis is focused on the citizens of Memphis and must evolve to meet their changing needs and expectations. The foundation of our relationship with the citizens of Memphis is based on sharing information openly and collaboratively. The information about how the Memphis City government operates, measures success, and achieves our goals will always be available to anyone that wants to see it. We also hope to have a continuing dialog around that information with our citizens, business community, and other public stakeholders so they can contribute to that success.
To be sustainable, we believe that a smart city strategy must contain three key elements:
1. Information **transparency** that encourages public engagement
2. A strong **governance** structure focused on the welfare of citizens
3. Continuous **engagement of the public** in defining the strategy

These elements of our strategy will enable it to live on through changing political cycles and evolve as technology evolves.

These tenets of our strategy will translate into how we create a Smart Memphis in every aspect of how we run the City well into the future.
Smart Governance

City open data can be harnessed to enable city agencies and public partners to develop innovative solutions that improve government effectiveness and efficiency and create value for citizens. Our Smart City strategy is built on a foundation of strong data governance that guides how we actively use information to manage programs, contracts, and initiatives. Each month Memphis City leaders track information on five key areas of government with the citizen at the heart of every decision we make. Our Data Governance Framework provides an enduring structure of collaboration and leadership that is focused on continuously improving City Government by defining measures of success up-front and tracking progress on a regular basis. Smart governance also drives innovation by purposefully involving business, academia, and the public in decision making.
Information Transparency

The data that the leaders of Memphis use to make the city run more effectively and efficiently is open to anyone that wants to see it in the Data Hub. This portal provides an open and honest view of how we are continually improving and where we still need to focus our collective attention.

We will continue to expand the information we share based on our ever-evolving improvement goals and the input we receive from the public.

The Data Hub will feature compelling stories about people, places, and events in our city and provide unique insights into the impact they have on Memphis.
Memphis Priorities

Our efforts are grouped around 5 top priorities.

Jobs
- Prepare more people for work – educate and train our workforce for tomorrow’s jobs
- Recruit, retain, and grow employers
- Promote good jobs for citizens

Public Safety
- Reduce crime through police recruitment and retention, community outreach and communication, and gang intervention
- Decrease calls (EMS/Fire) for non-emergency service
- Improve 911 service and meet the national standard

Good Government
- Provide outstanding customer service to our residents and businesses by going the extra mile to serve the public and measure customer satisfaction
- Provide good fiscal stewardship by eliminating waste, delivering value, and creating efficiency and productivity in our services
- Maintain bond rating and continued strategic focus

Youth
- Collaborate with community partners to provide summer job opportunities for youth and young adults to gain valuable training and work experience
- Connect and engage more opportunity youth with opportunities
- Support increase in third grade reading level in libraries and community centers
- Increase youth programming in parks, community centers and libraries

Neighborhoods
- Reduce blight to make our neighborhoods cleaner and more attractive
- Improve the quality of our roads and sidewalks
- Improve and increase access to parks, libraries and other public services that enrich our quality of life
The City of Memphis puts the citizen at the center of everything we do. That includes how we define the objectives of our Smart Memphis strategy.

In the private sector, our citizens experience immediate access to information through mobile devices, connections with like-minded peers online, personalization based on geography, identity, and preferences using customer profiles. They no longer accept lengthy, complicated processes or ineffective government as the norm. They’re not willing to be treated as a number or a transaction and they don’t have the patience to navigate multiple agencies to find their way.

The Smart Memphis strategy will recognize each citizen as an individual, with a personalized set of needs, interests, capabilities, and vulnerabilities. This ability will evolve through interactions with Smart Memphis technology and procedural solutions and will be enhanced by real-time data and events. The solutions we provide will enable Memphis to play an active role in reaching out to each citizen based on their specific needs.

As the specific plans take shape, each area can be exploded to describe specific initiatives that will be delivered.
Piloting Machine Learning (ML) to Improve City Services

Pothole detection is reliant on calls from residents who submit issues to 311. Typically, residents call in the most egregious potholes; ones that could cause harm to vehicles. Smaller potholes are left undetected until severe weather causes further deterioration. If provided a comprehensive assessment, Public Works could proactively fill potholes and could improve efficiency by accurately allocating resources based on the quantity and classification of potholes in an area.

The City has embarked on a pilot with Google and Spring ML to apply ML to detect and classify potholes. An Insta360 Pro 2 camera mounted to Code Enforcement vehicle collected 360 degree video of the most pothole prone areas in the city. Within three hours of filming, a terabyte of data was collected and sent to a Data Scientist to refine the ML.

In addition to pothole detection, the video will be used to produce a list of assets, such as; street signs, fire hydrants, telephone poles, etc. Once the AI has been trained to detect these assets, IS GIS can convert video coordinates and add to the City’s ESRI GIS system with little delay. The video can even be used to detect the reflectivity of street signs if recording is done at night.
Map901: Building Rich Interior Hazard Maps for First Responders

The City of Memphis and the University of Memphis are in the process of surveying 1.86 million square feet of indoor space using GVI LiBackpacks with GPS input for timing and synchronization combined with an Insta 360 camera and SLAM solution software.

The resulting 3D model is a point cloud with accurate color. Every LiDAR point is georeferenced down to the millimeter through GPS-RTK. The color shows objects that wouldn’t be visible with LiDAR alone, such as bicycles, and could be used in virtual reality applications.

In addition to the LiDAR mapping, objects of interest, are being catalogued through ML algorithms, Mask R-CNN (convolutional neural networks) and Google’s Inception-ResNet-v2. Mask R-CNN is the gold standard for image classification. R-CNN analyzes snapshots and correctly identifies objects via a bounding box. Inception-ResNet-v2 classifies those objects and refines the bounding box. 43 label classes have been created for a training and testing dataset, e.g. exit sign, fire alarm, person.

The results of this project could change the way firefighters respond to an event. A commander could better coordinate an event by visualizing the team’s location in the building as they respond. A firefighter could be able to see past smoke to see the interior of a building with important objects highlighted, e.g. exits and people.