

Dell Digital Cities

# Artificial Intelligence and Gen AI in Smart Cities

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# Introduction

Artificial Intelligence (AI) delivers cities a wide array of capabilities in handling multitudes of data bring to bear essential elements to assist in processing, categorizing, and determining patterns in the myriad of a city's many segments. Understanding the nuances of the data patterns allows cities, leaders, and administrators to improve community services with the limited resources at their disposal. One of the tools in particular, Generative AI (Gen AI), is moving the needle in ways once deemed impossible or improbable, delivering much needed automation to areas where budgets are constrained and cities are working to do more with less. As this document assesses impacts and ways AI and Gen AI will be used to enhance, optimize, and predict patterns in people, events, traffic, and many further use cases, the usage of AI within city operation centers from a departmental level through integration of entire city systems into a holistic framework of data sets will make the role of city leaders and master planners more simplified in the future.

Since the advent of collaborative artificial intelligence engines to the current state of the newest and most innovative tools, Gen AI brings a vast array of potential options for government to provide services to communities and citizens alike. AI and Gen AI's capabilities will help cities to simplify, optimize, and automate city services including urban modeling, master planning, and efficient sustainable development of a city's evolving needs. Gen AI technology provides city leaders and administrators efficient and accurate insights to the pulse of a city, rapidly adapting to the changing environment and improving citizen livability.



The initial critical role played by Gen AI would be in creating efficiencies for a wide range of understaffed city services without the need to increase resources, accurately responding to a city's needs. Where in the past, this required administrators to be versed in all aspects of city obligations, from policies to action to response, Gen AI offers the capability to have chatbots fill the gap, effectively reducing the human demand to support citizens' concerns. Gen AI further evaluates normally disparate data sets including both historical and real-time data trends to predict, optimize and automate labor-intensive administrative functions.

The Dell Digital Cities Solutions Team focuses on creating a tapestry of horizontally interconnected systems and subsystems forming a data oasis consisting of a multitude of data lakes, data lake houses, and other stored data sets to correlate data insights, driving a city's strategic vision by delivering meaningful outcomes. These outcomes are accelerated by five key pillars: Integrated Operations, Sustainable City Development, Urban Mobility, Public Safety, and eGovernment Services.

# Smart city AI and Gen AI use cases

Smart city AI and Gen AI initial use cases are designed to simplify, optimize, and automate the application of labor-intensive city services. The below use cases are a few examples associated with the five key pillars where AI and Gen AI are seen as having the highest potential benefits to Smart Cities of the future.

## Public Services

Interactive non-emergency services to capture and respond to citizen grievances, health services like outbreak awareness, health kiosks, and resource allocation, etc. AI and Gen AI will also benefit in multi-lingual cities by improving city services to cover a wide array of community languages, from city services to telemedicine scenarios used to address public health conditions.

## Urban Mobility

Adaptive traffic management systems utilize artificial intelligence engines to model and simulate traffic flows dynamically predicting and adjusting signal timing to changing traffic patterns in real-time, including incidents, including incidents, weather conditions, and other diverse factors affecting vehicle movement. These systems provide cities with the capabilities to improve emergency response times, overall traffic flow, and reduce greenhouse gas emissions (GHG).

## Sustainable Cities



**Energy Management:** AI and GenAI models are leveraged to forecast energy demand patterns, helping utilities balance supply and demand efficiently.



**Air Quality Indexing** can be used to accurately measure and monitor air quality factors to determine recommended actions designed to protect public health.



**Water Quality Indexing Analysis** evaluating elements such as sewage, rainfall, community reservoirs, and wastewater treatment to develop and improve data-based strategies for community water conditions.



**Efficient Waste Collection and Carbon Management** helps to ensure city resources are used effectively by adapting collection routes reducing the number of hours rubbish vehicles spend on the roads, in turn reducing man-hours, fuel usage, and GHG gases generated. Secondly, waste sort automation ensures recycling procedures and land fill measures are optimized to reduce carbon consumption.



**Predictive Energy Consumption:** Gen AI models can be used to forecast energy demand patterns, helping utilities balance supply and demand efficiently.



**Building Energy Optimization by Design:** AI can optimize lift management, control environmental conditions like heating and cooling, and lighting systems in buildings to reduce energy consumption patterns.



## Public Safety

Predictive crime analysis, fire detection and response based on current trends and patterns are used to improve resource usage and deployment based on actual / real-time needs rather than responding after the fact.

## City Master Planning (Digital Twins)

As City planners adapt continuously to evolving community requirements, such as traffic congestion and flow, power, water, and connectivity needs, population changes affecting schools, Digital Twin modeling and simulation greatly assists in determining where Critical Infrastructure development is best situated for the highest results. Citizen needs achieved such as enabling connected communities by analyzing the most effective locations to trench fiber, lay sewage channels, green shelters, health kiosks and public clinics, and other community needs. Coupled with augmented reality tools, AI can evaluate urban planning concepts to ensure designs are both sustainable and aesthetically pleasing.

## Natural and Human Disaster Management

Artificial intelligence and Gen AI can improve response models poised to yield improvements in public evacuations and resource distribution.

# Tools for the trade

AI and Gen AI tools listed below are some of the most common and readily available to assist cities through this transformative journey:



City service enhancements through optimization of city services such as permitting, automated payment of fines for violations, business licensing, etc.



Chatbots to assist with non-emergency monitoring and responses to citizen grievances and complaints needing to be addressed, as well as posting regular updates to city websites, social media, and city mobile apps.



Automation of service requests and workflows, with examples that could include reported events such as damage to roadways, flooding, street light maintenance, rubbish overflow, etc.



Inclusion of AI/ML components to continuously evaluate historical data and implement improvements to the above-mentioned use cases.

## Imagine a City of 2030

A smart city that is inclusive, sustainable, resilient and safe enabling healthy living for engaged & happy citizens.



The future of AI and Gen AI is now, with the potential to aid in city-wide digitalization and transformation optimizing how smart cities operate and enhance the quality of life for their residents by efficiently managing resource allocation, improving safety, and promoting sustainability. Privacy and ethical concerns will be at the front to ensure community support while phasing in AI and Gen AI applications. AI and Gen AI are invaluable tools to communities in a city's arsenal of data intelligence adoption. To ensure the best possible results, leaders must carefully evaluate when and how AI and Gen AI will be used to ensure privacy rights are maintained and data collected is secured. These considerations coupled with other technology advances such as Dell's NativeEdge platform will help cities protect and secure data collected, collated, including secure AI/ML distributed modeling, accurate data aggregation, and optimized edge management, in turn optimizing resources required to modernize and maintain city systems.

Learn more about the future of city planning, and how Dell Technologies is empowering partners to capitalize on their edge with data-driven capabilities that deliver results.



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