Team Details

a. Team name: Data Driven Droids
b. Team leader name: Utkarsh Tripathi
c. Problem Statement: Enhancing City Infrastructure with Data-Driven Decisions

Brief about the idea

- **System**: Web application
- **Data Sources**: News API, X-API, 511 NYC, NYC Open Data, NYC311 Data, Weather API
- **Target City for Prototype**: New York, USA
- **User persona**: It will be primarily used by Civic Planners, City Residents and Public Officials
- **Functionality**: The app/ website will have the following key modules as listed below

  - ✓ Smart Street
  - ✓ Urban SoS
  - ✓ City Guard Service
  - ✓ Bin Sync Service
  - ✓ Smart Watts
  - ✓ UtiliGen Service
  - ✓ City 360 Scope dashboard
  - ✓ Resilient Cities

- **Functional usage**: Our platform uses AI to create a safer, more efficient city. For city planners, it offers predictive insights for smarter budgeting and proactive maintenance. For residents, it provides real-time traffic solutions, instant emergency alerts, and easier access to city services, fostering a more responsive and connected community for all.
- **Technology used**: Python, Snowflake Tables, Snow Pipe, Tasks, Materialized Views, Snowflake Cortex Analyst, Snowflake Cortex Search, Snowflake Cortex Agents, Snowflake Intelligence, GCP, Fast API, Streamlit

Opportunities for the solution

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† - Opportunity
Ψ - Features

† With urban populations projected to reach 68% by 2050, cities struggle with siloed data

Ψ City Scope 360 is an AI-powered dashboard that unifies real-time data on traffic, environment, and services. Using Generative AI, planners, officials, and residents can ask questions in natural language, enabling smarter governance.

† Traffic congestion costs nations up to 1% of their GDP (International Transport Forum) through wasted time, fuel, and increased pollution, diminishing urban quality of life.

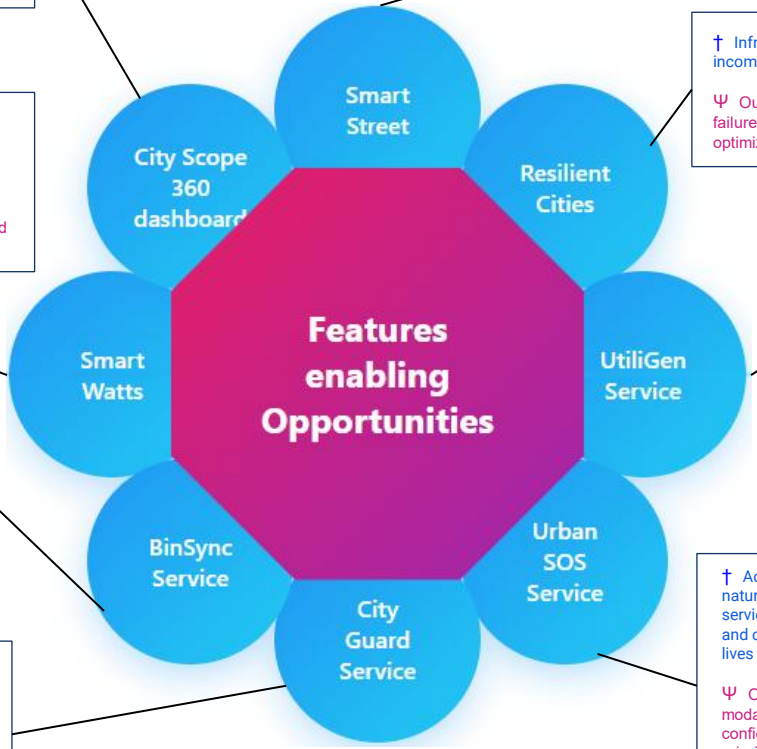
Ψ Integrating AI, our platform analyzes real-time data to predict congestion, optimize traffic signals, and suggest efficient routes, mitigating delays and economic waste.

† Infrastructure failures costing at least $390 billion annually in low- and middle-income countries.

Ψ Our unified city platform integrates Generative AI to predict these costly failures by analyzing real-time data, simulating risks, and automatically generating optimized response plans to reduce the impact on daily life.

† Cities consume 75% of global energy (IEA), but planners struggle to translate complex smart grid data into actionable strategies, leading to inefficiency.

Ψ Our Generative AI tool that lets officials ask plain-language questions to forecast demand and generate optimized strategies for energy distribution and infrastructure placement, turning complex data into clear, actionable plans.



† According to the UN E-Government Survey(2022), a major challenge for smart cities is overcoming fragmented data. Public utility information is often trapped in departmental silos, forcing citizens to navigate multiple platforms, which causes inefficiency and frustration. This lack of a holistic view hinders effective decision-making for both residents and city planners.

Ψ Our unified city platform solves this by using Generative AI. It provides a conversational interface that allows citizens to ask complex questions in natural language—like how a power outage will affect traffic and public transport. The AI synthesizes real-time data from various departments to provide a single, comprehensive answer, turning data chaos into actionable clarity.

† The world faces a monumental waste crisis, with waste generation projected to hit 3.8 billion tones by 2050. At least one-third is mismanaged, creating pollution and severe health risks. The direct global cost of waste management was estimated at $252 billion in 2020 and is on track to nearly double to $640.3 billion by 2050 if current practices continue

Ψ Bin Sync uses smart bins to monitor waste levels in real-time. AI agents create optimized collection routes, reducing emissions. A Generative AI-powered app guides citizens on proper waste sorting.

† With the global economic impact of violence at $17.5 trillion, cities face escalating physical and cyber threats.

Ψ City Guard is an AI service that unifies security, using ML to predict crimes, riots, and cyber attacks by analyzing city data. AI agents automate responses, while Generative AI gives commanders instant threat briefings, ensuring a faster, more proactive defense.

† According to a report by UN DESA, nearly three in five cities are at high risk of natural disasters. This is worsened by a high rate of false alarms—up to 42% of fire service incidents in the UK—which drains resources, delays response to real crises, and creates "alarm fatigue." This operational strain costs billions annually and puts lives at risk

Ψ Our Gen AI system that instantly triages emergency alerts. It analyzes multi-modal data from calls, IoT devices, and social media to generate a real-time confidence score for each incident. This allows dispatchers to filter false alarms, prioritize genuine crises, and deploy resources with greater speed and accuracy, saving crucial time and money while improving situational awareness for first responders.

List of features offered by the solution

Smart Street

- **Dynamic Traffic Control**: An AI agent adjusts traffic signals and congestion pricing based on real time traffic.
- **Smart Transit Assistant**: An AI agent suggests the fastest public transit routes to bypass traffic congestion.
- **Predictive Incident Response**: An AI agent predicts accidents, instantly rerouting traffic and guiding emergency vehicles

Urban SoS

- **Vocal Verifier**: AI analyzes caller's voice and speech to detect false alarms in real time.
- **Digital Witness**: An AI agent scans social media and news to find real-world incident proof.
- **Responder Briefing**: AI transforms chaotic alert data into simple, actionable briefings for emergency responders.

Bin Sync Service

- **AI Sorting App:** An app uses your phone's camera to identify trash and instantly show you how to correctly sort and dispose of it.
- **Predictive Collection Routes**: AI agents analyze data to predict which bins will be full, creating smarter, fuel-efficient collection routes.
- **24/7 Chatbot Assistant:** A GenAI chatbot on website which provides instant answers to all waste and recycling questions.

City Guard

AI Briefings: GenAI synthesizes city data into instant threat briefings and response plans.

Cyber Analysis: GenAI analyzes cyber threats, generates reports, and answers security questions.

Local Watch: GenAI processes citizen reports for early local threat detection and awareness.

City Scope 360

- **Holistic City Monitoring:** Provides a comprehensive, 360-degree view of city operations for holistic monitoring.
- **Powered by Real-time Data and Visuals:** Utilizes real-time data and image analysis for immediate, actionable insights.
- **Dual-Purpose for Planners and Citizens:** Serves both civic planners for strategic management and citizens for transparent information.

Smart Watts

- **Ask-to-Forecast Assistant**: Get energy demand and grid stress forecasts from simple questions.
- **Infrastructure Optimizer Agent:** Recommends optimal sites for energy assets using real-time data.
- **Demand Strategy Generator:** Simulates energy strategies with cost, impact, and adoption insights.

UtiliGen Service

- **City Compass:** AI guides citizens to utility and essential services, routes, and real-time information across city data.
- **Citizen Advocate:** AI explains service disruptions, offering insights and actionable advice to citizens.
- **Community Pulse**: AI analyzes citizen feedback, synthesizing trends for better city planning insights.

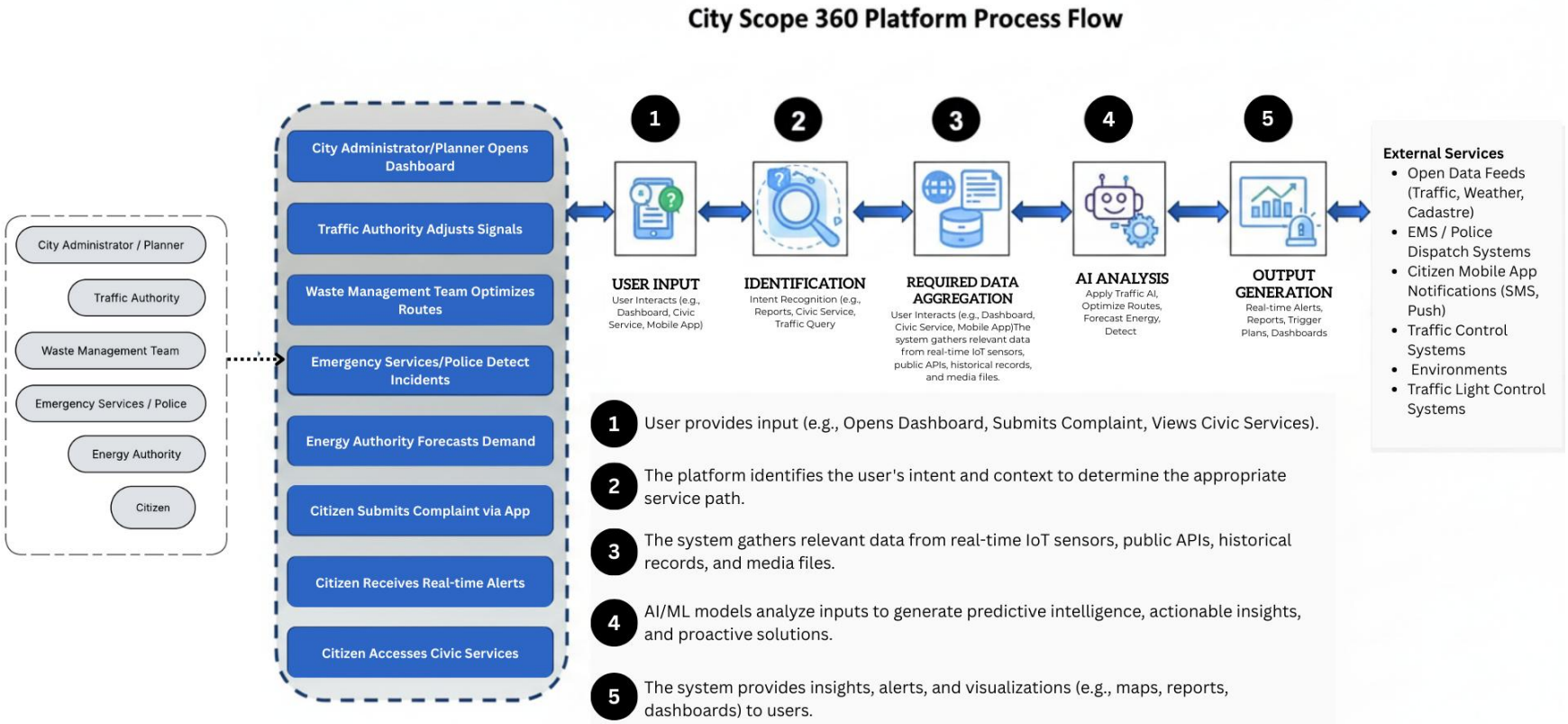
Resilient Cities

- **Predictive Maintenance**: An AI agent analyzes data to predict failures and trigger preventative alerts.
- **Instant Response Plans**: Gen AI instantly drafts emergency response and traffic rerouting plans during a failure.
- **Budget Simulation**: Use AI to simulate the impact of infrastructure investments for smarter budget planning.

- News analysis
- Real time information
- Google map connectivity
- Utility and Essential Services
- Energy and Waste Management.
- Emergency and Threat Detection Services

Technology Enablers

Target City for Prototype: New York, USA



Technologies to be used in the solution

Interface

Prototype

Streamlit

Login

Client

Login Form

Authentication Service
Account Store
Identity Platform

Tools/Data Sources Required

X - API

511NY
GETCONNECTEDTOGO

WEB SCRAPING

XML JSON

News API

NYC 311

NYC OpenData

Grounding
Source: Google Search
Edit Grounding

Google Maps API

Backend

SNOWFLAKE CORTEX AI

FastAPI

SNOWFLAKE MATERIALIZED VIEWS

SNOWFLAKE TASKS

Snowpipe Streaming

snowflake INTELLIGENCE

Production

Google Cloud

docker

gunicorn

Google Cloud

Cloud Function

Artifact Registry

Cloud Build

Google Kubernetes Engine

THE DEV PREMIER (LEAGUE)

Architecture diagram of the proposed solution

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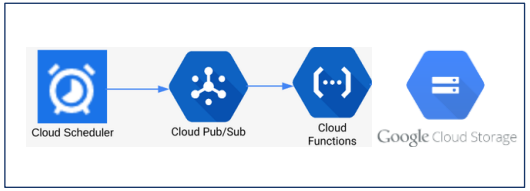
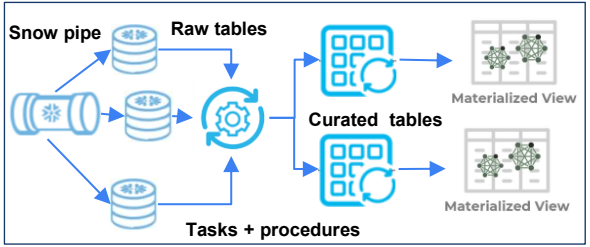
Data Pipeline





Feedback

AI Framework

UI

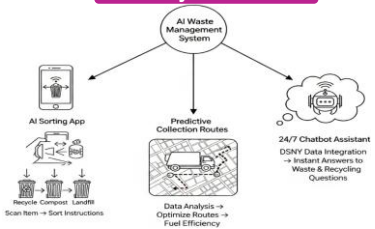
Streamlit

Multi Agent Architecture

Smart Street

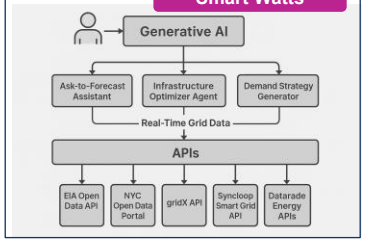
- **Dynamic Traffic Control Agent** — Traffic Signals & Congestion Pricing
- **Smart Transit Assistant Agent** — Multi-modal Route Optimization
- **Predictive Incident Response Agent** — Accident Prediction & Rerouting

Bin Sync Service

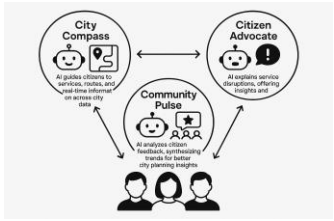


City 360 Dashboard

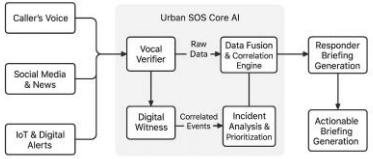
Smart Watts



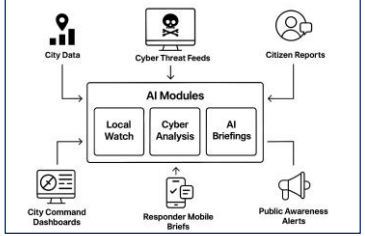
UtiliGen Service



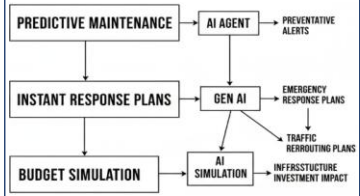
Urban SoS



City Guard



Resilient Cities



Deployment

Cloud Build

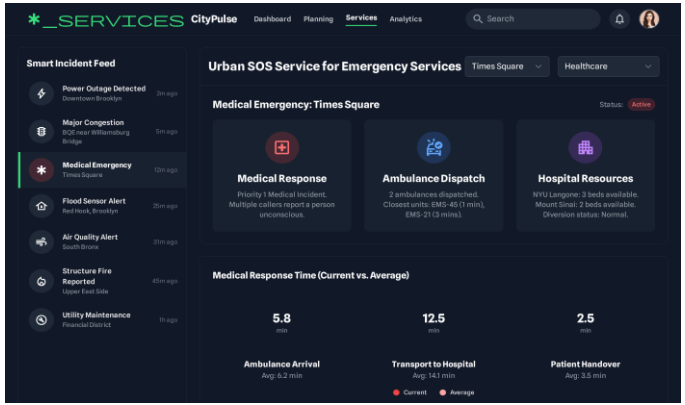
Container Registry

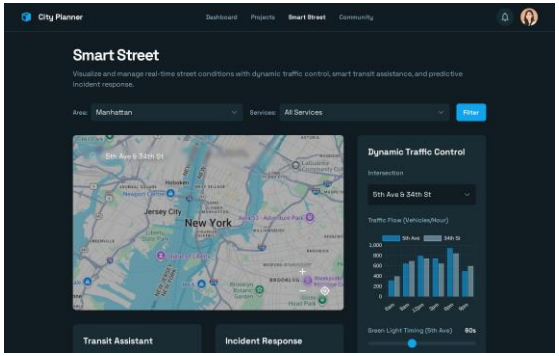
Kubernetes Engine

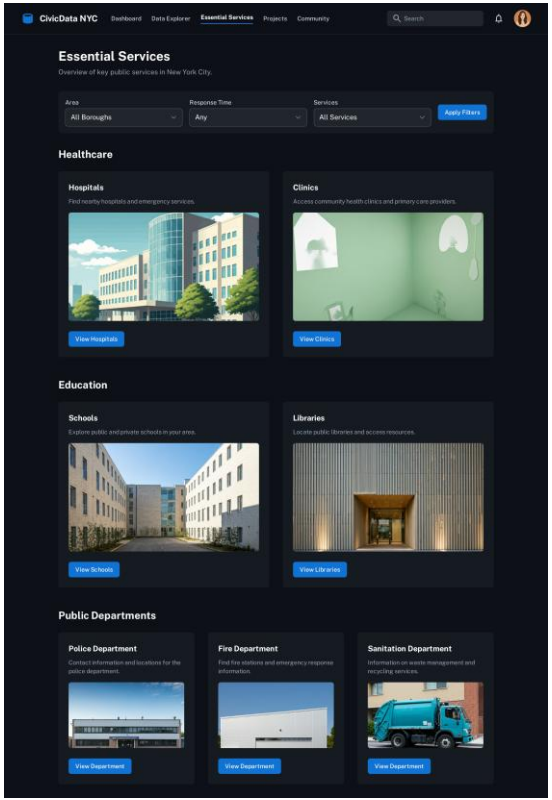
Tools Used

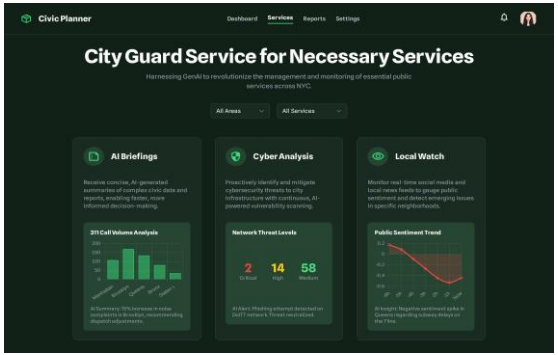
SNOWFLAKE CORTEX AI | snowflake INTELLIGENCE | Snowpipe Streaming | SNOWFLAKE TASKS | Google Cloud Platform | FastAPI

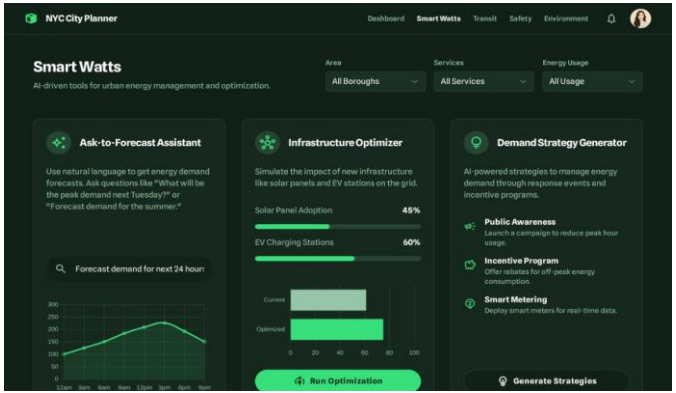
Wireframes/Mock diagrams of the proposed solution











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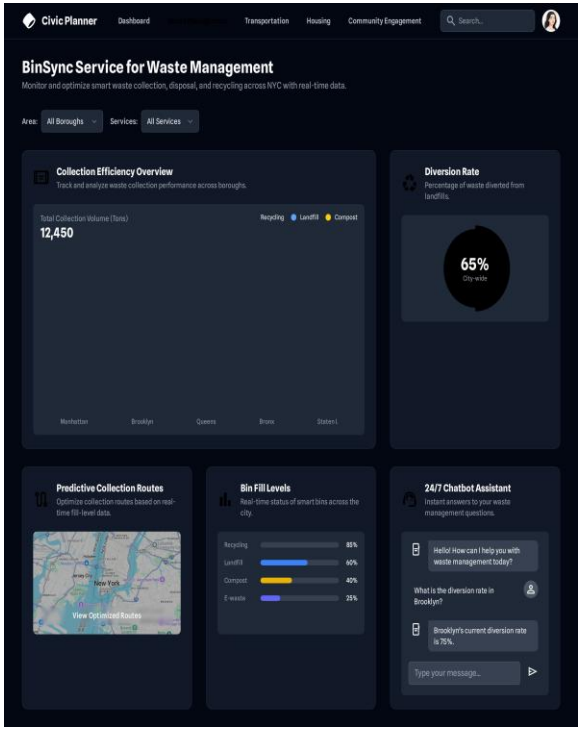

Future Enhancements

- Introduce gamification for residents to report infrastructure issues, earning civic points and promoting community engagement.
- Add an Augmented Reality (AR) mode for field workers to visualize real time infrastructure data on-site.
- Integrate accessibility features, including voice commands and multilingual support, to ensure inclusivity for all city residents.
- Include a "Data Privacy Dashboard," showing citizens how their anonymized data is used to improve city services.
- Develop a hyper local climate impact module to predict and visualize risks like flooding at a street level.


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Thank you