

# CivicSense

Real-Time Public Safety & Services Intelligence

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AI on Data in Motion — Turning live city data streams into human-friendly guidance, as events happen.



# Our Cities are Overwhelmed by Disconnected, Delayed Signals

Every day, thousands of critical alerts are generated across our cities. But for citizens, this information is often fragmented, generic, confusing, and arrives too late.

- **Fragmented:** Alerts are spread across countless disconnected systems.
- **Impersonal:** Generic warnings lack personal relevance or clear actions.
- **Confusing:** Technical jargon is inaccessible to vulnerable populations.
- **Delayed:** Batch processing means information is often outdated on arrival.

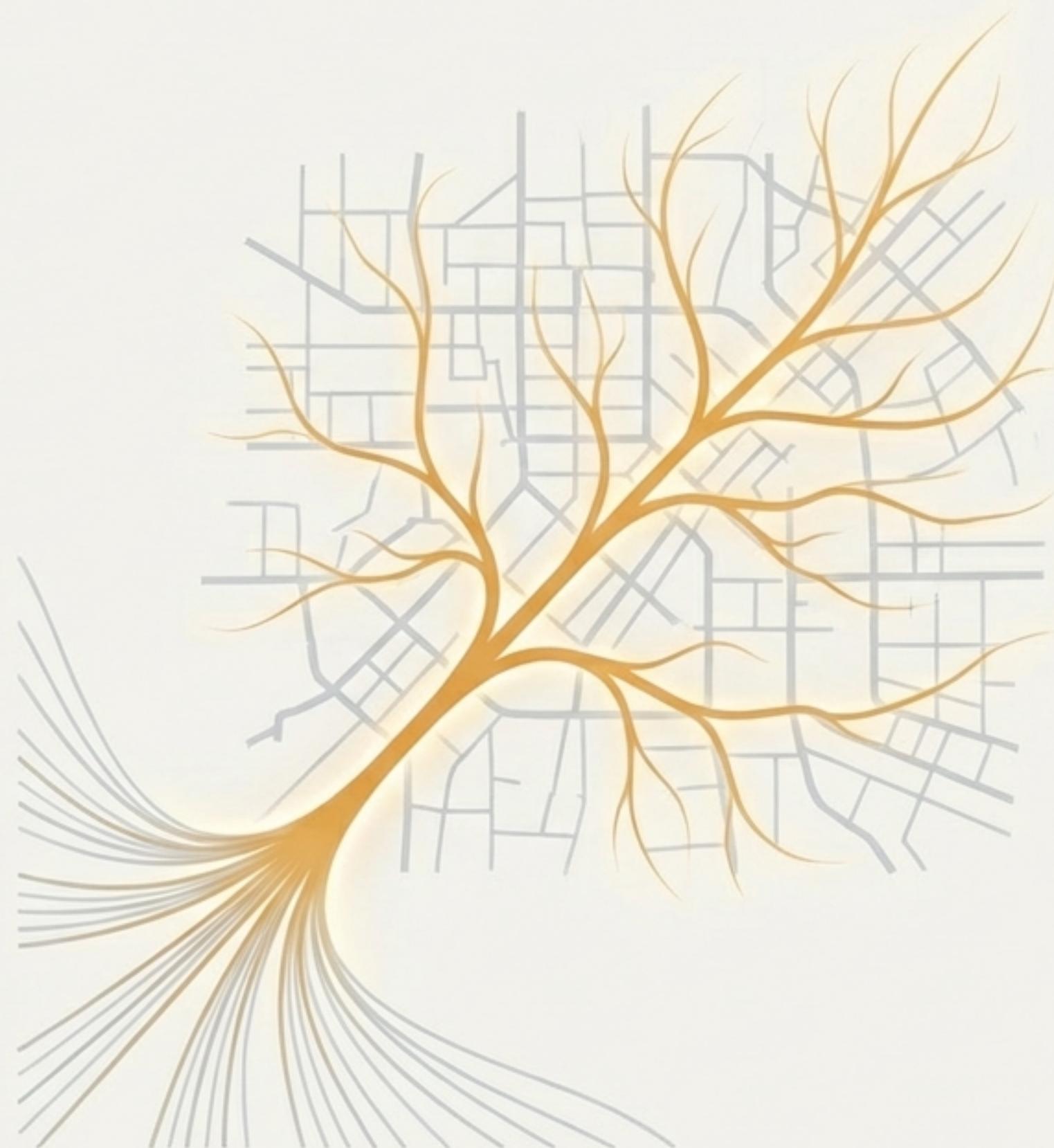


*The result: Parents struggle with safety decisions, commuters are stranded, and seniors miss vital warnings.*

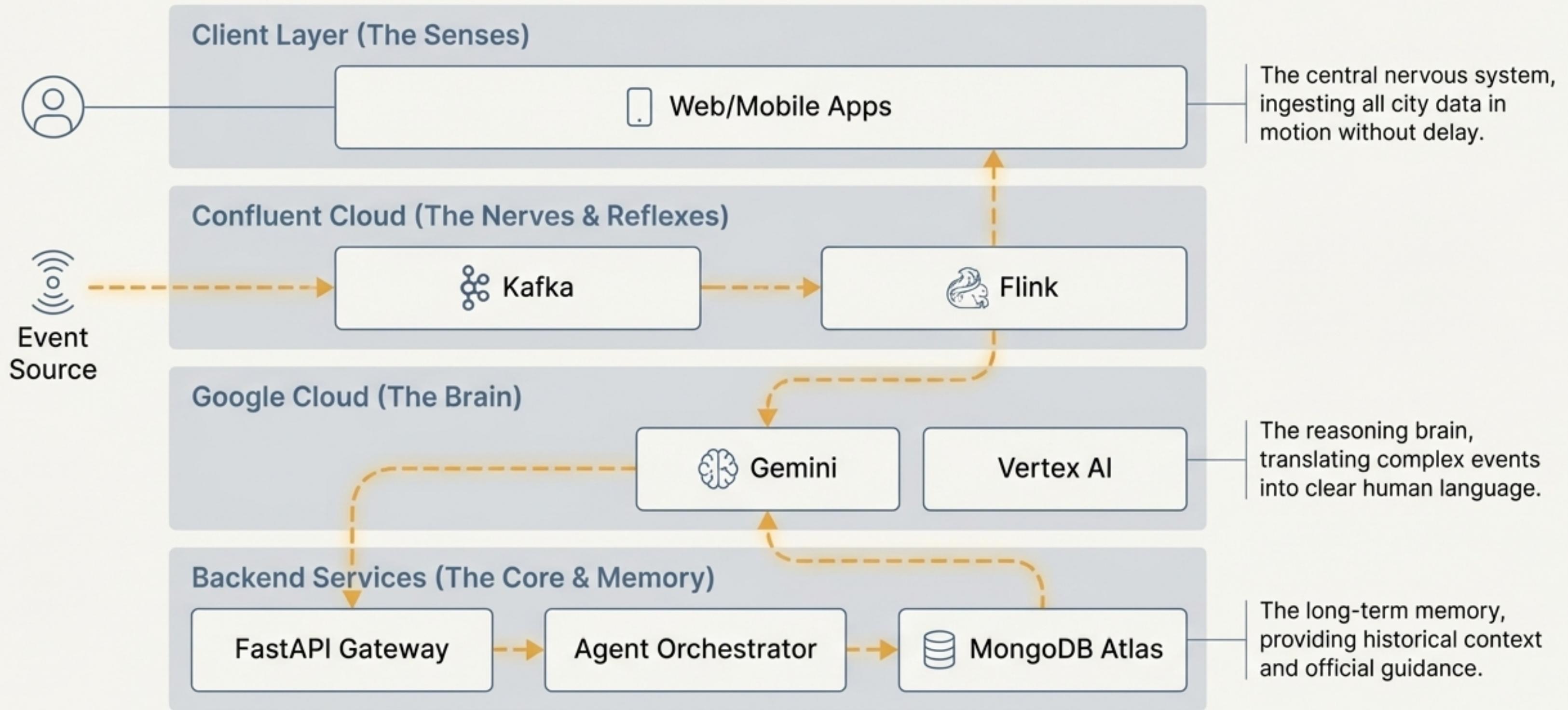
# The Solution is a Central Nervous System for the City

CivicSense ingests every live event stream, processes it in real-time, and delivers clear, actionable guidance to the people who need it most. We transform data chaos into civic clarity.

-  **Streaming Platform:** Confluent Cloud Kafka
-  **Real-Time Processing:** Apache Flink SQL
-  **Multi-Agent Reasoning:** Google Gemini AI
-  **Contextual Memory:** MongoDB Atlas  
Vector Search
-  **Instant Delivery:** WebSocket Protocol



# The Blueprint: A Real-Time, Event-Driven Architecture

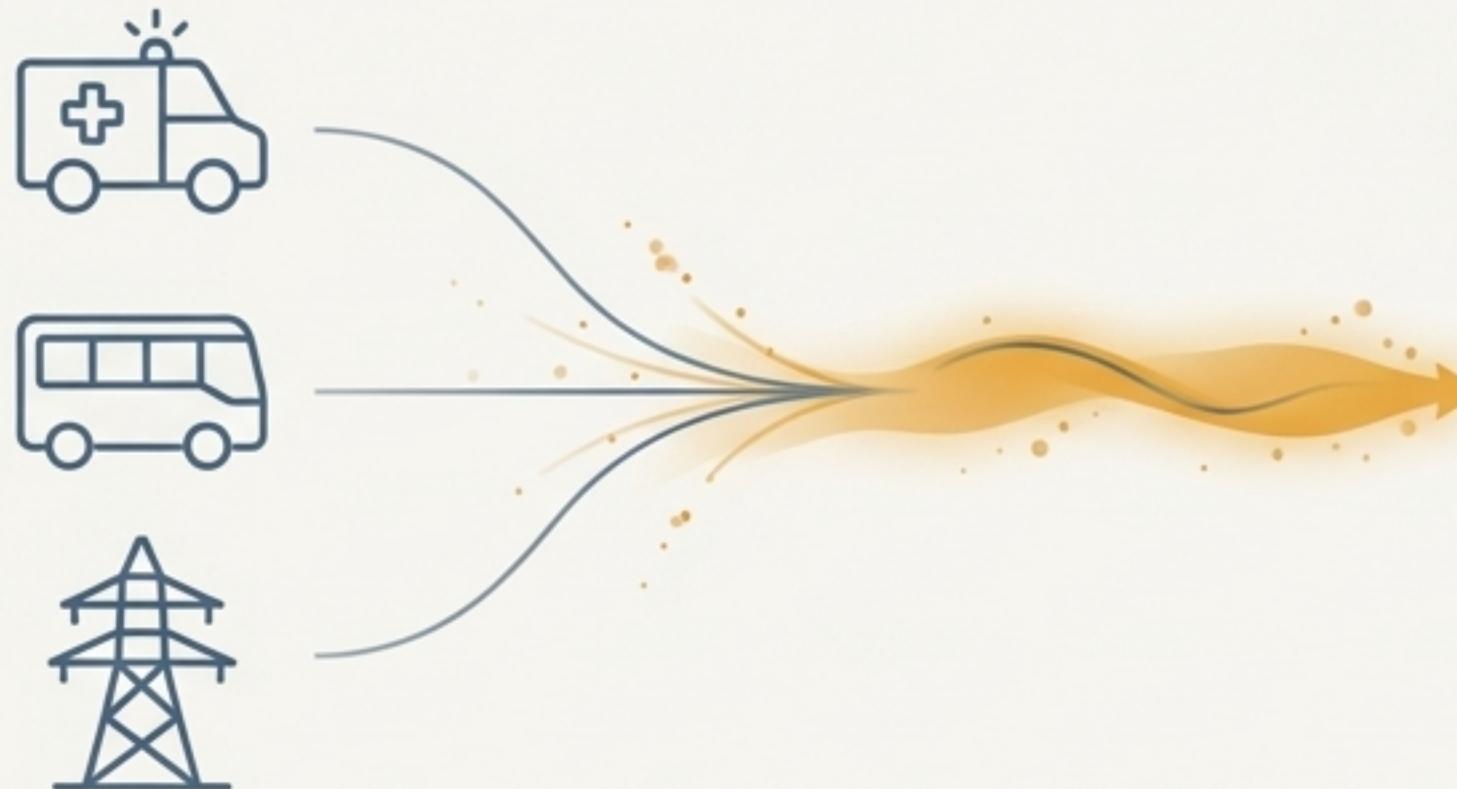


# The Reflex: Instant Signal Processing with Confluent & Flink SQL

Before data even lands in a database, we use continuous Flink SQL queries to detect patterns and aggregate thousands of events into meaningful signals. This is the difference between batch reporting and real-time response.

## The ‘What’: Live Event Streaming

Ingests high-velocity data from emergency, transit, and infrastructure sources into Kafka topics. Decouples producers from consumers for instant reaction.



## The “How”: Real-Time Stream Processing

We use **5-minute tumbling windows** to identify critical event clusters as they form.

```
-- Real-time aggregation of events by area and severity
INSERT INTO civic_events_aggregated
SELECT area, severity, COUNT(*) as event_count,
       TUMBLE_START(timestamp, INTERVAL '5' MINUTES)
FROM emergency_events
GROUP BY area, severity, TUMBLE(timestamp, INTERVAL '5' MINUTES);
```

This query turns thousands of raw sensor readings into a single ‘High Risk Area’ alert, enabling an immediate, automated response.

# The Brain: From Raw Data to Personalised Guidance

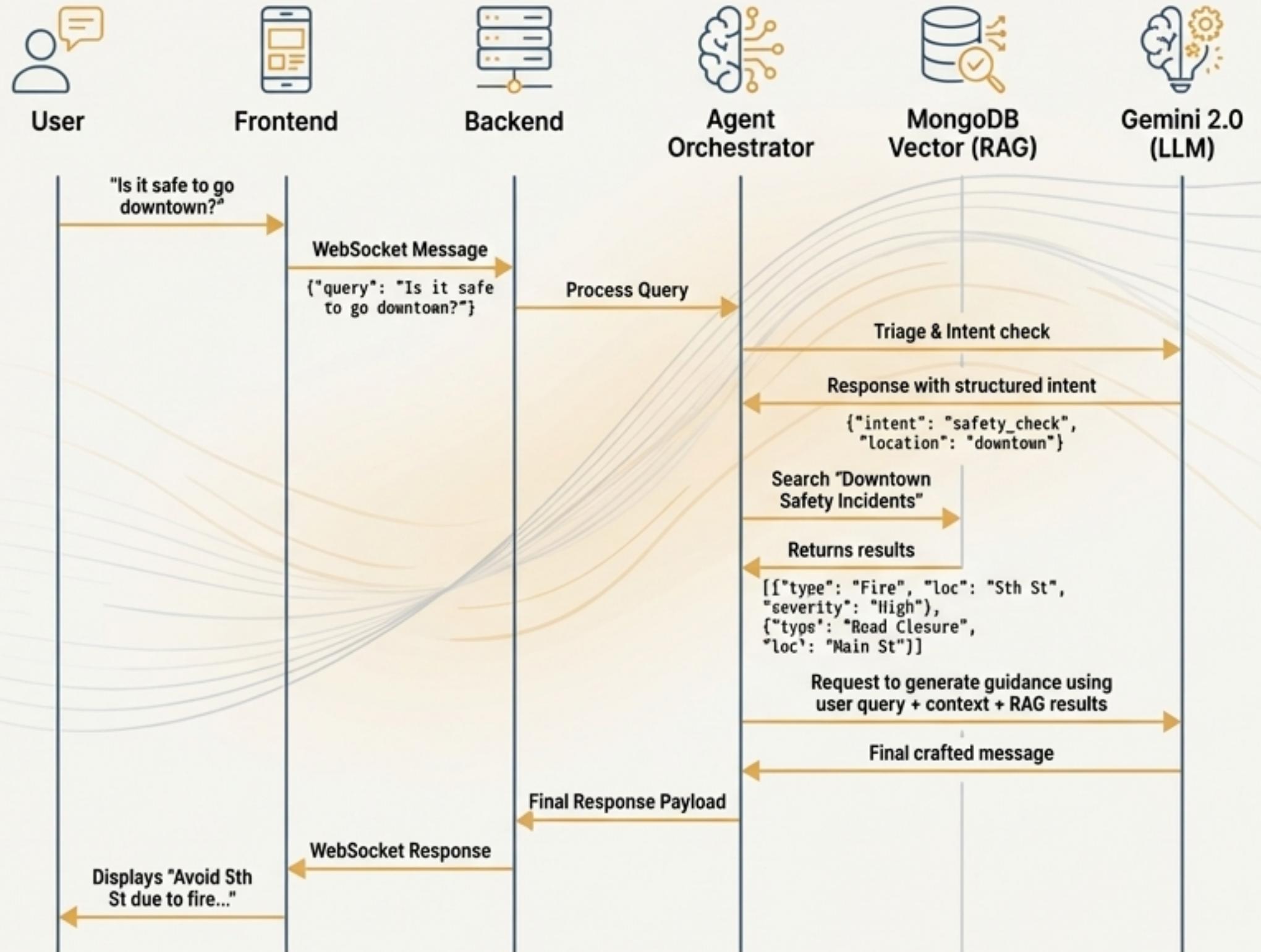
Raw data like “Code 10-33” is useless to a citizen. Our multi-agent AI system orchestrates reasoning and context to generate guidance tailored to specific people and situations.

## Multi-Agent System

- Triage Agent:** Classifies query intent and urgency.
- Impact Agent:** Assesses the severity and affected areas.
- Guidance Agent:** Generates persona-specific advice using the RAG pattern.

## Retrieval-Augmented Generation (RAG)

MongoDB Atlas vector search provides the AI with essential context from a knowledge base of city protocols, shelter locations, and real-time incident data from Kafka streams.



# The ‘Moment of Truth’: From Live Event to Actionable Alert in <5 Seconds

**Before** 14:01:02

Source Sans Pro  
User Query



Live data streams are flowing normally.

Source Sans Pro

**The Event**

A critical “fire” event is produced and enters the Confluent Kafka stream.



14:01:05



**After** 14:01:09

Source Sans Pro  
User Query



**This is AI reacting to data in motion.**

# Designed for People: Clarity and Safety for Every Citizen

Most safety applications are built for first responders.

CivicSense is designed for the 98%—the general public who need to make safe decisions every day. We bridge the information gap, especially for vulnerable populations.



## For Parents

Get immediate, clear guidance on school safety during an incident, not generic closures.



## For Seniors

Complex agency alerts are translated into simple, accessible language.



## For Commuters

Receive real-time alternative routes based on live transit and traffic disruptions.



## For First Responders

Gain high-level situational awareness to better coordinate public communication.

# The Foundation: Built for Municipal Scale and Enterprise Reliability



## Performance

- Event-to-Insight Latency: < 500ms
- Average Query Processing: ~1.2s
- WebSocket Delivery: < 100ms
- System Uptime Target: 99.99%



## Scalability

- Platform: Google Cloud Run (Fully managed serverless)
- Architecture: Auto-scales from 0 to 10,000+ concurrent users.
- Data Ingestion: Supports 1,000+ events/second via Flink backpressure.



## Reliability

- System Design: Features automatic WebSocket & Kafka reconnection.
- User Experience: Graceful degradation and fallback responses ensure the system is always available.
- Security: HTTPS/TLS by default, IAM-integrated.



 FastAPI

# Defining the Future of Public Safety Intelligence

## Why CivicSense Leads



**Real-Time First:** We operate on live streaming data, not stale batches. This is the fundamental architectural advantage.



**True AI Integration:** A novel multi-agent system with RAG on streaming data provides deep reasoning, not just keyword matching.



**Designed for Public Impact:** Our focus is on broad accessibility and clear communication for everyone, from parents to public officials.

## The Future Roadmap

### Immediate Priorities



- Multi-language support (Spanish, Chinese)
- Native mobile apps (iOS/Android) with push notifications



### Strategic Developments



- Historical analysis & predictive alerting
- Integration with city 311 systems
- Exploring Confluent Streaming Agents



**CivicSense is more than a platform; it's a new model for how cities can communicate with their citizens in the moments that matter most.**