

# Tech Stack Flow

## 1. Data Ingestion Layer (External Signals)

- **News & Event APIs** [Google News API, GDELT, Bloomberg, or sample mock feeds] → global disruptions.
- **Weather APIs** [Google Weather API, OpenWeatherMap] → floods, storms, droughts.
- **Economic/Trade Data** [World Bank API, UN Trade Data, commodity price feeds].
- **Optional:** IoT/Warehouse mock sensor data [temperature, stock levels].

### Data Sources



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## 2. Preprocessing & Event Structuring

- **Cloud Function (Firebase Cloud Functions)**: fetches raw feeds.
- **Gemini API**:
  - Summarizes long news reports → “Port strike in LA, impacting exports.”
  - Classifies **relevance** (High, Medium, Low impact).
  - Extracts **entities** (location, commodity, supplier).

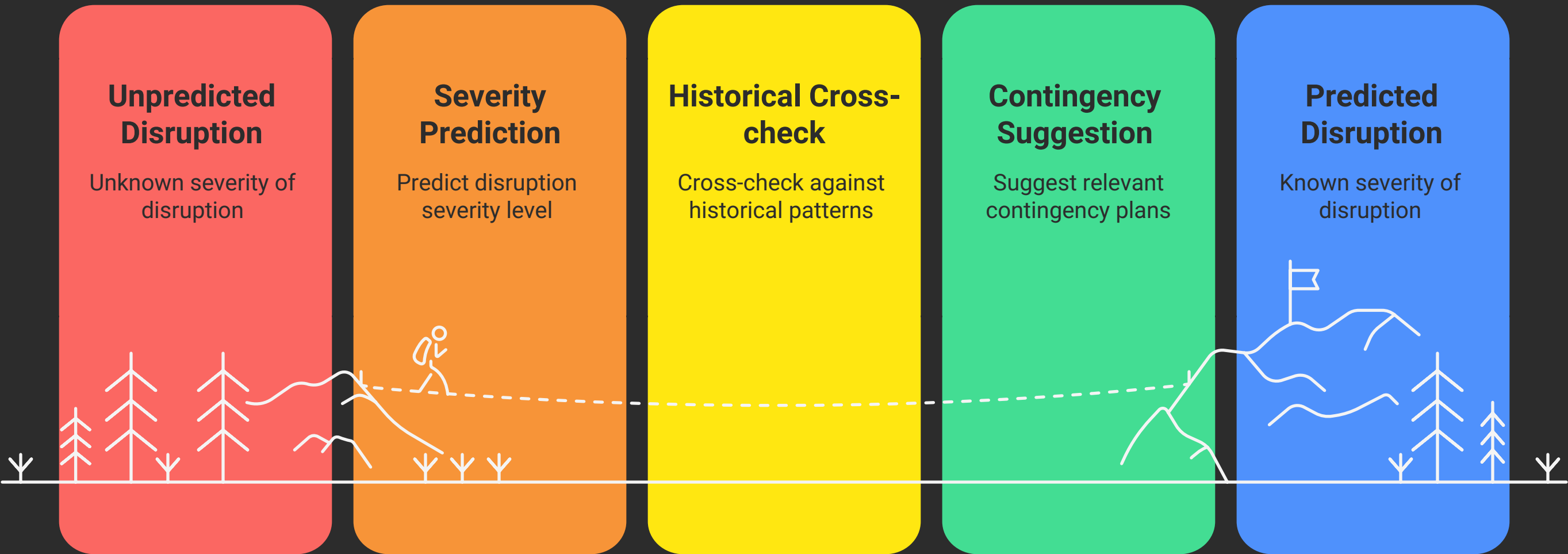
## Gemini API Functions



### 3. Risk Analysis Engine

- **Gemini API** [reasoning layer]:
  - Predicts disruption severity [short delay vs. global shortage].
  - Cross-checks against historical patterns [toilet paper shortage, chip shortage].
  - Suggests contingency plans: “Switch to Supplier B in Vietnam.”

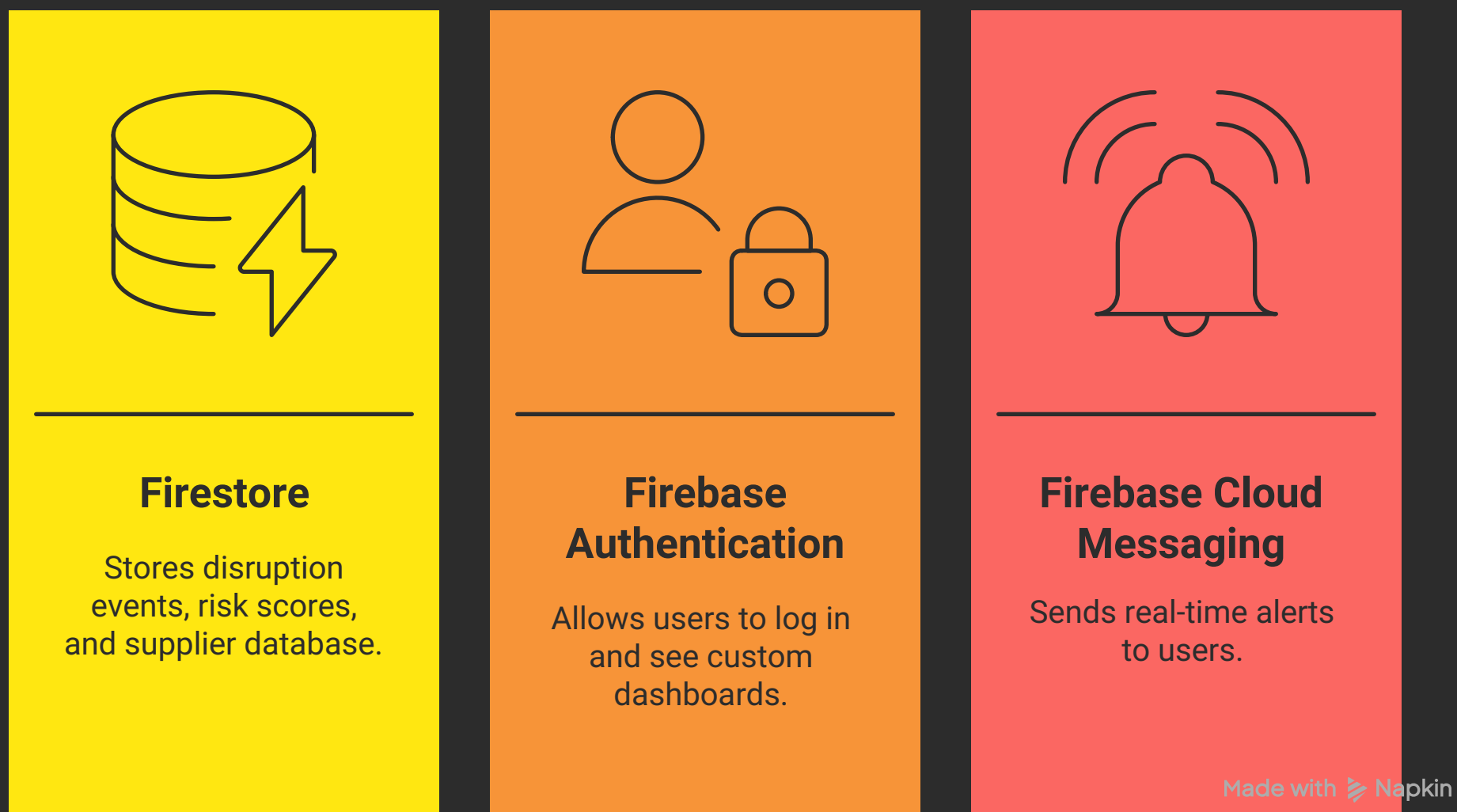
## Predicting Disruption Severity



#### 4. Data Storage & Sync (Firebase)

- **Firestore:** stores disruption events, risk scores, supplier database.
- **Firebase Authentication:** users (logistics managers, companies) login to see custom dashboards.
- **Firebase Cloud Messaging:** push real-time alerts → “⚠️ Risk Alert: Typhoon in Taiwan affecting semiconductors.”

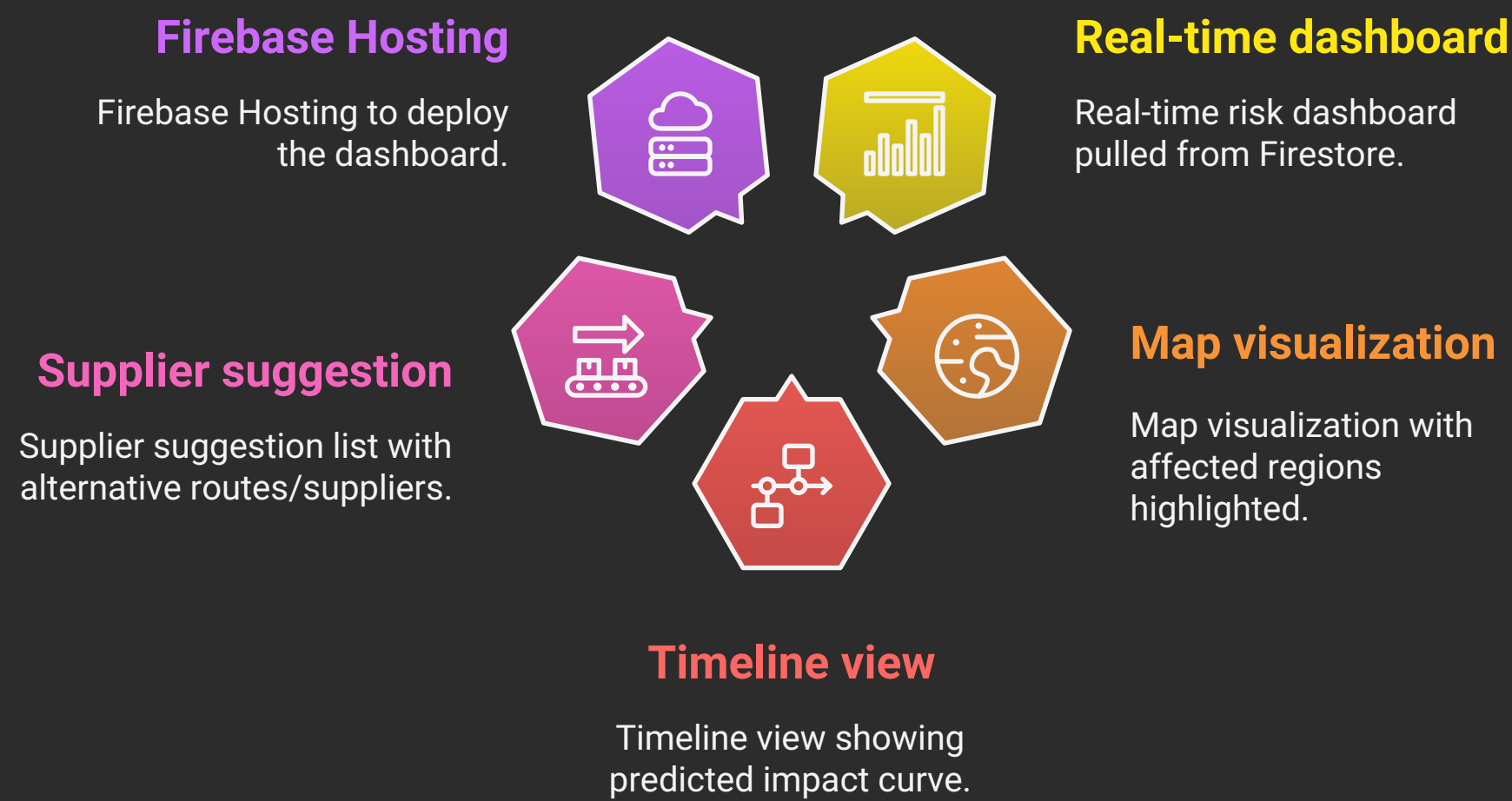
### Firestore Services



#### 5. Frontend / Dashboard

- **React / Flutter Web** (for cross-platform UI):
  - Real-time risk dashboard (pulled from Firestore).
  - Map visualization → affected regions highlighted.
  - Timeline view → predicted impact curve.
  - Supplier suggestion list → alternative routes/suppliers.
- **Firebase Hosting** → deploy the dashboard.

## Dashboard features

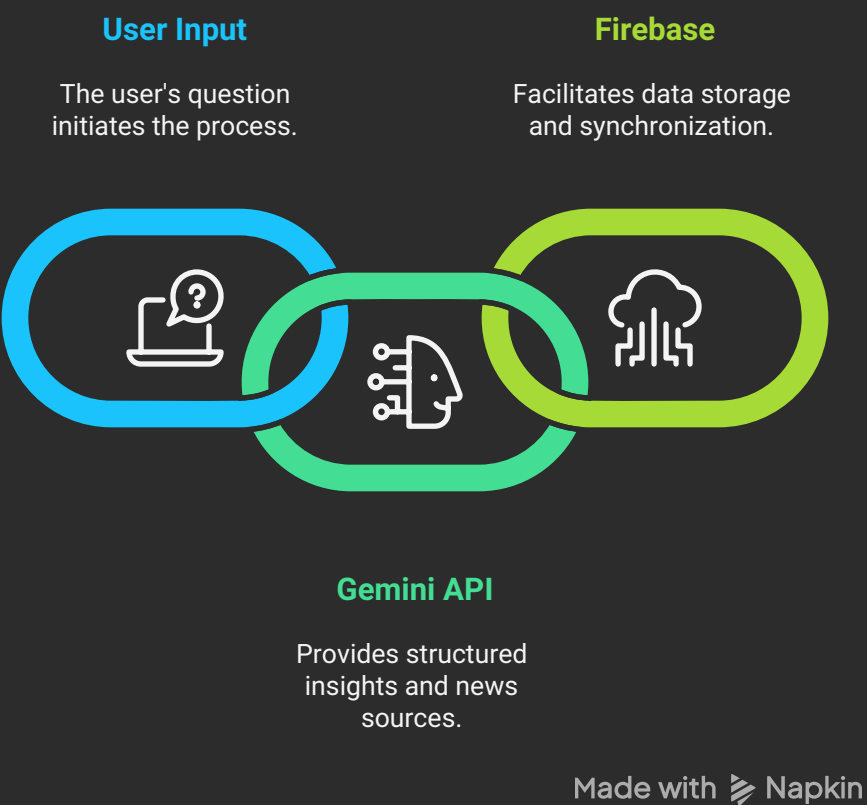


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## 6. AI Interaction Layer

- **Chat Interface [Gemini API + Firebase]:**
  - User asks: “What’s the biggest risk to electronics supply in the next month?”
  - Gemini responds with structured insights + supporting news sources.

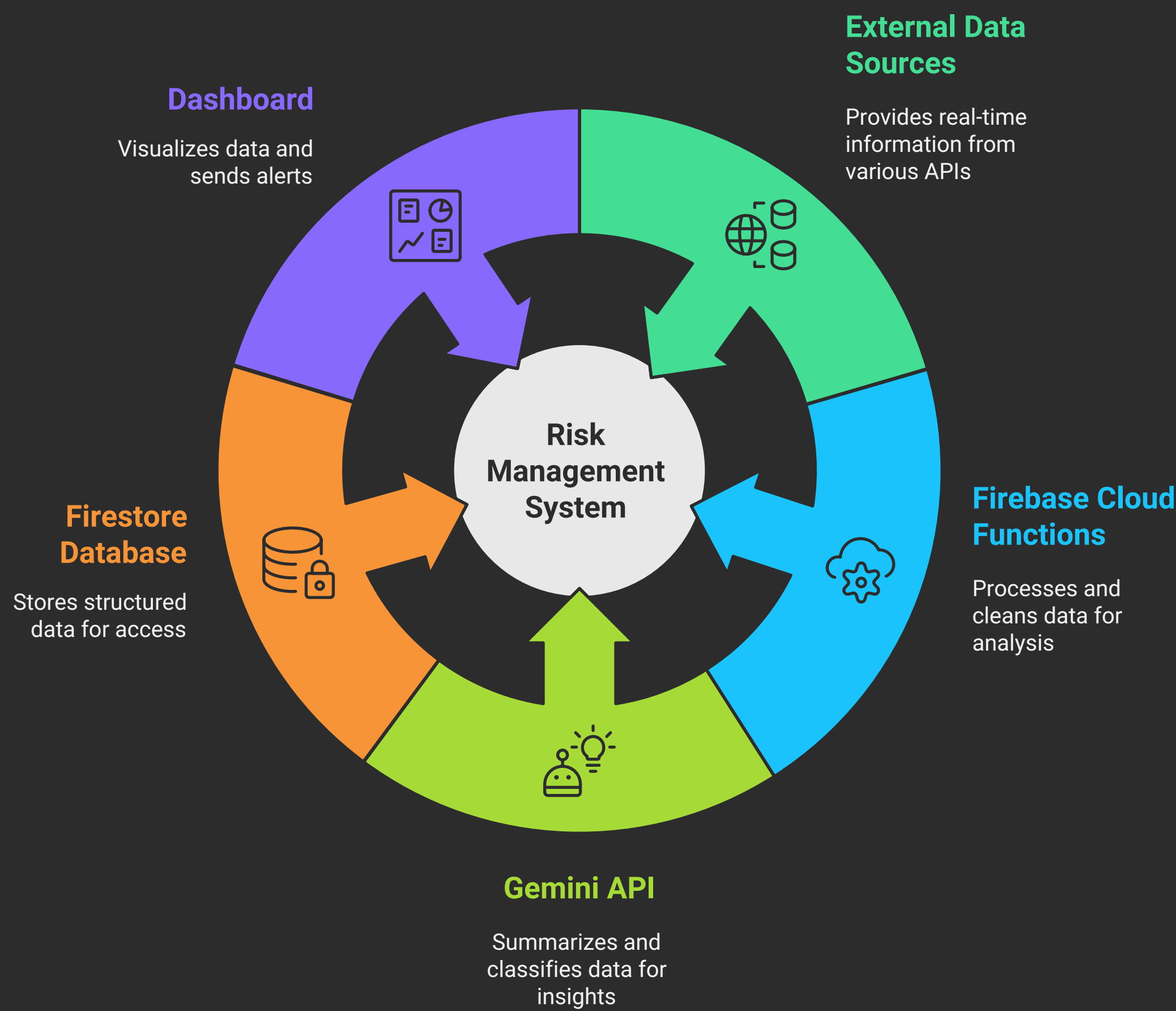
## Gemini-Firebase Interaction



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## ◆ Flow Diagram (Simplified)

External Data Sources (News, Weather, Trade APIs) →Firebase Cloud Functions [fetch & clean] →Gemini API [summarize, classify, predict, plan] →Firestore Database [store disruptions, suppliers, risk scores] →Dashboard (React/Flutter) + Push Alerts (Cloud Messaging)



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- ◆ Suggested Stack
- **Frontend:** React.js [or Flutter Web for cross-platform].
  - **Backend:** Firebase [Firestore, Cloud Functions, Hosting, Auth, Cloud Messaging].
  - **AI:** Gemini API [reasoning + text understanding].
  - **Data APIs:** Google News, Weather, Trade Data.
  - **Visualization:** Mapbox or Google Maps API [to show affected regions].

# Project technologies

