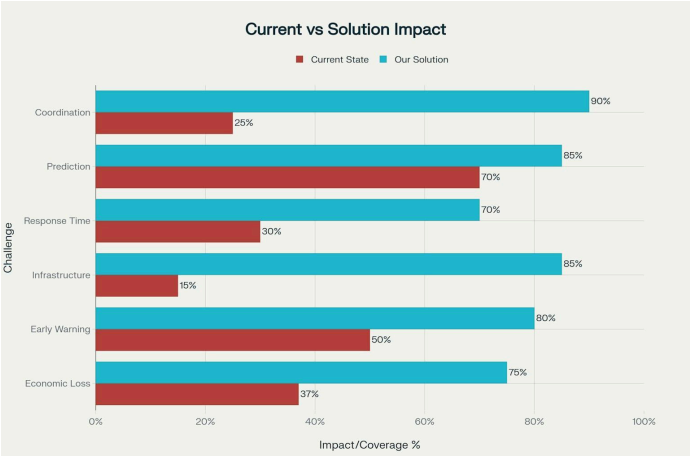
Resilience AI: Vertical AI Agents for Climate-Disaster Resilience
for Economy, Agriculture, Health, Infrastructure & Safety

Problem Statement

Climate disasters in 2024 caused $368 billion in global economic losses, with 60% uninsured. Critical gaps persist: 96 of 193 countries lack adequate early warning systems, and 85% of critical infrastructure, privately owned, is poorly integrated into emergency responses. Disasters like the Lahaina fires destroyed 3,000 structures in 15 hours, exceeding FEMA's 300-structure target in 24 hours. Food supply chains face disruptions, with cocoa production down 14% and egg prices at record highs. Siloed systems delay responses, leading to preventable losses in lives and property across agriculture, health, infrastructure, and safety.



Target Audience & Context

Resilience AI targets government disaster agencies, private infrastructure operators, agricultural organizations, and supply chain companies in climate-vulnerable regions. Secondary audiences include insurers, NGOs, and international development groups. With extreme weather as the second-highest short-term risk (2025 Global Risks Report) and a 15.8% annual increase in climate disasters, the $1 trillion AI disaster management market demands integrated solutions. The UN's “Early Warnings for All" initiative underscores the urgency to close coverage gaps by 2027.

Relevance to Problem

Current disaster management systems are reactive and siloed, failing to coordinate across sectors. Floods in agricultural regions overwhelm systems unable to simultaneously protect crops, reroute supply chains, pre-position medical supplies, and repair infrastructure. Social media, with 500 million daily posts, offers untapped real-time intelligence. Resilience AI addresses this by deploying specialized AI agents that share data and coordinate multi-sector responses in real-time, transforming crisis management into proactive resilience to reduce losses and save lives.

Gen-AI Use Case

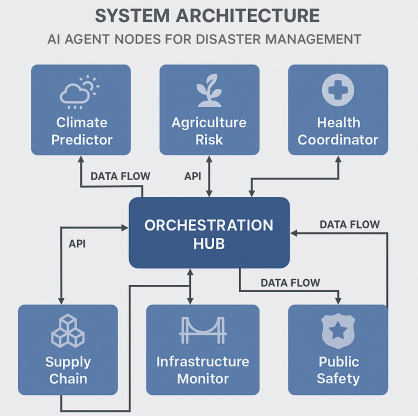
Generative AI drives Resilience AI through predictive modeling, natural language processing (NLP), and automated decision support. GPT-4 analyzes satellite imagery, weather data, and social media for accurate 72-hour disaster forecasts. NLP processes millions of posts, news, and government reports for situational awareness and rumor detection. LLMs generate actionable recommendations for resource allocation, evacuation routes, and supply chain rerouting. Communication orchestration delivers multilingual alerts, while scenario planning simulates disaster responses. LangGraph orchestrates agents, ensuring seamless collaboration while maintaining sector-specific autonomy, making Gen-AI ideal for real-time, multi-sector coordination.

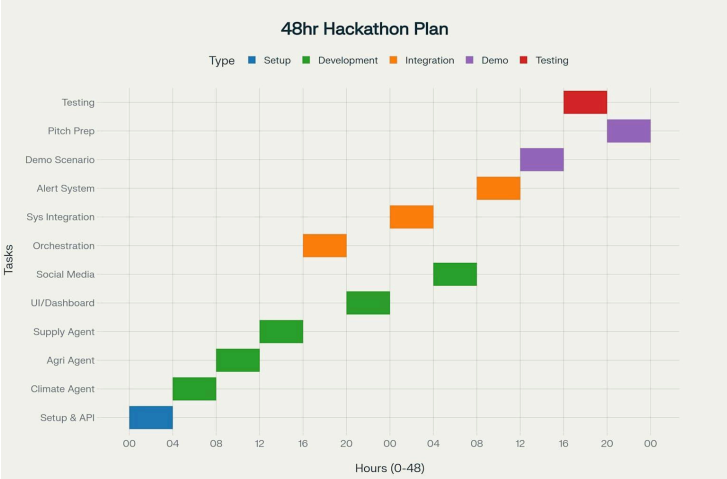
Solution Framework

Resilience AI is a multi-agent system with six vertical agents:

- **Climate Predictor Agent:** Forecasts disasters 72 hours ahead using Open-Meteo, Visual Crossing APIs, and machine learning.
- **Agriculture Risk Agent:** Monitors crop health via IoT sensors, adjusting irrigation/pest control.
- **Health Coordination Agent:** Predicts post-disaster disease outbreaks and pre-
- deploys medical supplies.
- **Supply Chain Optimizer:** Reroutes shipments based on infrastructure damage assessments.
- Infrastructure Monitor: Assesses structural damage using computer vision on drone footage.
- **Safety Coordinator:** Manages evacuations and disseminates alerts via NLP chatbots.

The workflow operates in three phases: Prediction (72-hour triggers), Coordination (data sharing), and Action (resource deployment). Agents communicate via Lang-Graph, ensuring modular integration. The MVP targets Southeast Asian floods, with three core agents (Climate, agriculture, and supply chain) demonstrating coordination.





Feasibility & Execution

The solution uses open-source APIs (Open-Meteo, Geo API, and EOSDA LandViewer), OpenAI's free/low-cost tokens, and LangChain for orchestration. The stack includes Python, TensorFlow, OpenCV, and Twilio. A modular architecture enables independent agent development with standardized APIs. The MVP, deployable in 48 hours, focuses on flood prediction in Southeast Asia, using Docker for scalability, and cloud infrastructure ensures global access. Existing frameworks minimize costs, ensuring rapid implementation.

Scalability & Impact

Resilience AI scales by adding agents for new sectors (e.g., energy, finance) and regions with localized data. It offers 40% faster response times, 25% loss reduction, and 29% and 80% early warning coverage. Developing countries can adopt low-cost AI coordination, leapfrogging traditional systems. Revenue streams include $ 10B early warning contracts, $6B infrastructure monitoring, and $300B insurance markets. Long-term impact includes climate adaptation and smart city integration.

Conclusion / Summary & Minimum Lovable Product

Resilience AI revolutionizes disaster management with vertical AI agents coordinating across sectors, reducing $368B annual losses by 25% annually. Its unique multi-agent system delivers 40% faster responses. The MLP, a flood management platform for Southeast Asia, integrates three agents using proven APIs. Revenue from B2G contracts, B2B monitoring, and insurance partnerships ensures sustainability, addressing critical needs with scalable growth.