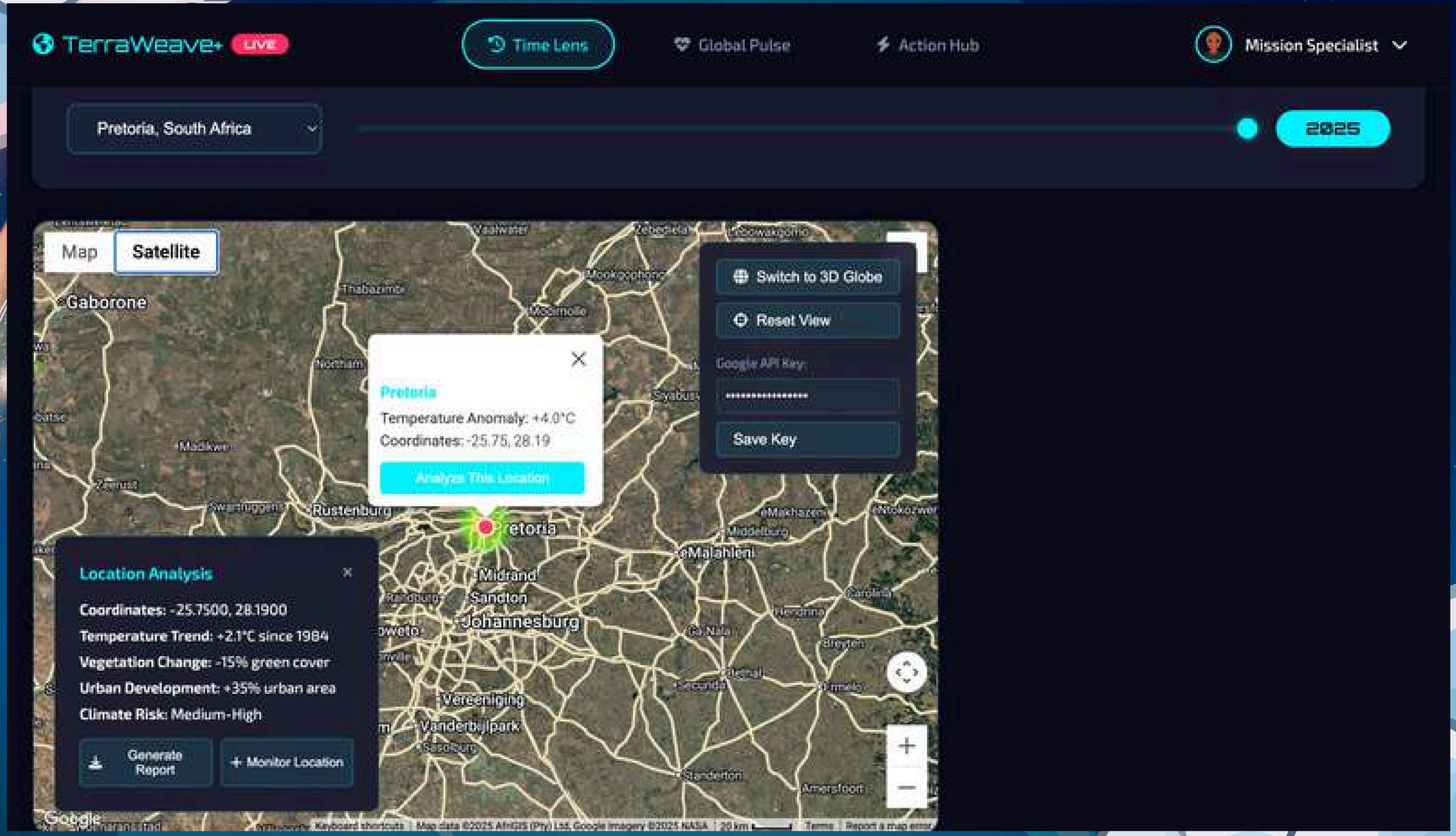
Team Msebetsi Solutions

NASA Space Apps Hackathon Presentation:

TerraWeave+

From Your Backyard to the Universe

Introduction



THE CHALLENGE

Climate change data feels abstract and distant - people struggle to connect global trends to their own lives, while organizations lack actionable insights for meaningful change.

* Connecting NASA's satellite data to personal experience
* Bridging the gap between awareness and action
* Making climate science accessible and actionable

THE CHALLENGE

KEY GOALS

- Transform complex NASA data into personal stories
- Provide real-time climate monitoring across global cities
- Deliver personalized, actionable recommendations
- Enable corporate climate transition planning

BENEFICIARIES

- General Public - Personal climate awareness
- Educators - Classroom climate science tools
- Corporations - ESG and sustainability planning
- Policy Makers - Data-driven decision support
- NASA - Public engagement with Earth science data

Research & Context

NASA DATASETS USED

- Landsat Archive (1984-Present) - Historical land change
- GIBS (Global Imagery Browse Services) - Real-time satellite imagery
- POWER API - Climate and solar data
- MODIS & VIIRS - Vegetation and thermal data
- GEOS-5 - Atmospheric composition

Research & Context

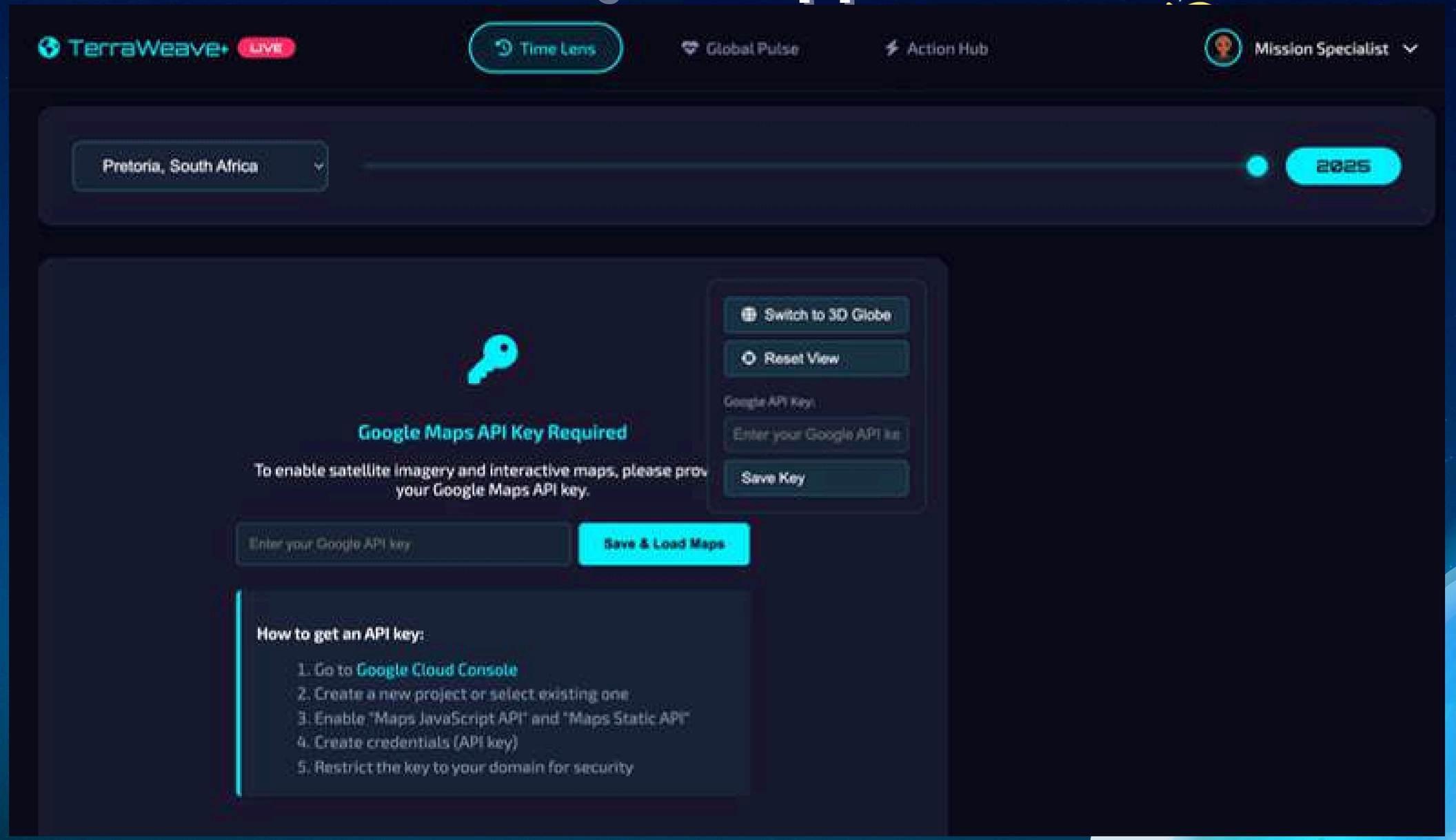
❌ GAPS IDENTIFIED

- No personalization to user location
- Limited interactive visualization
- No actionable recommendations
- Poor integration of real-time vs historical data

🔍 EXISTING APPROACHES

- Static climate dashboards
- Academic data portals
- Generic weather apps
- Corporate sustainability reports

Screenshot of NASA data integration in your app



Brainstorm & Ideation

TOP 3 RAW IDEAS

1. Climate Time Machine – Historical satellite imagery slider
2. Global Climate Pulse – Real-time city monitoring dashboard
3. Personal Carbon Action Planner – AI-driven recommendations

Brainstorm & Ideation

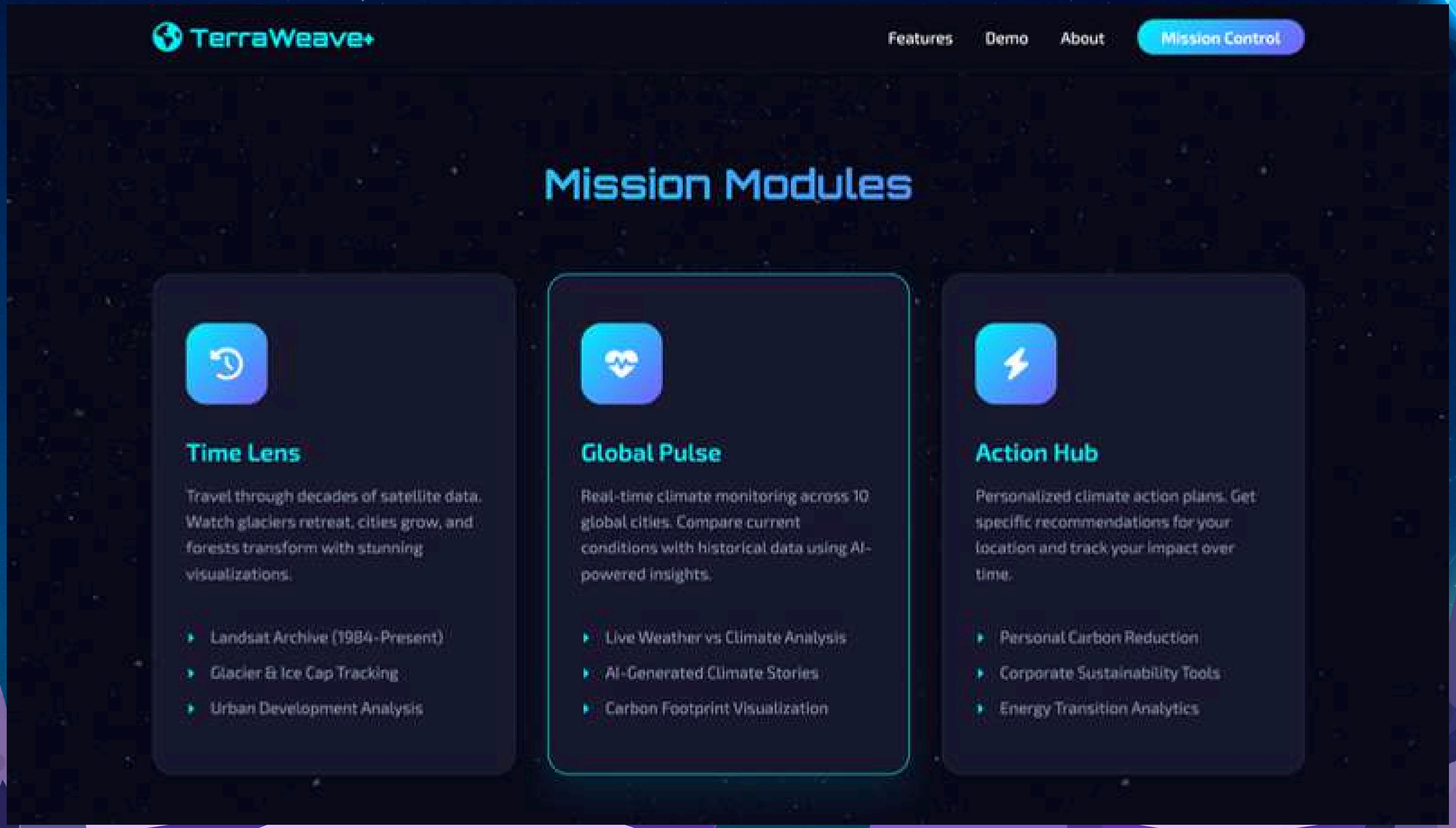
CHOSEN CONCEPT & WHY

TERRAWEAVE+ – Combines all three into a unified platform:

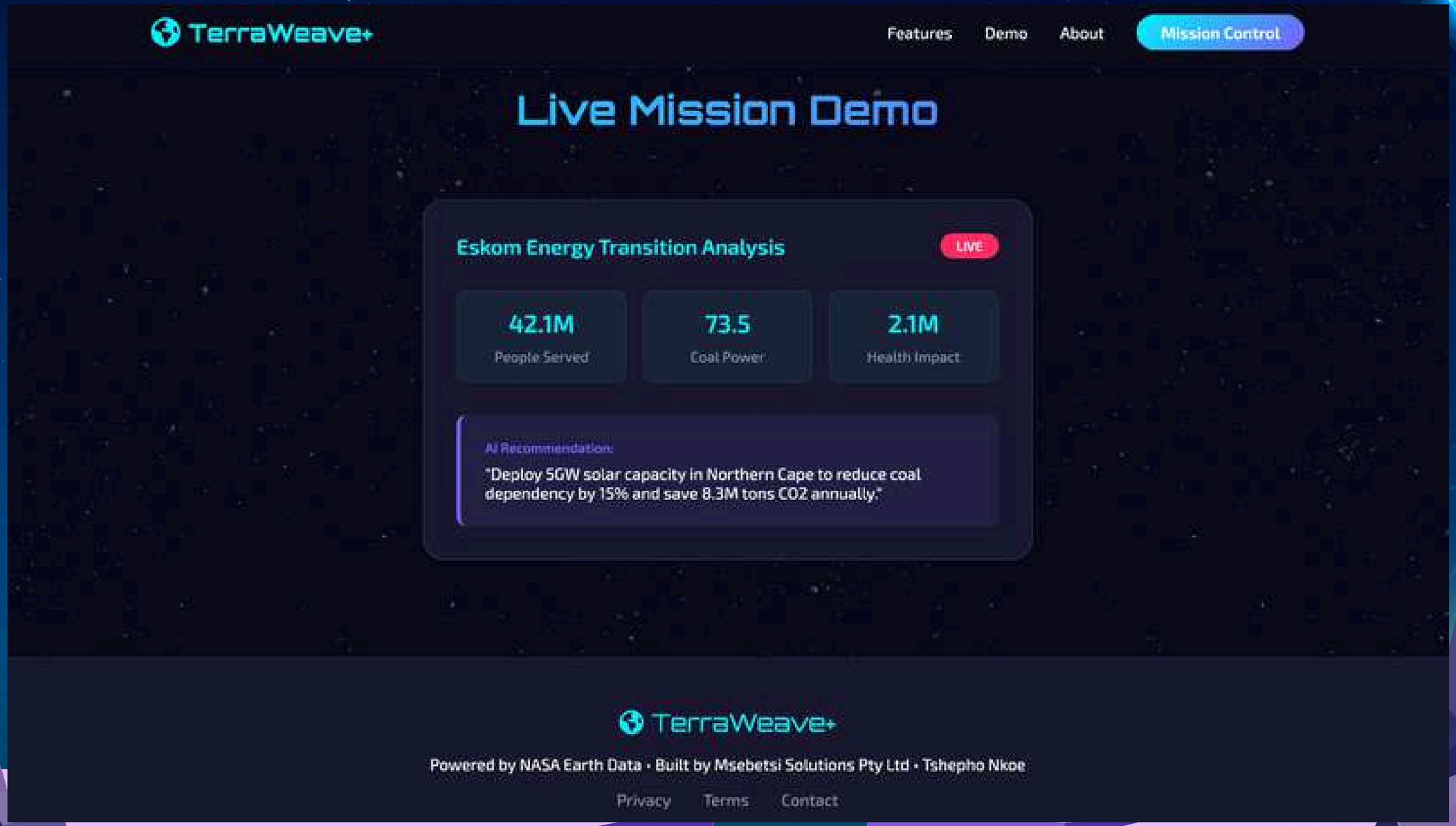
- Time Lens (Historical analysis)
- Global Pulse (Real-time monitoring)
- Action Hub (Personal & corporate action)

Provides end-to-end climate awareness → understanding → action

Fun Fact


TerraWeave+
Features
Demo
About
Mission Control
Mission Modules
Time Lens
Travel through decades of satellite data. Watch glaciers retreat, cities grow, and forests transform with stunning visualizations.
Landsat Archive (1984-Present)
Glacier & Ice Cap Tracking
Urban Development Analysis
Global Pulse
Real-time climate monitoring across 10 global cities. Compare current conditions with historical data using AI-powered insights.
Live Weather vs Climate Analysis
AI-Generated Climate Stories
Carbon Footprint Visualization
Action Hub
Personalized climate action plans. Get specific recommendations for your location and track your impact over time.
Personal Carbon Reduction
Corporate Sustainability Tools
Energy Transition Analytics

Fun Fact


TerraWeave+
Features
Demo
About
Mission Control
Live Mission Demo
Eskom Energy Transition Analysis
LIVE
42.1M
People Served
73.5
Coal Power
2.1M
Health Impact
AI Recommendation:
"Deploy 5GW solar capacity in Northern Cape to reduce coal dependency by 15% and save 8.3M tons CO2 annually."
TerraWeave+
Powered by NASA Earth Data · Built by Msebetsi Solutions Pty Ltd · Tshepho Nkoe
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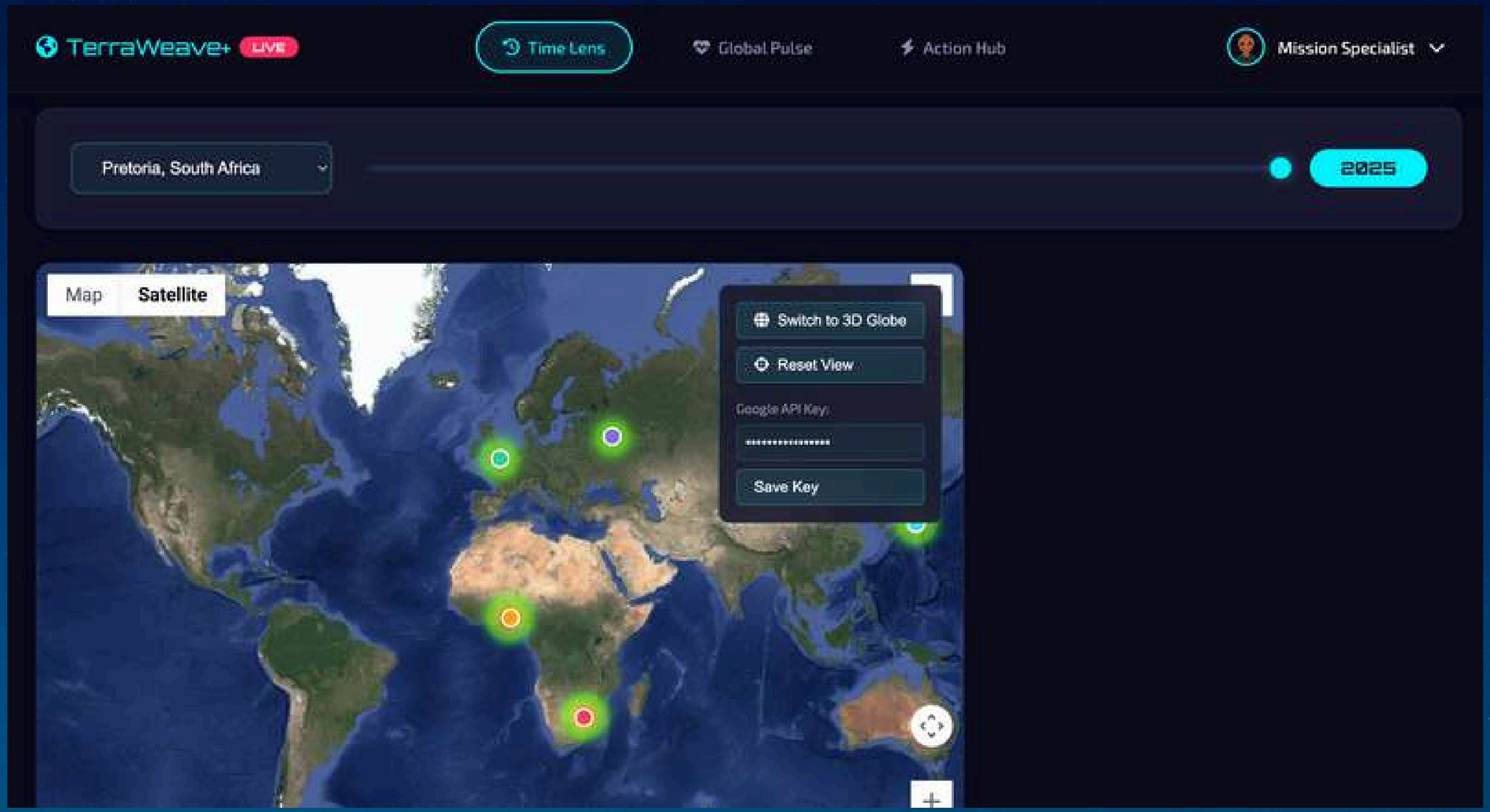
Design the Solution

CORE FEATURES

- Interactive 3D Globe with Google Maps integration
- Time-lapse satellite imagery (1984-2024)
- Real-time climate anomaly detection
- AI-powered personalized recommendations
- Corporate energy transition analytics
- Eskom power plant impact analysis



ARCHITECTURE / WORKFLOW

Frontend (React-like) → Backend (Node.js/Express) → NASA APIs → SQLite Database

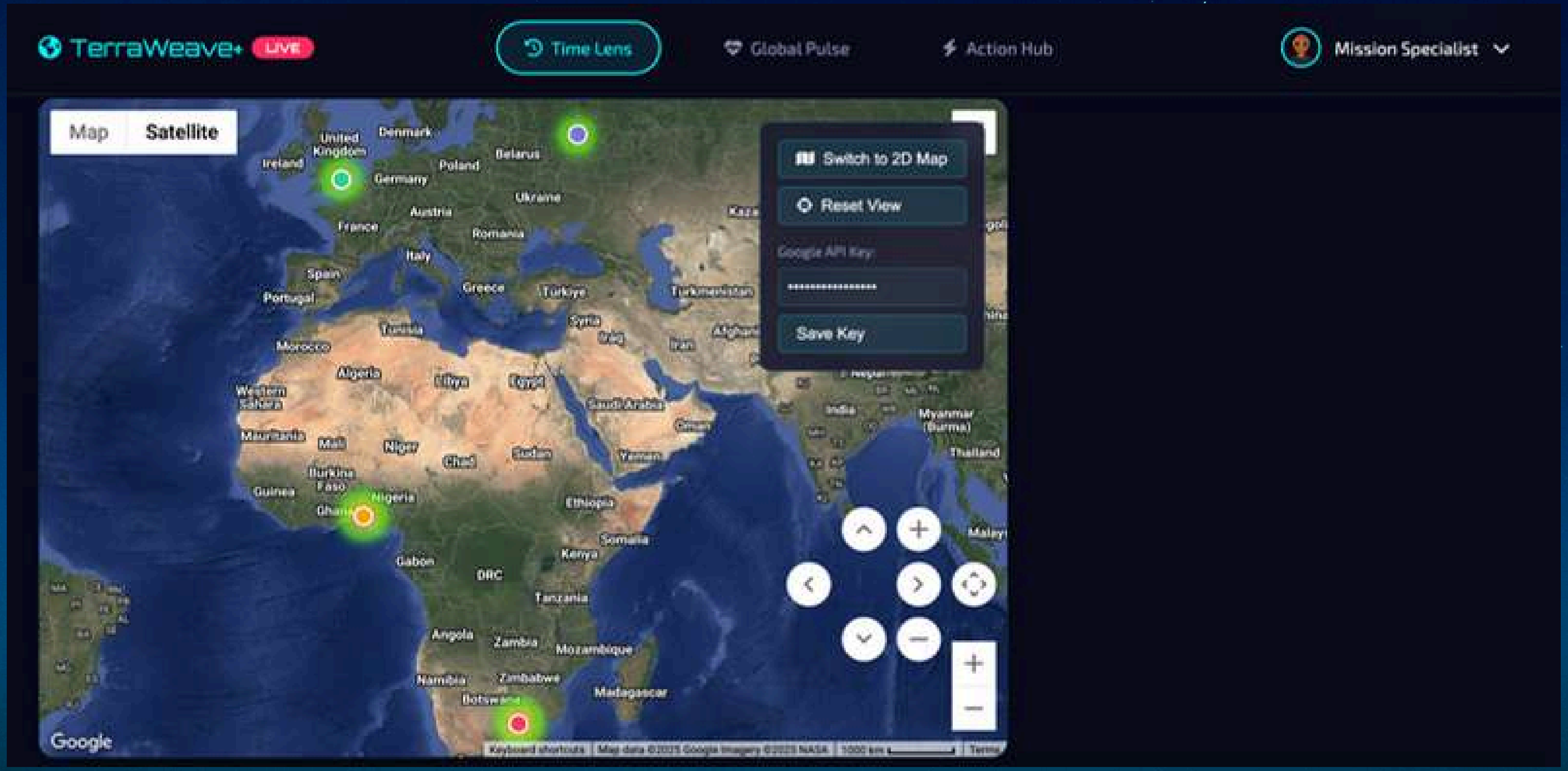
↓

User Interaction → Data Processing → Visualization → Actionable Insights

UNIQUE/INNOVATIVE ASPECT

- Personal climate stories based on user location
- AI-generated insights from complex datasets
- Seamless integration of personal + corporate action
- Interactive 3D globe with automatic rotation

UNIQUE/INNOVATIVE ASPECT



Build & Implement

TOOLS & TECHNOLOGIES

Frontend: HTML5, CSS3, JavaScript, Chart.js

Backend: Node.js, Express.js

Database: SQLite

APIs: Google Maps, NASA GIBS, NASA POWER

Design: Custom CSS with NASA-inspired theme

TEAM ROLES & DIVISION

[Tshepho Nkoe] – Full-stack development, NASA API integration + Research, climate data analysis

[Olona Nkoe] – UI/UX design, data visualization

PROTOTYPE SCOPE

10 global cities with real-time climate monitoring

- Historical data from 1984-2024 for 5 key locations
- Personal action recommendations
- Eskom energy transition analysis
- Interactive 3D globe with satellite imagery

TOOLS & TECHNOLOGIES

terraweave-app

dashboard.html
database
index.html
js
login.html
node_modules
package-lock.json
package.json
server
styles
venv

TEST & REFINE

STUDIO SHODWE

DOCKER IMAGES

- User testing with climate scientists and general public
- NASA data accuracy verification
- Performance testing with large datasets
- Cross-browser compatibility testing

TEST & REFINE

STUDIO SHODWE

DOCKER IMAGES

KEY FEEDBACK

- "The 3D globe makes data feel tangible"
- "Personal recommendations are surprisingly accurate"
- "Corporate energy analysis is instantly valuable"
- "Interface is intuitive despite complex data"

TEST & REFINE

STUDIO SHODWE

DOCKER IMAGES

ADJUSTMENTS MADE

- Simplified climate anomaly indicators
- Added API key management for easy judge testing
- Enhanced mobile responsiveness
- Improved data loading performance

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IMPACT STATEMENT

TerraWeave+ transforms abstract climate data into personal stories

and actionable plans, empowering everyone from individuals to major corporations to become active participants in climate solutions.

CONTACT OUR TEAM

Support & Contact

For questions, collaboration, or support:

- Email: tshephonkoe@gmail.com
- GitHub: https://github.com/TshephoNkoe/terraweave-app
- Business: Msebetsi Solutions Pty Ltd