EMERGENCY RESPONSE LEADERSHIP NETWORK

Improving Leadership Coordination in HCA Healthcare During Disasters

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PROBLEM STATEMENT

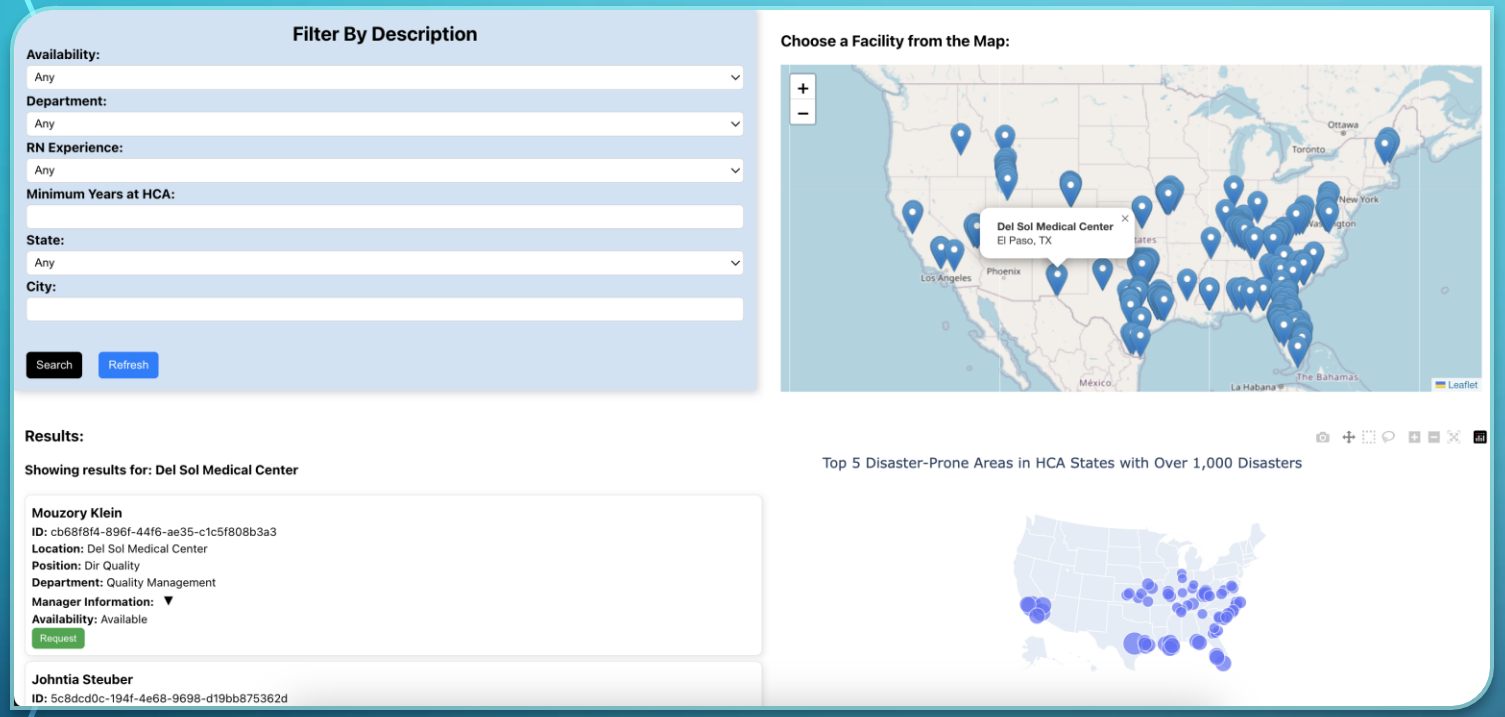
What is the issue?

- During natural disasters, hospitals struggle to locate and deploy experienced crisis leaders, as unpredictable events overwhelm healthcare systems and complicate coordination

Why does it matter?

- Loss of staff and resource shortages disrupt hospital operations, directly affecting patient assistance
- HCA has the Enterprise Emergency Operations Center established, but no centralized system to quickly locate & request leadership across hospitals

OUR SOLUTION

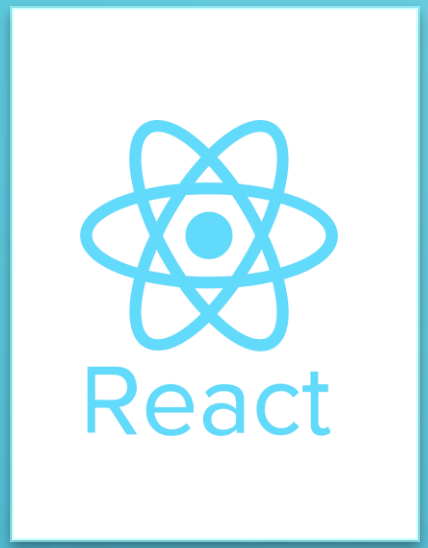


Emergency Response Leadership Network

- A leadership database platform for faster supervisor deployment
- Filter & search supervisors based on their Availability, Department, RN Experience, Employment Tenure, and Facility location (City, State)
- One-click deployment requests

Who benefits?

- Hospital administrators, emergency response teams, and most importantly, **patients**



TECH STACK

Data Preprocessing & Visualization

- Jupyter Notebook (Python Libraries: **Pandas, NumPy, Matplotlib, and Plotly**)

Database

- **SQLite** (storage and querying)

Backend

- **FastAPI** (data retrieval)

Frontend

- **React.js** (interactive UI)

DATA ANALYSIS

Cleaning and Standardization

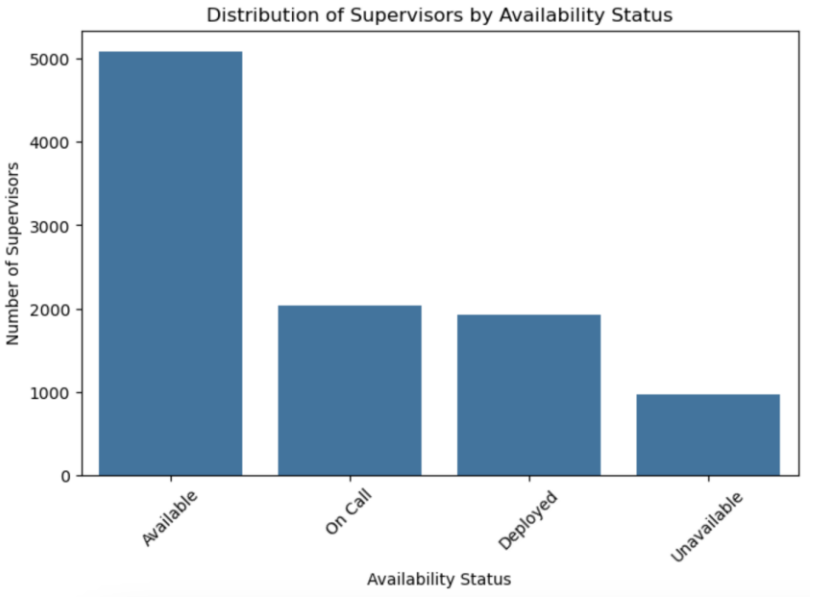
- Checked for missing and inconsistent values, aligning them with the majority
- Adjusted data types for consistency in querying
- Included only employees in supervisory positions

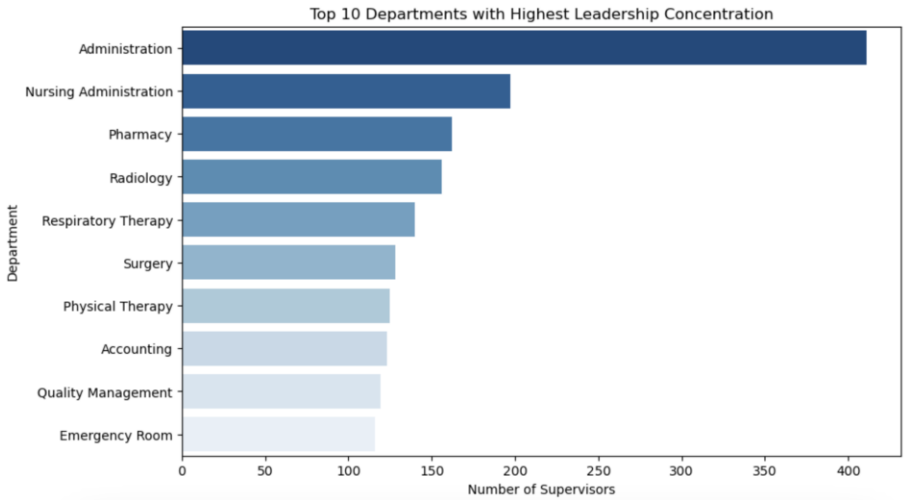
Availability Assignment

- Randomly assigned four statuses to simulate real-world availability

Departmental Leadership Analysis

- Identified departments with the highest concentration of supervisors
- Ensures hospitals can prioritize leaders from the most relevant departments in UI





DATA ANALYSIS CONT…

Disaster Risk Integration

- Incorporated FEMA disaster data to highlight high-risk areas in disaster-prone states
- Used **OpenCage's Geoencoding API** to generate coordinates for the top 5 areas that have the highest disaster counts per HCA state to create disaster-prone map
- Serves as a reference for pre-disaster planning through the platform

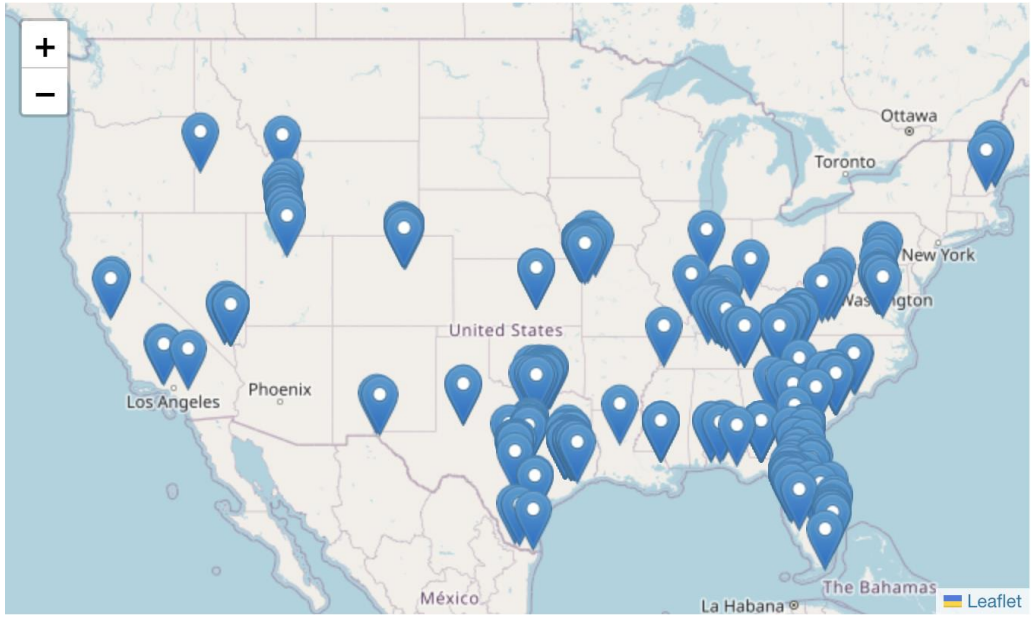
Facility Mapping

- Used **GeoApify's Geocoding API** to generate coordinates for each facility that have supervisors
- Created an interactive map displaying all facilities with supervisory personnel
- Allows users to visually assess proximity of supervisors to affected hospitals for faster decision-making

facility_state	fema_disaster_count	most_common_disaster
AK	339	Biological
CA	1684	Fire
CO	664	Flood
FL	2791	Hurricane
GA	2653	Hurricane
ID	369	Flood
IN	1464	Severe Storm
KS	1842	Severe Storm
KY	2796	Severe Storm
LA	2589	Hurricane
MO	2764	Severe Storm
NC	2317	Hurricane
NH	320	Severe Storm
NV	286	Biological
SC	1136	Hurricane
TN	1723	Severe Storm
TX	5350	Hurricane
UT	255	Flood
VA	2585	Hurricane

Top 5 Disaster-prone Areas in HCA States over 1,000 Disasters

HCA Facilities with Supervisors



FUTURE CONSIDERATIONS

Given more time:

- Refine UI layout and filter functionalities for a seamless experience

With more HCA data:

- **Automated Availability Updates:** Sync real-time scheduling data to dynamically update supervisor status
- **Requesting a Manager:** If data on supervisors' managers were available (location, department, tenure, availability)
- **AI-Powered Leadership Recommendations:** Machine learning could analyze Enterprise Emergency Operations Program participation, department expertise, and geographic proximity to suggest the most suitable leaders
- **Specified Requests:** Instead of simulated request messages, the system could trigger urgent real-time emails, messages, or calls directly to the requested employee

CONCLUSION

Emergency Response Leadership Network

- **Reduces** leadership deployment delays during crises
- **Improves** coordination between facilities by providing a shared resource pool
- Can **enhance** pre-disaster planning to avoid emergency scrambling

Impact on Patient Assistance

- Ensures that patients receive timely and well-coordinated care, whether hospitals are preparing ahead of a disaster or reacting in real time