Prioritizing Risk and Building Resilience for Climate Change Disasters

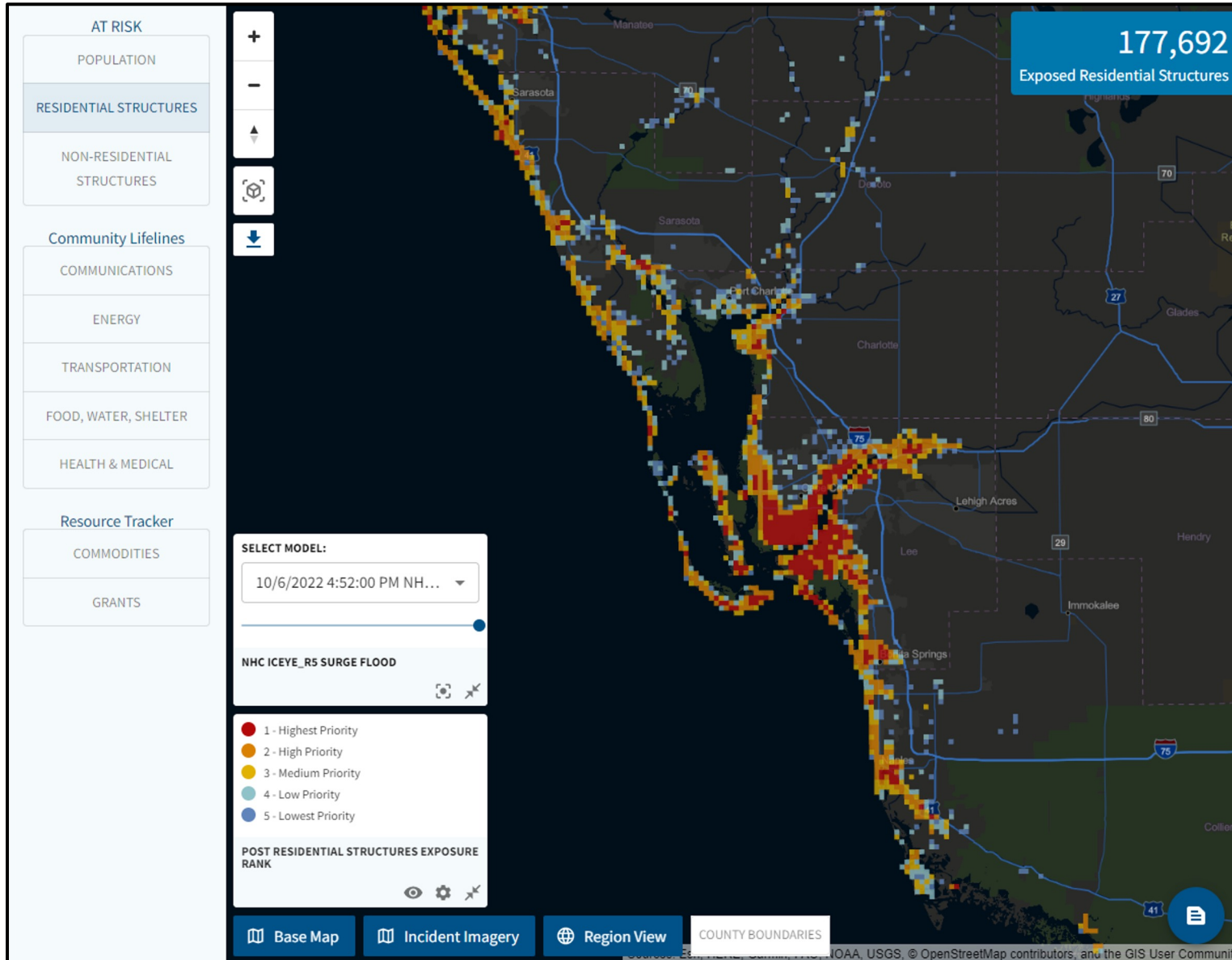TEMPO - Tool for Emergency Management and Prioritizing Operations

City Scan Climate Resilience Hub

IMPACT - An Incident Management, Prioritization, Alerting and Coordination Tool: Revolutionizing disaster management
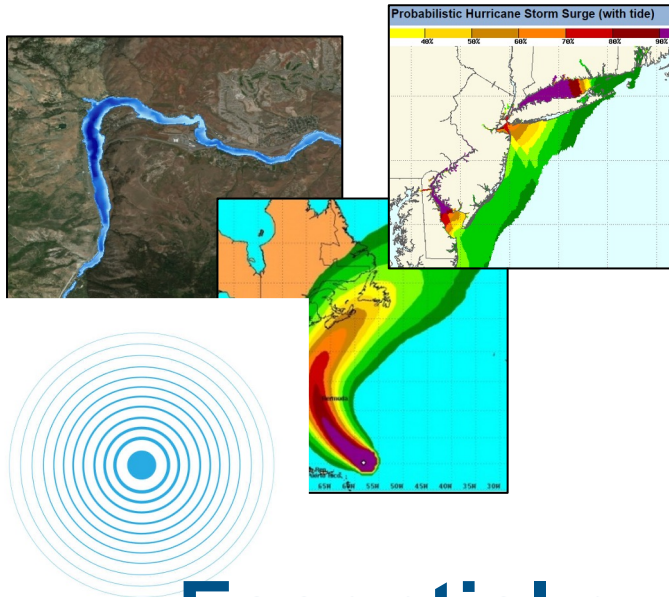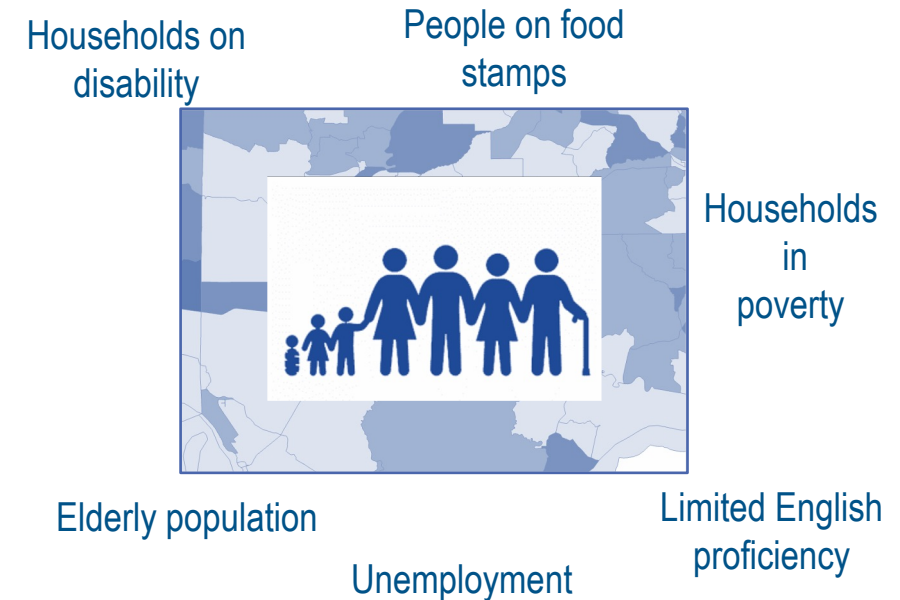
Brooke Hatcher – GWF 2023

The Elements of a Disaster

HAZARDS AND RISK
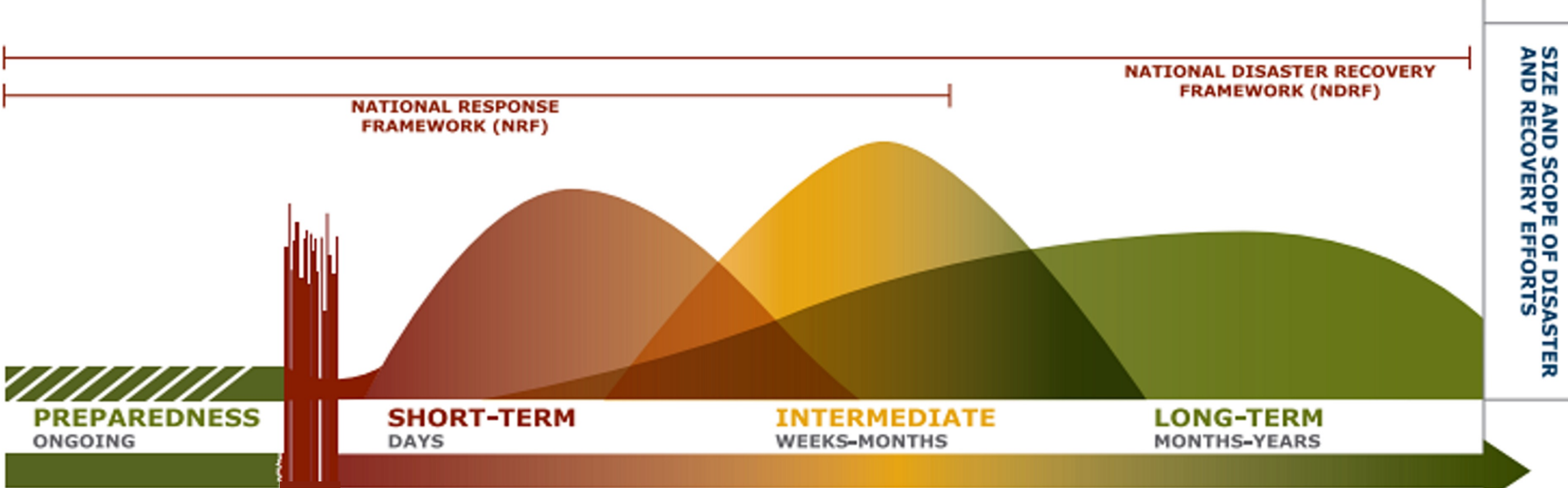
CRITICAL INFRASTRUCTURE

VULNERABLE POPULATION

Households on disability

People on food stamps

Households in poverty

Elderly population

Limited English proficiency

Unemployment

Essential questions:

- Which areas are most likely to be hit?
- Which areas are most likely to be severely damaged?
- Where are vulnerable people are most likely to be impacted?
- Which community lifelines are likely to be impacted?
- How should we prioritize disaster management operations?

2

The Timeline of a Disaster

NATIONAL DISASTER RECOVERY FRAMEWORK (NDRF)

NATIONAL RESPONSE FRAMEWORK (NRF)

SIZE AND SCOPE OF DISASTER AND RECOVERY EFFORTS

PREPAREDNESS
ONGOING

SHORT-TERM
DAYS

INTERMEDIATE
WEEKS-MONTHS

LONG-TERM
MONTHS-YEARS

DISASTER

PRE-EVENT MODELING

Data: Forecast Rain, Wind, Surge (NHC, CERA), Inland Flooding (USACE)

Models: SLOSH, POST, WOW

Uses: Hazard Detection, Risk Exposure, Declarations, Planning, Logistics

POST-EVENT MODELING

Data: ICEYE SAR Flood Depth, Surge Hindcast NHC, USA Structures, FCC DIRS, Waze, etc.

Models: POST Structure-level Damage Estimates; Isolated Communities

Uses: Data Collection, USAR, Logistics, Evacuations, Commodities
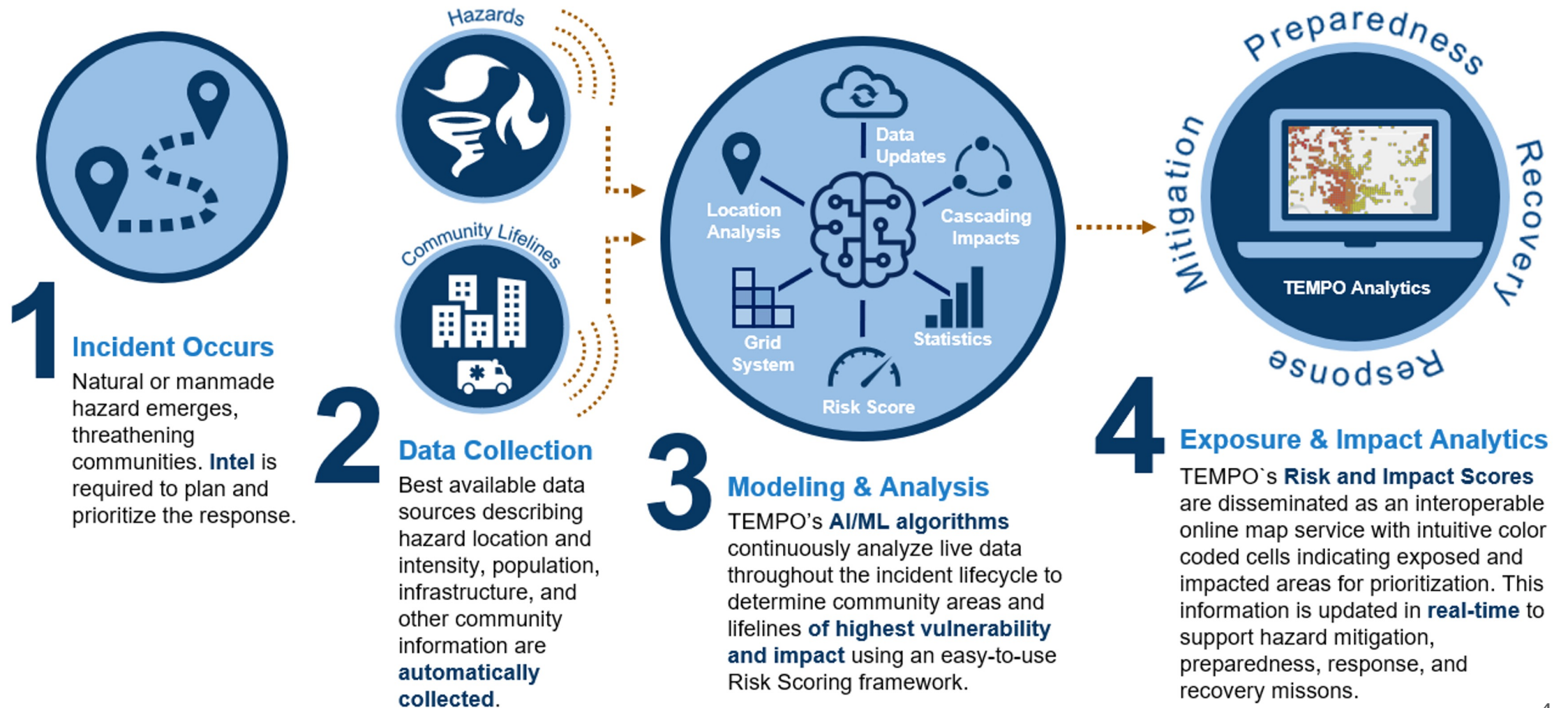
ROAD TO RECOVERY

Data: Imagery (CAP, NICB, NOAA), ICEYE SAR Flood Depth, Surge Hindcast NHC, USA Structures, FCC DIRS, Waze, Etc.

Model: Imagery-based Structure-level Damage Assessments, Debris Detection
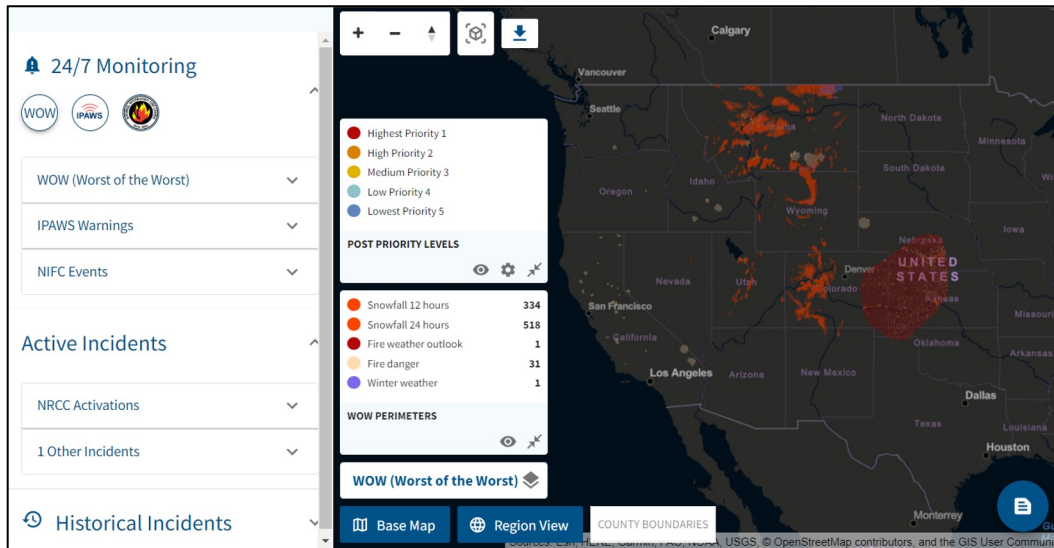
Uses: Individual Assistance (IA), Debris Removal, Recovery Operations

TEMPO
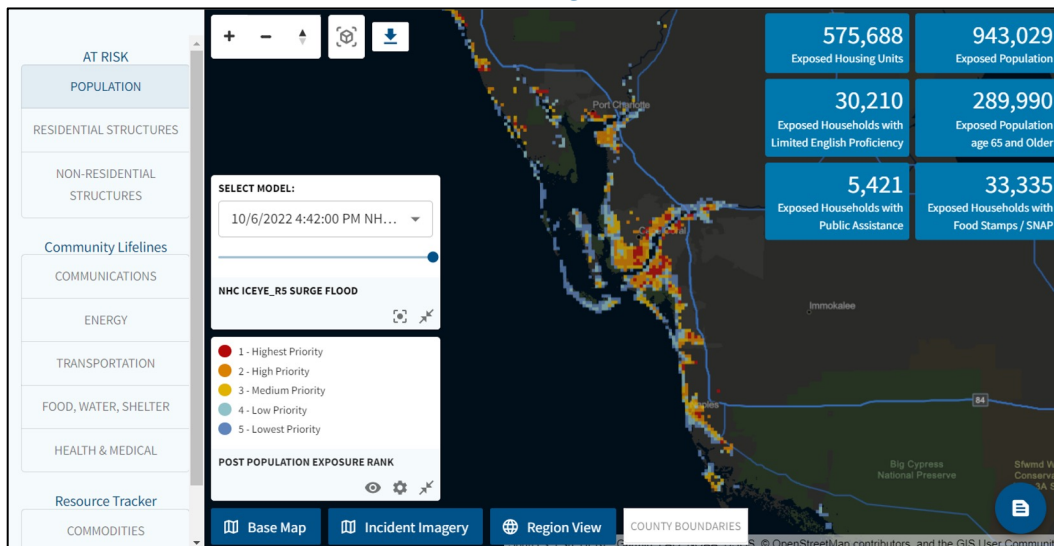## *Tool for Emergency Management Prioritization & Operations*

Hazards

Community Lifelines

Data Updates

Location Analysis

Cascading Impacts

Grid System

Statistics

Risk Score

Preparedness

Mitigation

Recovery

Response

TEMPO Analytics

1 Incident Occurs
Natural or manmade hazard emerges, threatening communities. **Intel** is required to plan and prioritize the response.

2 Data Collection
Best available data sources describing hazard location and intensity, population, infrastructure, and other community information are **automatically collected**.

3 Modeling & Analysis
TEMPO's **AI/ML algorithms** continuously analyze live data throughout the incident lifecycle to determine community areas and lifelines **of highest vulnerability and impact** using an easy-to-use Risk Scoring framework.

4 Exposure & Impact Analytics
TEMPO`s **Risk and Impact Scores** are disseminated as an interoperable online map service with intuitive color coded cells indicating exposed and impacted areas for prioritization. This information is updated in **real-time** to support hazard mitigation, preparedness, response, and recovery missons.

"24/7" Page View

Incident Page View

What does TEMPO provide?

- **An integrated framework** for disaster management and operations

- Intuitive **user interface** for the disaster management community

- Two main components:

  "24/7" page
  - Critical intelligence on all **activations and warnings**
  - **Real-time data feeds**
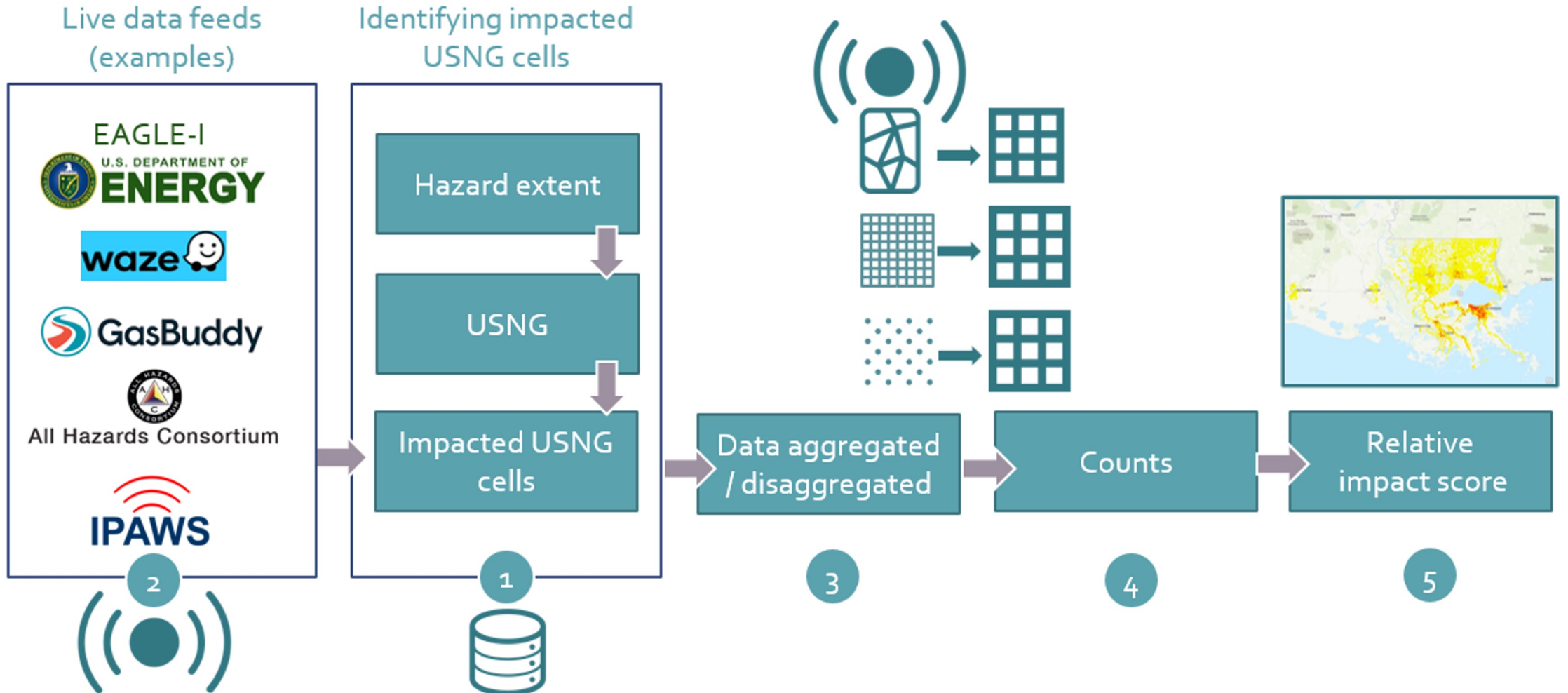
  Incident Page Views
  - Predicted/modeled **exposure** analytics
    – Population
    – Structures
  - **Impact** assessments based on live data feeds
  - Frequent updates of priorities + historic views

- Granular **demographics** and aggregated **statistics** (USNG, county)

- Estimated **commodities needs**

- Updated view of all **counties designated for assistance**

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Determining Priorities: Incident Exposure

Modeled hazards

Observed hazards

Residential structures

Critical infrastructure

Demographics
(vulnerability)
ACS, LandScan

US National Grid System

POST Algorithm:
Relative Exposure
and priorities

⚠ High risk for severe impact
⚠ Many residential structures
⚠ Critical infrastructure
⚠ Vulnerable populations

Priorities / Exposure

1
2
3
4
5
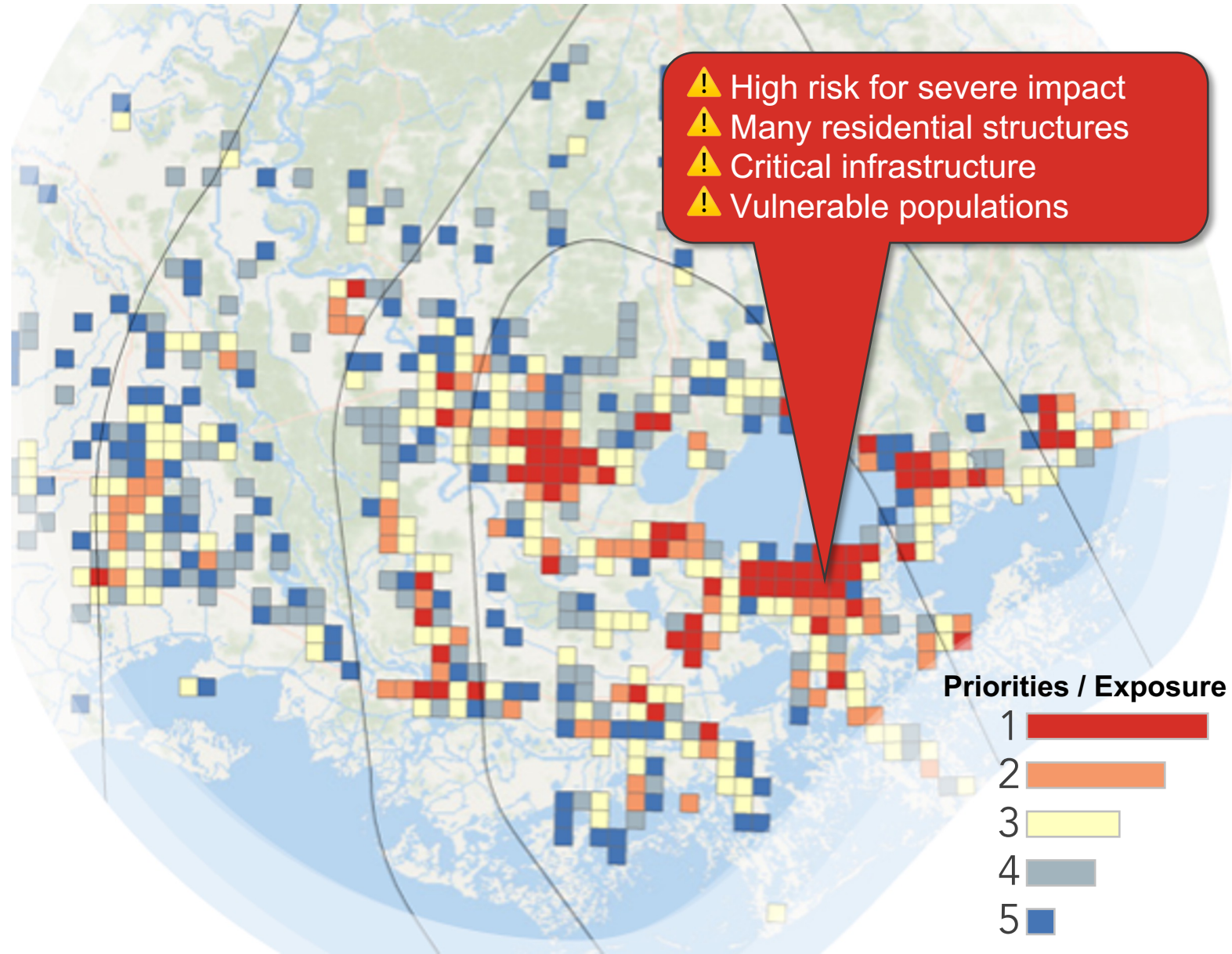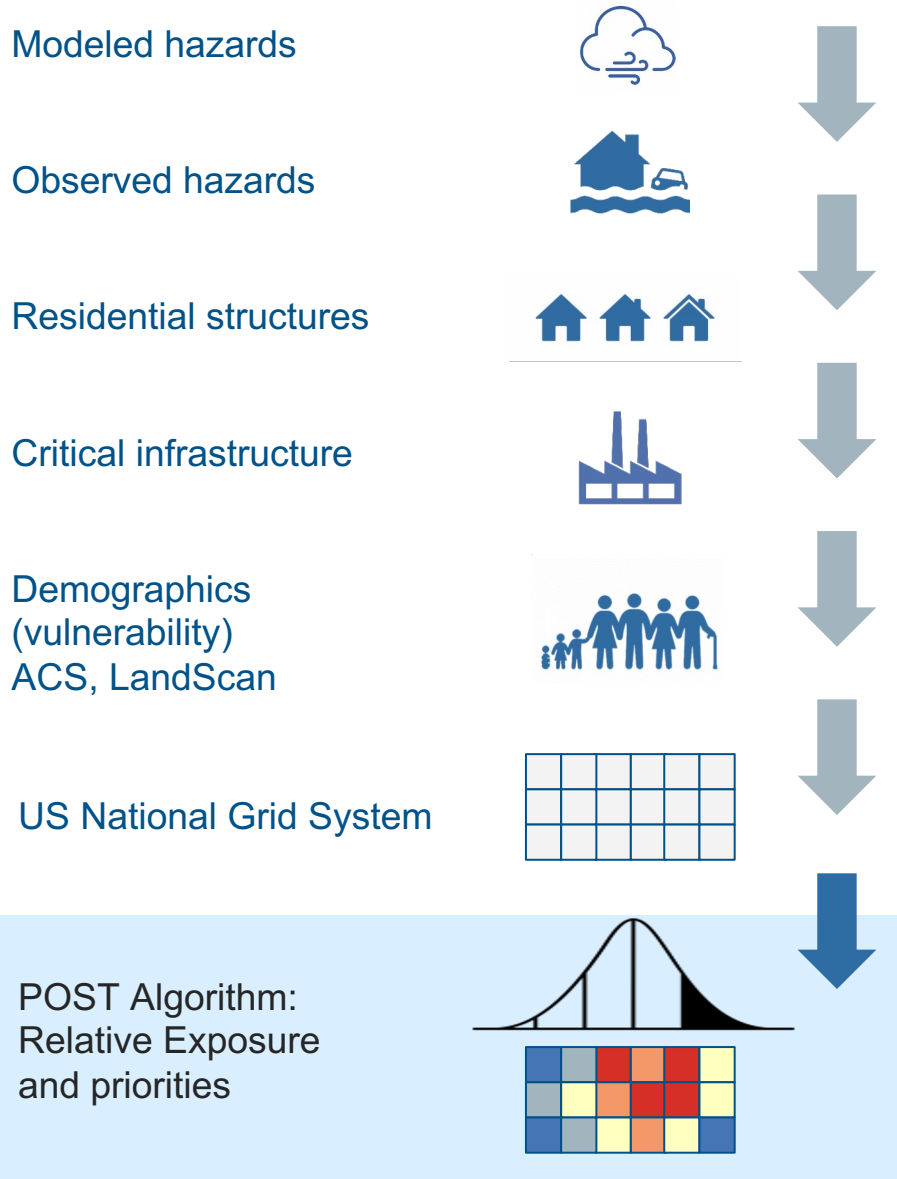
Determining Priorities: Incident Impact

Live data feeds (examples)

- EAGLE-I, U.S. DEPARTMENT OF ENERGY
- waze
- GasBuddy
- All Hazards Consortium
- IPAWS

2

Identifying impacted USNG cells

- Hazard extent
- USNG
- Impacted USNG cells

1

3 — Data aggregated / disaggregated

4 — Counts

5 — Relative impact score

TEMPO: user interface
tempo.nltmso.com

Access real-time alerts or specific incidents

🔔 24/7 Monitoring

(WOW) (IPAWS) (NIFC)

WOW (Worst of the Worst) ⌄

IPAWS Warnings ⌄

NIFC Events ⌄

Active Incidents ⌃

NRCC Activations ⌄

1 Other Incidents ⌄

🕘 Historical Incidents ⌄

● Highest Priority 1
● High Priority 2
● Medium Priority 3
● Low Priority 4
● Lowest Priority 5

POST PRIORITY LEVELS
👁 ⚙ ⤧

● Snowfall 12 hours	198
● Snowfall 24 hours	337
● Fire weather outlook	1
● Fire danger	31
● Winter weather	1

WOW PERIMETERS
👁 ⤧

WOW (Worst of the Worst) ▧

Select alert to display on map

🗺 Base Map   🌐 Region View   COUNTY BOUNDARIES
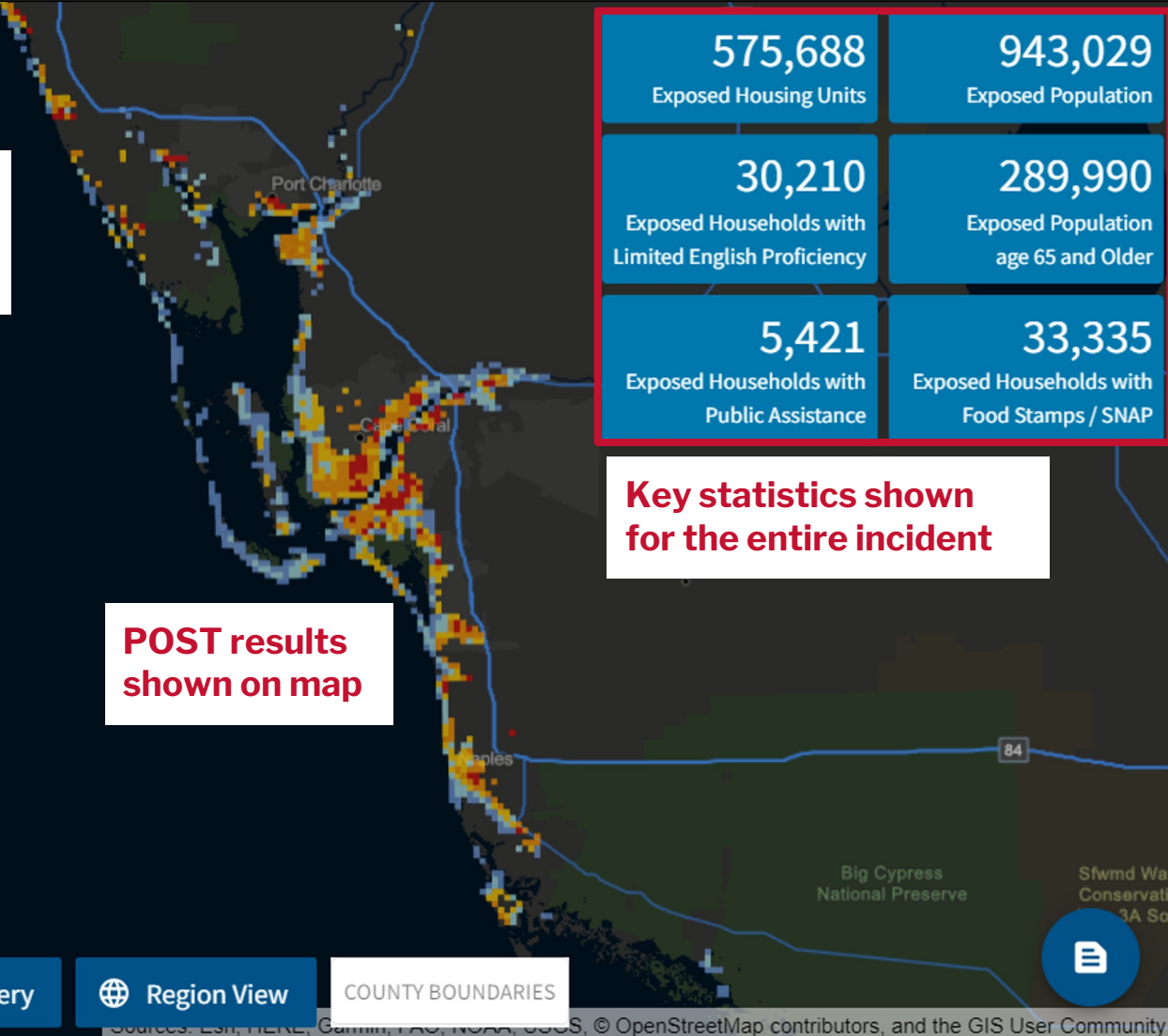
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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TEMPO: user interface
tempo.nltmso.com

POST priority grid cells calculated automatically from live alerts every 4 hours

TEMPO: user interface

Select incident exposure or impacts to display

Select from different models (track over time, varying inputs)

Key statistics shown for the entire incident

POST results shown on map

TEMPO: user interface
tempo.nltmso.com
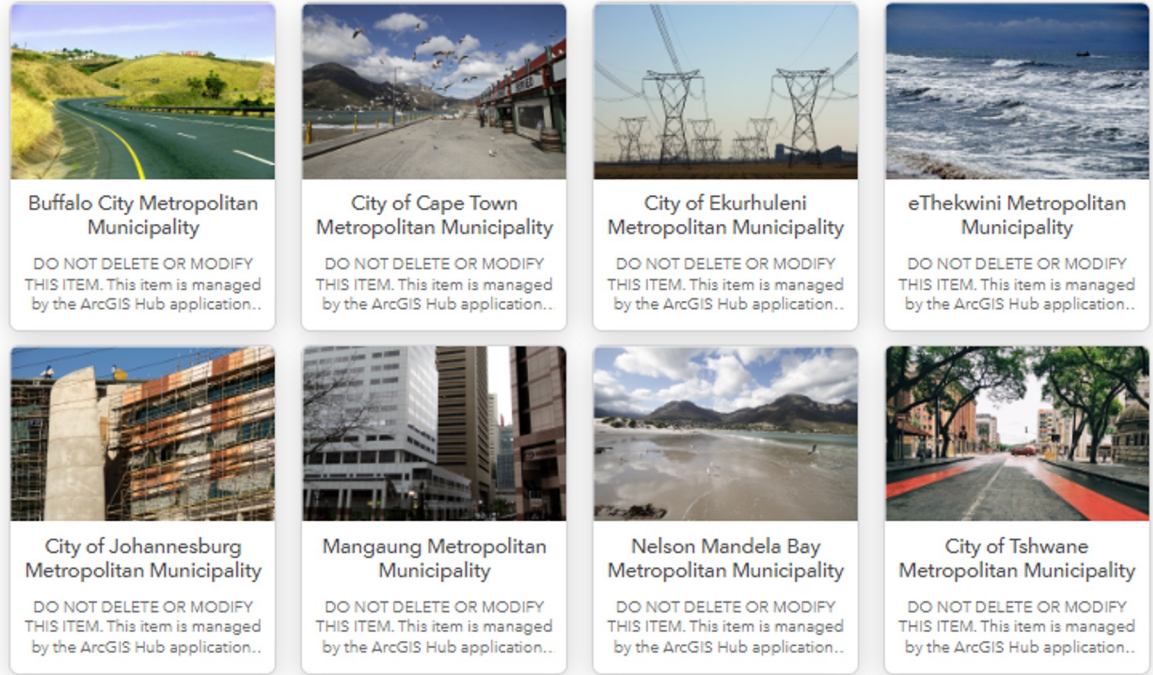
TEMPO: user interface
tempo.nltmso.com

Community lifelines based on live data feeds

City Scan Resilience Project – World Bank

The City Scan
The City Scan is a package of maps, geospatial tools, and data visualizations that together provide a rapid assessment of the critical resilience challenges that cities face. It primarily uses the best publicly available global geospatial datasets and open-source tools.

The City Scan builds dialogue and generates shared insights around a city's most pressing resilience challenges. It is designed as a conversation starter rather than a direct decision-making tool. The spatial thinking it promotes – about how urban forces affect the resilience of various local conditions, networks, and people – helps equip city officials to develop risk-informed investment proposals, identify opportunities and barriers to unlocking private capital, and prioritize and coordinate future investment

https://cityscan-nlt.hub.arcgis.com/pages/johannesburg-municipality

Risk Mitigation: https://storymaps.arcgis.com/stories/e56a283135a6450aac79f7f4e467b3cf

Climate Conditions: https://storymaps.arcgis.com/stories/42fedb2f5654448da2ba34c9833d87d8

IMPACT: An Incident Management, Prioritization, Alerting and Coordination Tool: Revolutionizing disaster management

Earthquakes. Hurricanes. Floods. Wildfires. Landslides. Tornadoes.

IMPACT. A revolutionary platform developed by New Light Technologies Inc. for **disaster management**

IMPACT. Alerting and **prioritizing** disaster and emergency management operations from a **community lens**.
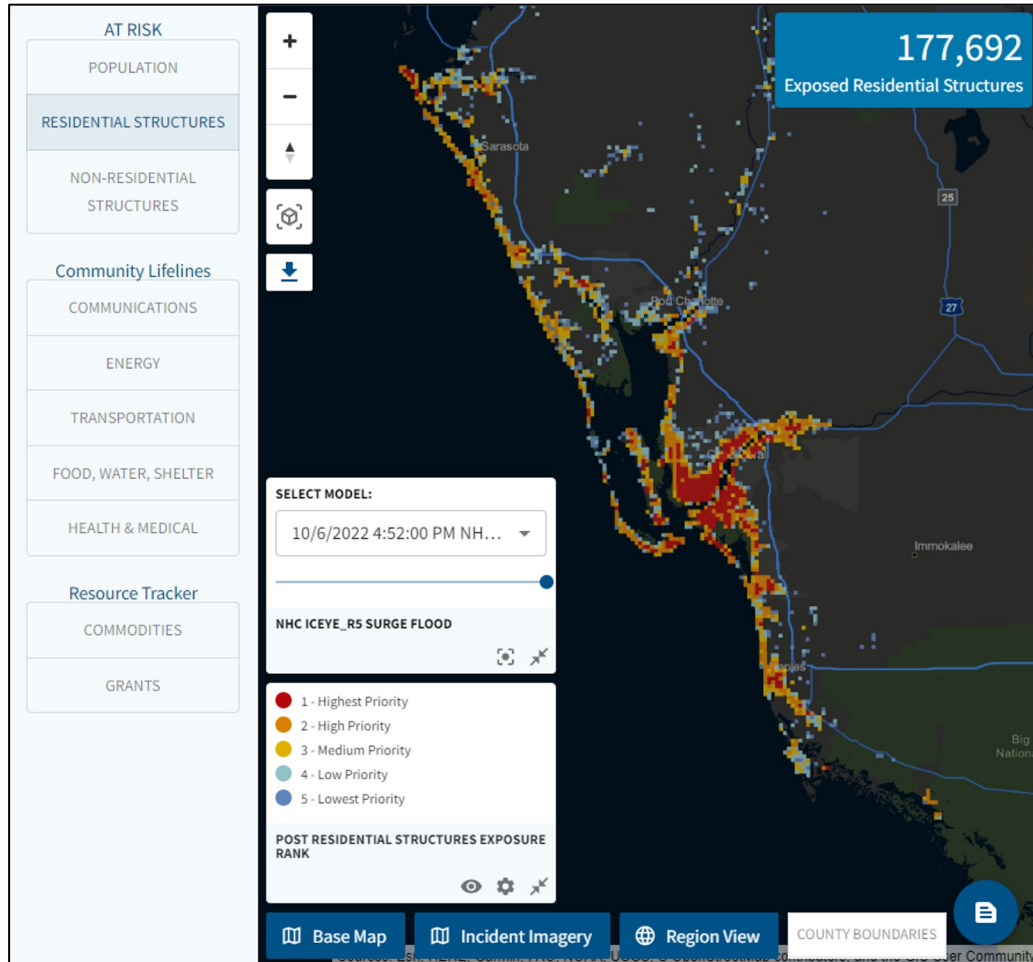
IMPACT. Prioritizing collection of satellite imagery where the most vulnerable populations are likely to be impacted.

IMPACT. Real time granular intelligence on the exposure of **vulnerable populations**, **critical infrastructure** and **community functionalities** to emerging threats.

https://disaster-impact.com/

Contact

tempo.nltmso.com

- **New Light Technologies**

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