



Flood Forecasting Initiative



Google Crisis Response

Our Mission

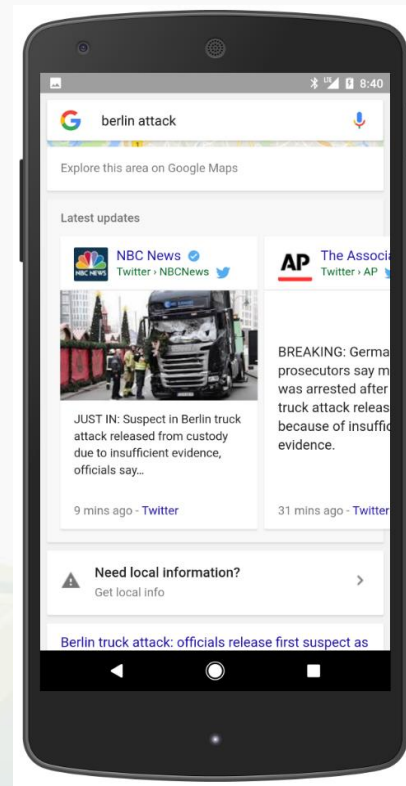
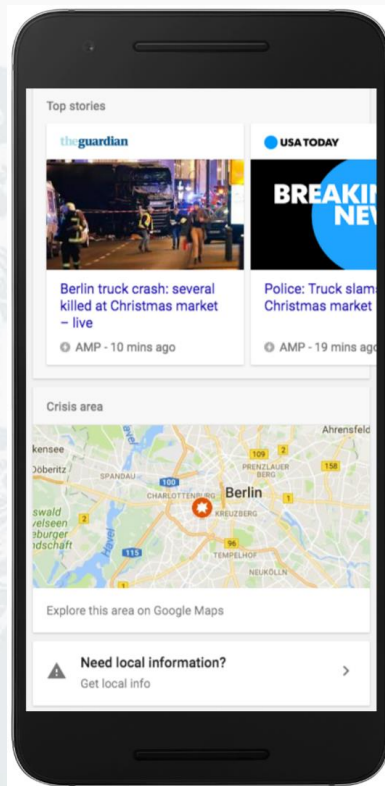
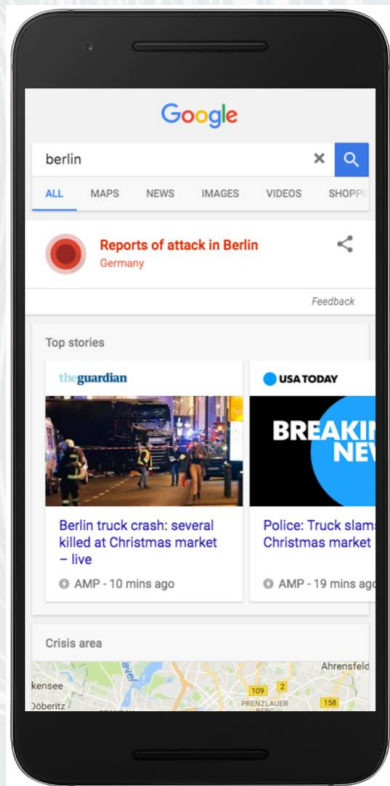
Save lives and prevent suffering with timely information.
Help everyone make better decisions in emergencies by quickly getting them credible, actionable information; enabling them to contribute and exchange information.



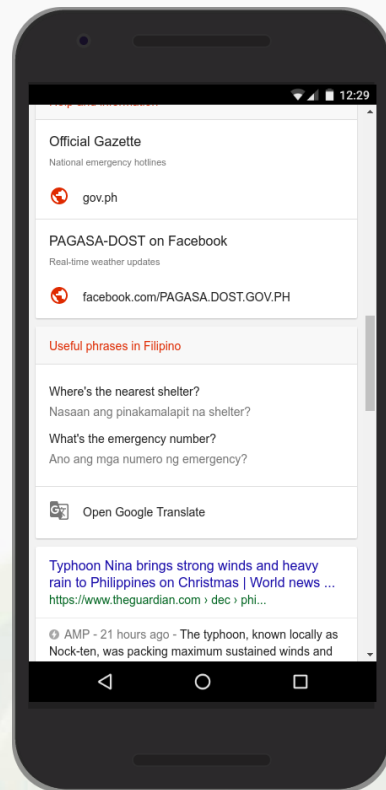
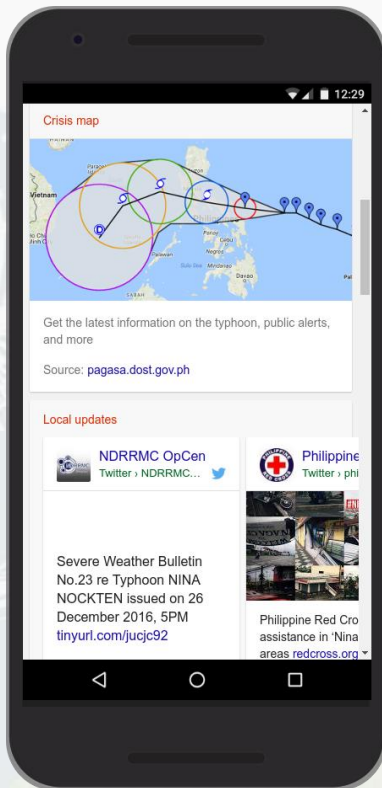
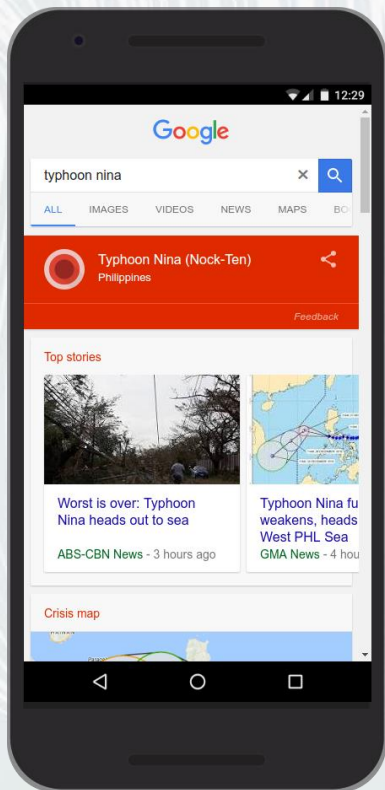
SOS Alerts - The Beginning

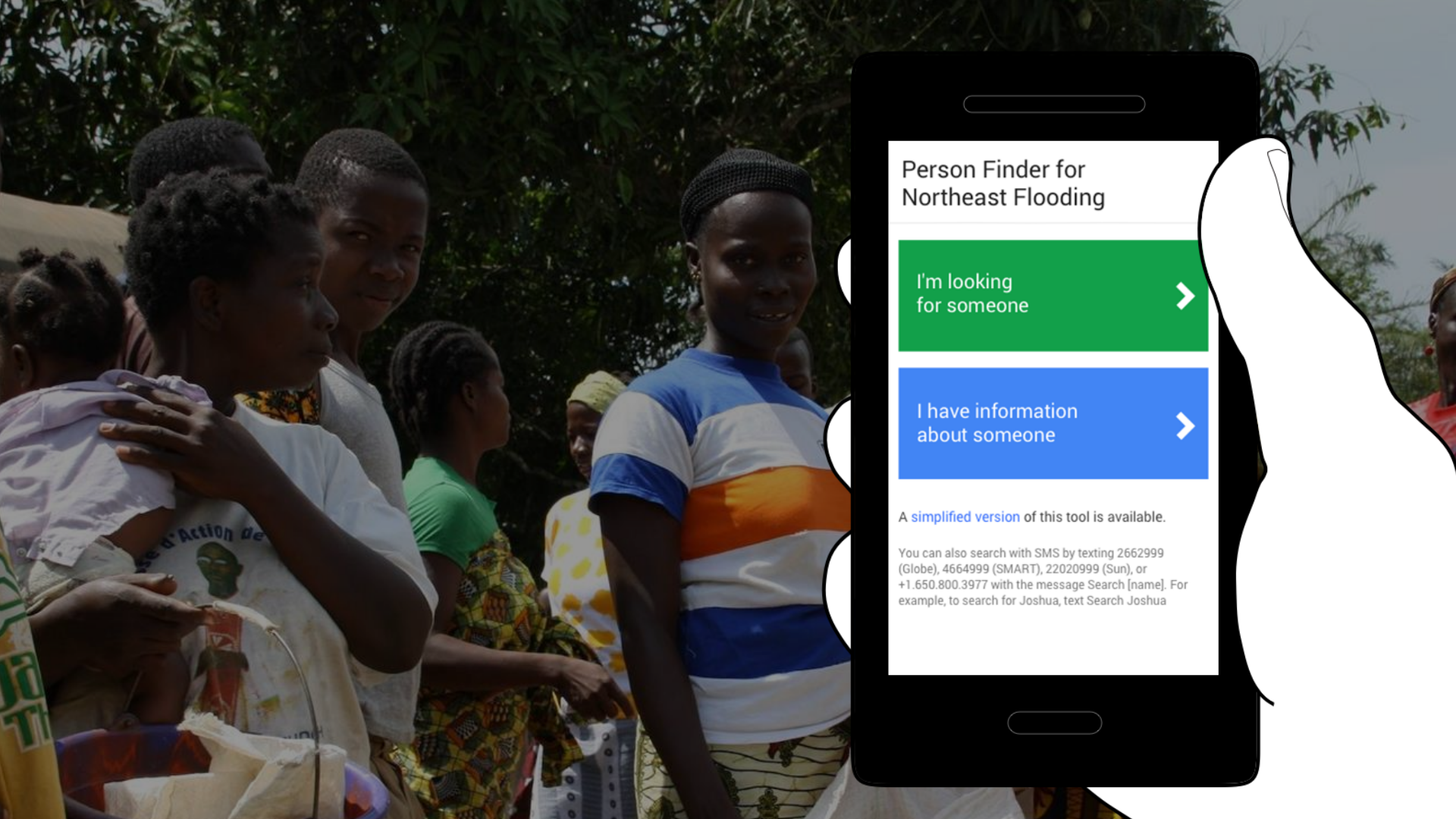


SOS Alerts - Terror Attacks



Crisis Response - Typhoons





Person Finder for Northeast Flooding

I'm looking
for someone

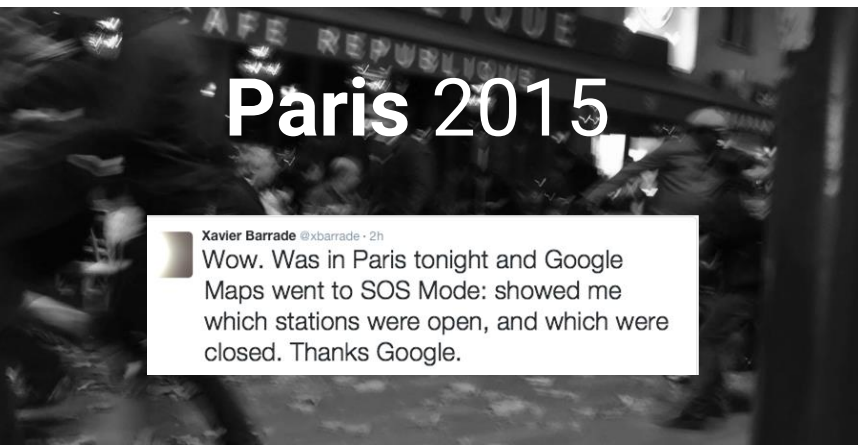
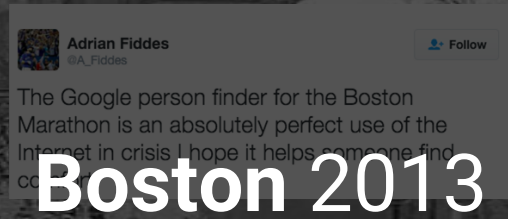
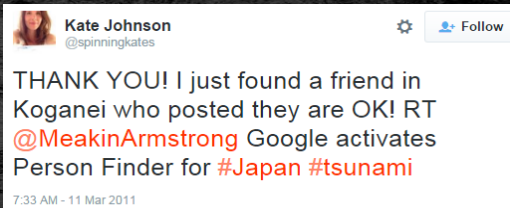
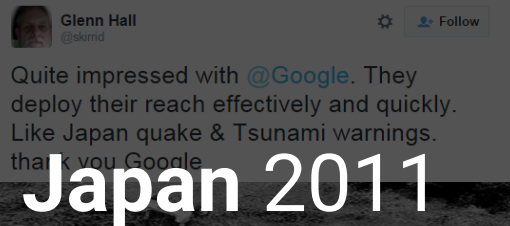
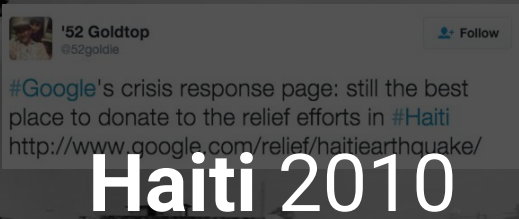


I have information
about someone



A [simplified version](#) of this tool is available.

You can also search with SMS by texting 2662999 (Globe), 4664999 (SMART), 22020999 (Sun), or +1.650.800.3977 with the message Search [name]. For example, to search for Joshua, text Search Joshua



"I was at the airport sitting right outside that terminal when it was all happening. I had no clue something this serious was happening until I used Google and found out. You saved my life."
Fort Lauderdale SOS Alert recipient,
Airport Shooting - 6th Jan, 2017

Flooding impact


- Floods are the most common and the most deadly natural disaster on the planet. They affect 250M people, and cause 7,000 fatalities and \$9.8B in economic damages **annually**
- Simple safety guidelines prior to and during a flood can prevent a substantial portion of flood fatalities
- Improving alerts for floods has the **most life-saving potential** of all interventions assessed by Google's Crisis Response team



Flooding Alerts - Current Status

- In flooding events, we provide real time warnings, updates and safety recommendations
- Currently, the warnings are based exclusively on governmental alerts. Which is a problem.



**Flash Flood Warning** for Central South Carolina
Active for next 1 hour · National Weather Service


Posted 51 minutes ago

The National Weather Service in Columbia has issued a Flash Flood Warning for: Southeastern Lincoln County in east central Georgia. Moultrie County in east central Georgia. Columbia County in east central Georgia. Southeastern McCormick County in central South Carolina. Northwestern Aiken County in central South Carolina. Southwestern Lexington County in central South Carolina. Southeastern Saluda County in central South Carolina. Edgefield County in central South Carolina.

- Until 2:30 am EDT.
- At 12:32 am EDT, Doppler radar indicated a thunderstorm producing Heavy Rain across the warned area. A line of thunderstorms will develop from the Cera to Lexington County. Very heavy rain is expected over the next couple of hours. Radar estimated 2 to 3 inches in a few areas and additional rainfall is likely. Flash Flooding is expected to begin shortly.
- Some locations that will experience flooding include: North Augusta, Lexington, Cayce, Evans, Thomson, Springdale, Batesburg, Martinez, Red Bank, Batesburg-Heesville, Edgefield, Johnston, South Congaree, Pine Ridge, Ridge Spring, Leesville, Gilbert, Dearing, Summit and Monetta.

Recommended actions

Move to higher ground now. Act quickly to protect your life. Report large hail, damaging winds or flooding to your county sheriff, also use www.facebook.com/nwscolumbia And Email cswwx@noaa.gov to relay Severe Weather Reports.



Alert area: Aiken; Edgefield; Lexington;
McCormick; Saluda

The Google Flood Forecasting Initiative

The background of the slide features a stylized illustration of a flood. On the left, there are large, white, swirling waves. On the right, there are green, rolling hills or mountains. The entire scene is set against a light blue background.

Goal: High-resolution high-accuracy flood forecasts and warnings where it matters most

The Google Flood Forecasting Initiative

- Why Google?
 - Computational resources
 - Access to global data
(Elevation, user-generated data, etc.)
 - Scalability
 - Machine learning expertise

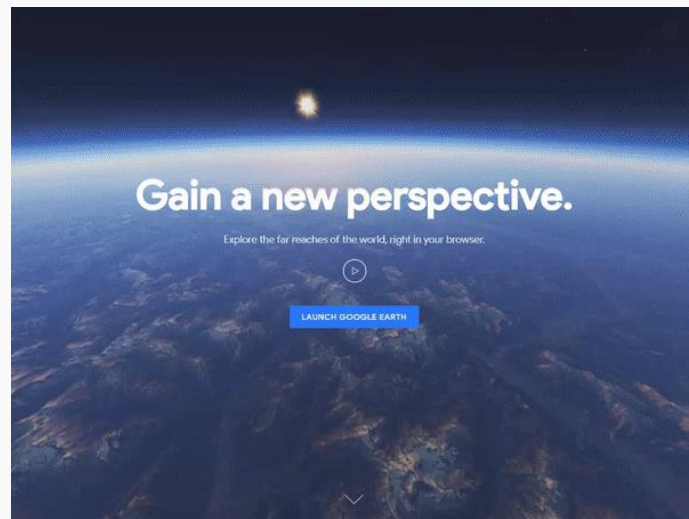
Why not (just) Google?

Hydrologic expertise

Operational expertise

Relationship with organizational consumers

We're looking for collaborators!



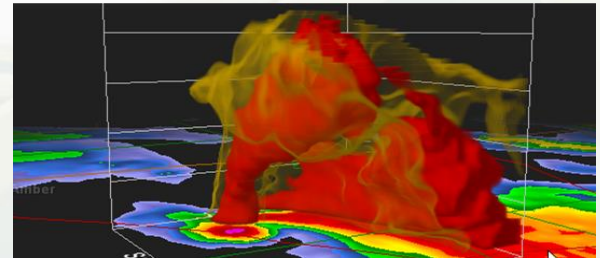
Discharge data - via Remote Estimation

- Use machine learning models to integrate information from various signals: Optical, MW, SAR and others
- Currently use Gradient Boosting Machines, but experimenting with other frameworks
- This data can (hopefully) be useful for all hydrologic models in data scarce regions, not just ours



Hydrologic Modeling - Research Directions

- Incorporating machine learning into classic physical models
- Estimating physical model parameters in ungauged basins
- Downscaling model-generated input data



Inundation Modeling

- Google has already spent many millions collecting global high-resolution elevation data
- We are currently working on implementing standard raster-based flood inundation models based on this data
- Pilot based on CWC stream gauge data





Questions?

Feel free to contact me at sellanevo@google.com