



Project started in 2013



AIDR: Artificial Intelligence for Digital Response

Qatar Computing Research Institute

Muhammad Imran (Project & Science lead)

Ferda Ofli (Computer Vision Science lead)

Firoj Alam (Postdoc)

Partners & Customers:



New York (Suffolk)
Emergency Management Dept.



Time-Critical Events and Information Gaps

Disaster event (earthquake, flood)



Urgent needs of affected people



- Food, water
- Shelter
- Medical assistance
- Donations
- Service and utilities

Information gathering,
especially in real-time, is
the most challenging part



Information gathering



Relief operations



Humanitarian organizations and local administration



OCHA



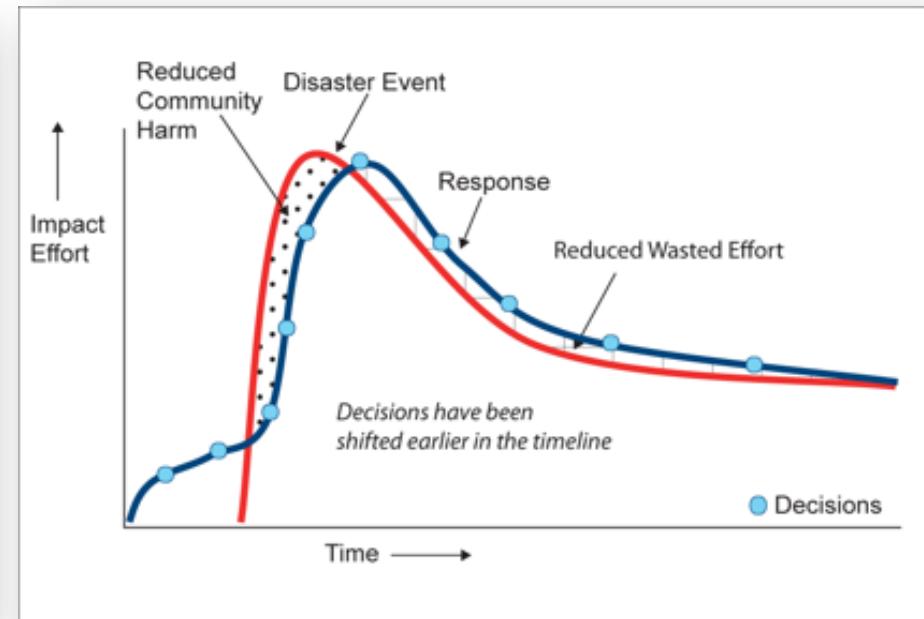
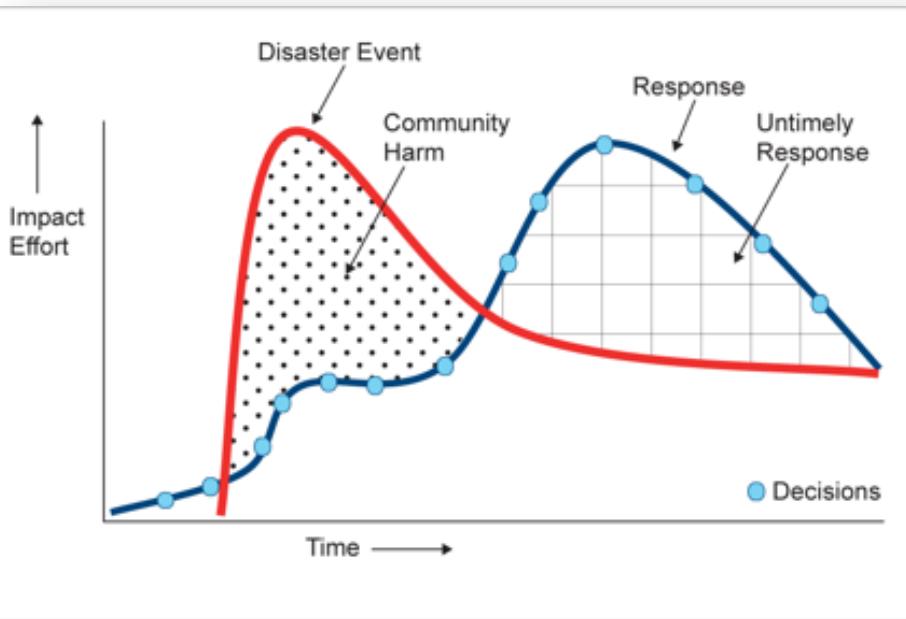
unicef



World Health Organization



Decision-making and Response

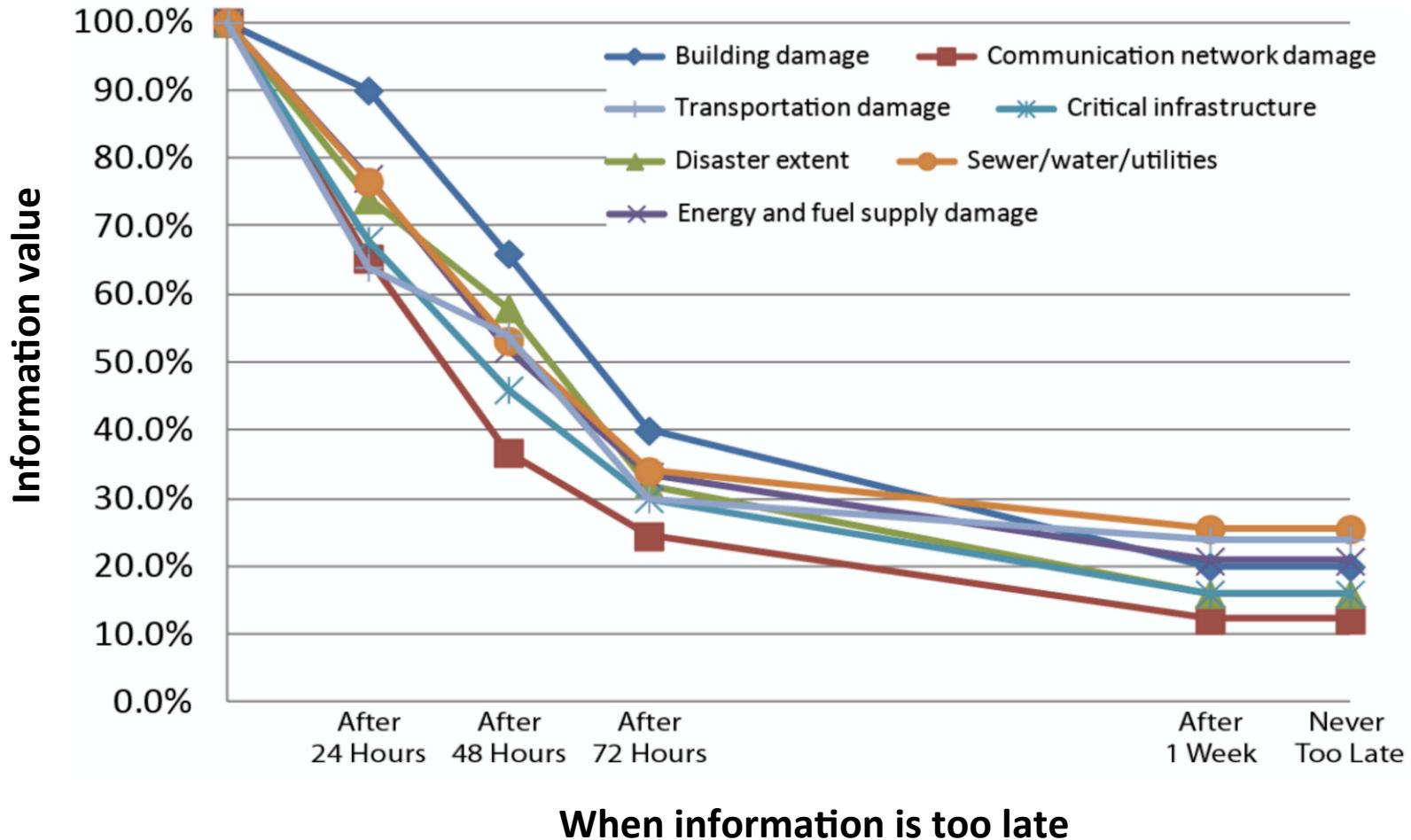


- ↓
- **Delayed decision-making**
 - **Delayed crisis response**
 - **High community harm**

Target

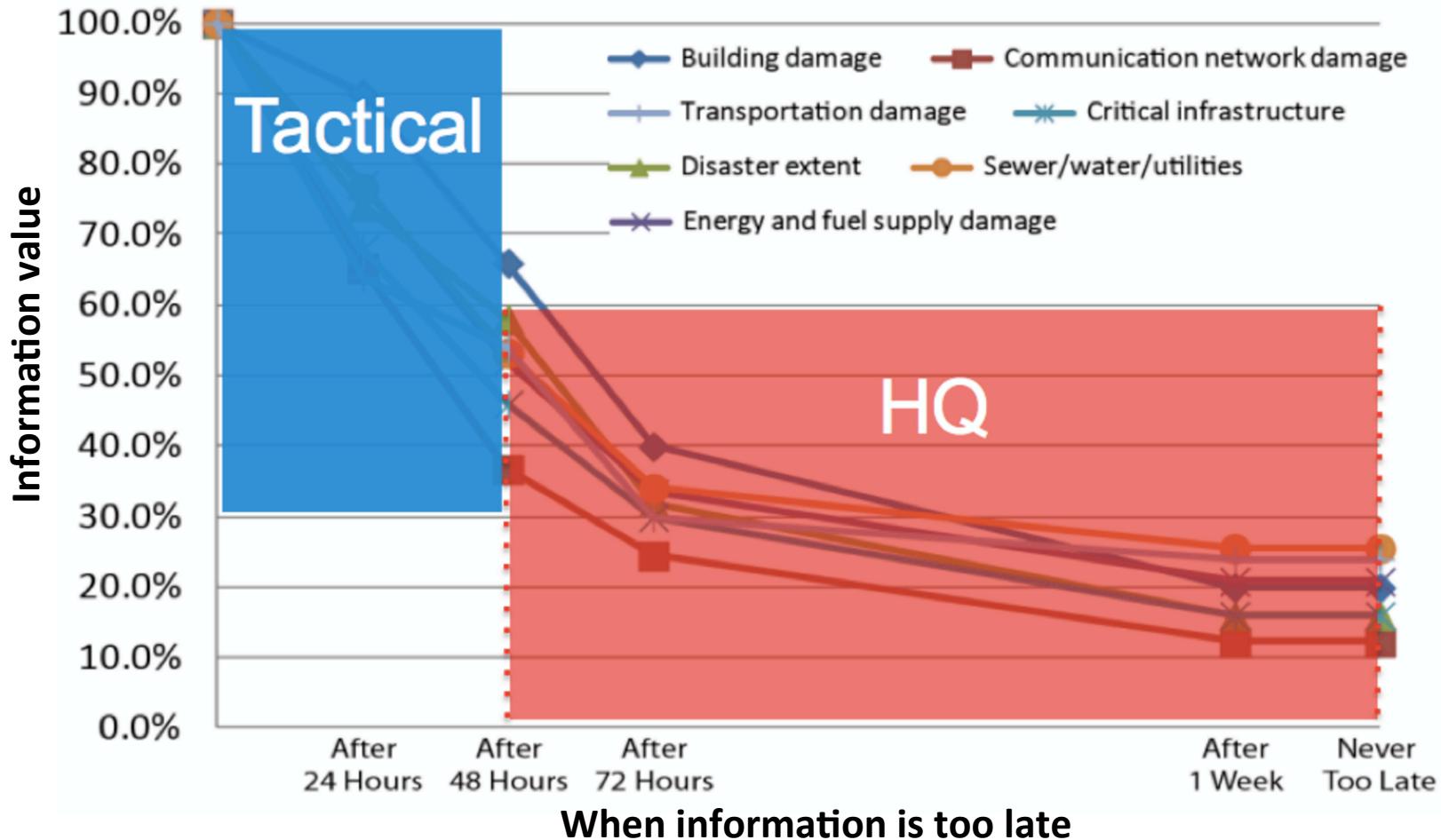
- ↓
- **Early decision-making**
 - **Rapid crisis response**
 - **Low community harm**

The Value of Timely Information



Based on FEMA large-scale survey among emergency management professionals across the US.

The Value of Timely Information



Based on FEMA large-scale survey among emergency management professionals across the US.

Current Customers and Uses



To gain situational awareness and to extract actionable information



To answer HIV/AIDS-related health questions using SMS



To find suspicious reports, road accidents, blockage, power outages etc.



To find reports of attacks and destruction of cultural heritages sites in Yemen, Syria



To develop effective solutions for disaster management



Consumes and triangulates important information for small response organizations

Typhoon Hagupit (2014)

[the guardian](#)
Winner of the Pulitzer prize

Typhoon Hagupit

Typhoon Hagupit: UN using crowdsourcing platform to help assess damage

The United Nations is working with crowdsourcing platform, MicroMappers, to assess how much destruction has been caused by the latest typhoon to hit the Philippines



 Fishermen dock their boats at Manila Bay as Typhoon Hagupit (locally known as Ruby) approaches on 7 December 2014, Pasay City, Philippines. Photograph: Mark Cristino / Barcroft Media/Mark Cristino / Barcroft Medi

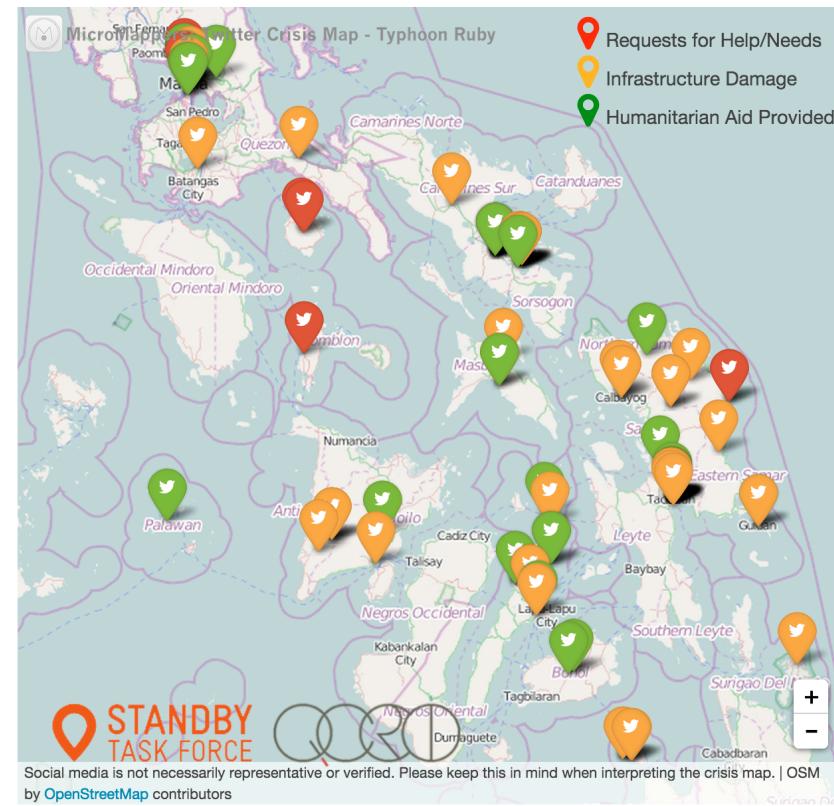
At least 27 people have been killed and a million people evacuated after Typhoon Hagupit (locally known as Ruby) made landfall in the Philippines on Saturday night. Though Hagupit appears to be weakening as it approaches the Philippines capital, Manila, it's thought to have destroyed around 80% of all the homes along some coastal areas.

Like Typhoon Haiyan, last year, technology is again being used to help identify damage and needs assessment on the ground. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) in Manila has requested support

- Killed 27 people
 - A million evacuated
 - \$114 million of damage

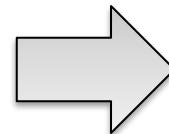
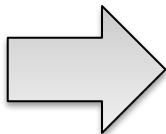


MicroMappers Map showing tweets which mention urgent needs, infrastructure damage and humanitarian aid regarding Typhoon Ruby.



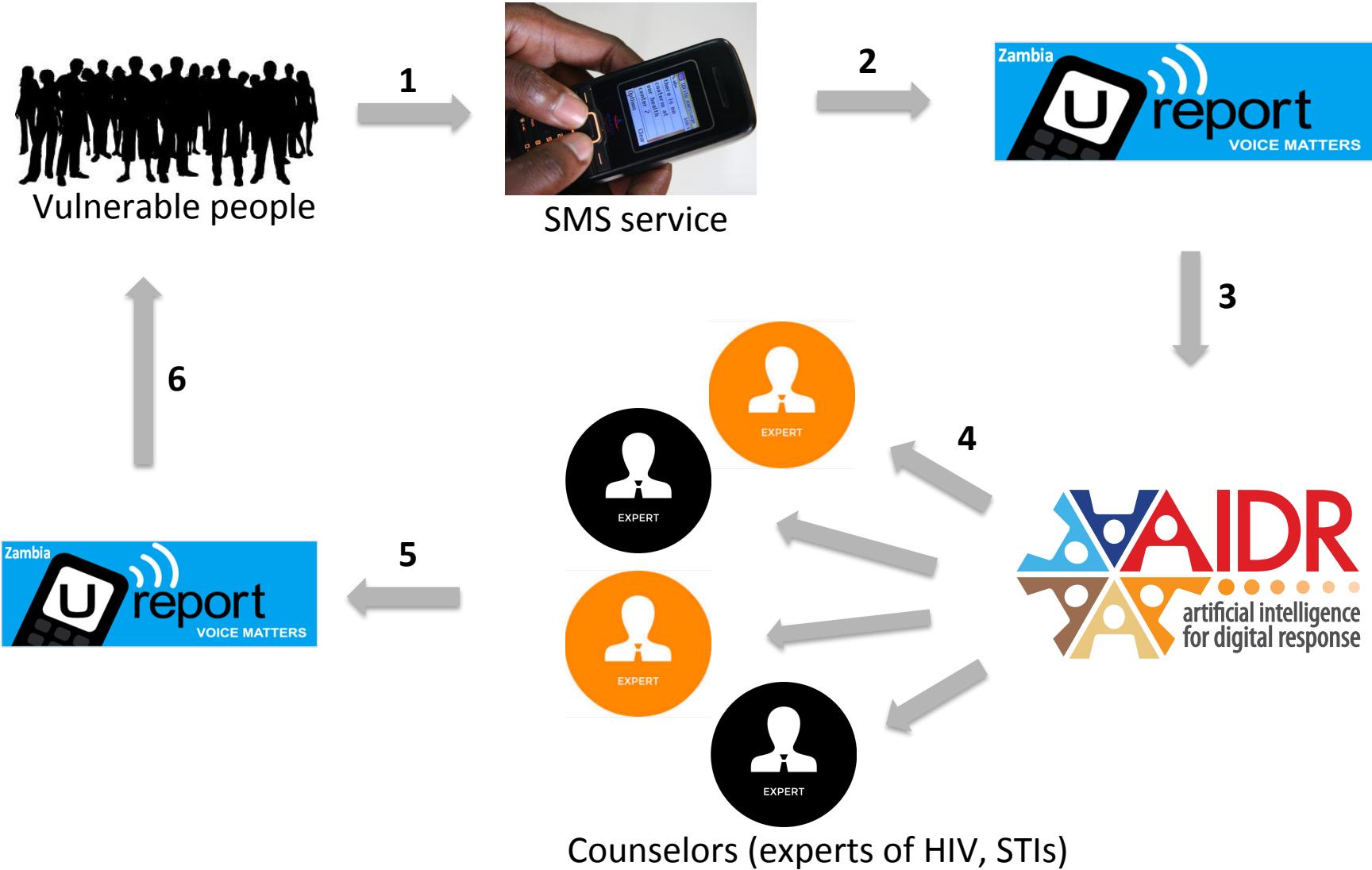
As per the ICRC's guidelines on data protection and privacy, the Tweet Map does not include any personal identifying information (PII). This PII along with the raw tweets are only shared with the United Nations.

Suffolk Marathon 2015



Task: Suspicious reports/images and accidents detection

AIDR Helps Answer Thousands of Health Queries



New Scientist Featured This Work



DAILY NEWS 4 April 2016

AI helps answer thousands of health queries in Zambia via SMS



SMS has proven an exceptionally useful technology in parts of Africa
GIANLUIGI GUERCIA/AFP/Getty Images

For many people in Zambia with health queries, sending a text message is the best way to get it answered. U-report, a free SMS-based service set up by UNICEF and run by volunteers, receives many thousands of questions a month, many specifically about [HIV and AIDS](#).

Also popular in Uganda, U-report has seen usage triple in the last three years, and about a thousand new users register every day. The volume of messages is growing so fast that the volunteers can't keep up, so UNICEF is testing software that reads and responds to many of the messages automatically.

In Zambia, there are roughly 27,000 new HIV infections a year, according to UNICEF, and 40 per cent of these are in those aged 15 to 24. With people constantly texting U-report for all kinds of HIV information and advice, the automated version [uses machine learning algorithms](#) to sort messages into eight categories: symptoms, HIV testing, treatment, pregnancy, transmission, prevention, definition, and male circumcision.

To train the system, [Patrick Meier](#), then at the Qatar Computing Research Institute in Doha, and colleagues fed in at least 50 messages for each category that had been selected by hand, and asked it to identify patterns that it could then use to do the sorting itself. As well as how to handle typos, the system learned to cope with textspeak such as "HOW 2 AVOID SPREADING HIV/AIDS 2 OTHERS?" and "I feelin bad becoz im th only one wh hs hiv wht shld i do?"

Near Real-time Processing Challenges

Goal: To find relevant and actionable information in near real-time.



Apply crowdsourcing

DATA

Apply machine learning

AIDR

Crowdsourcing + Machine Learning



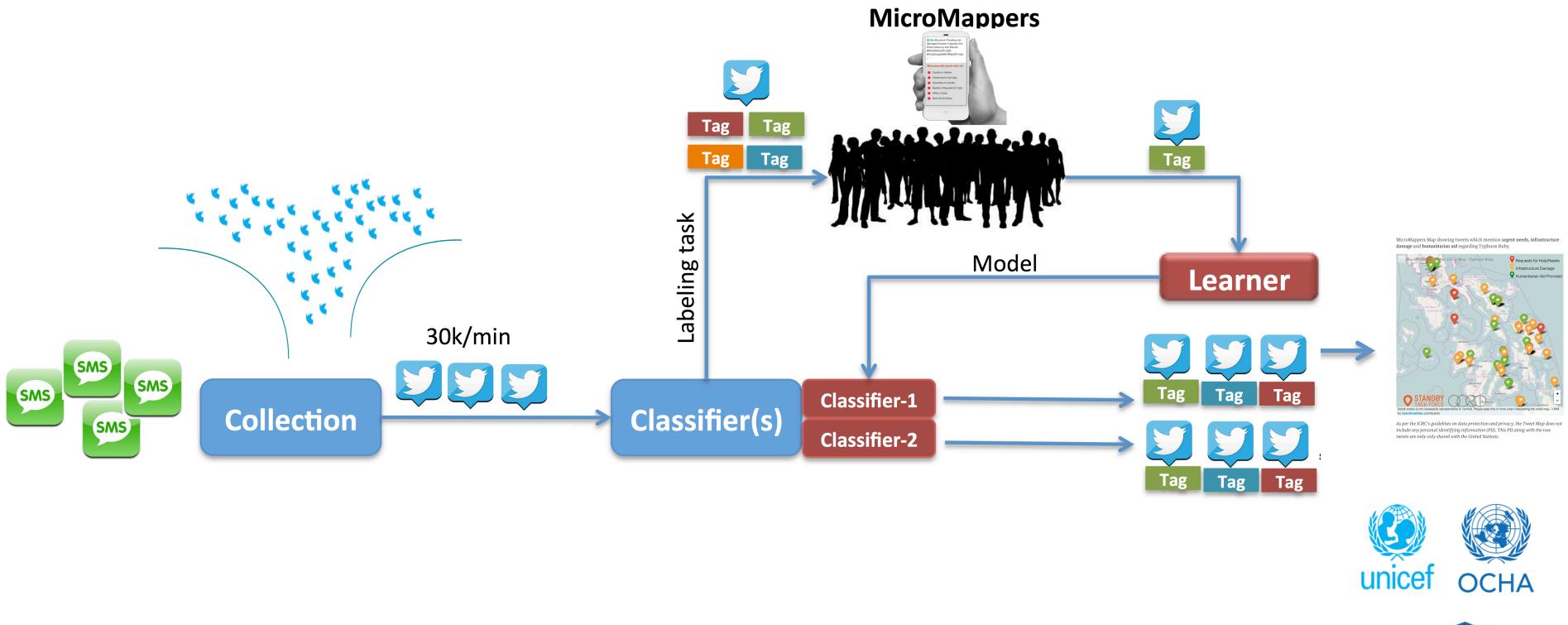
CROWDSOURCING

Filter-failure

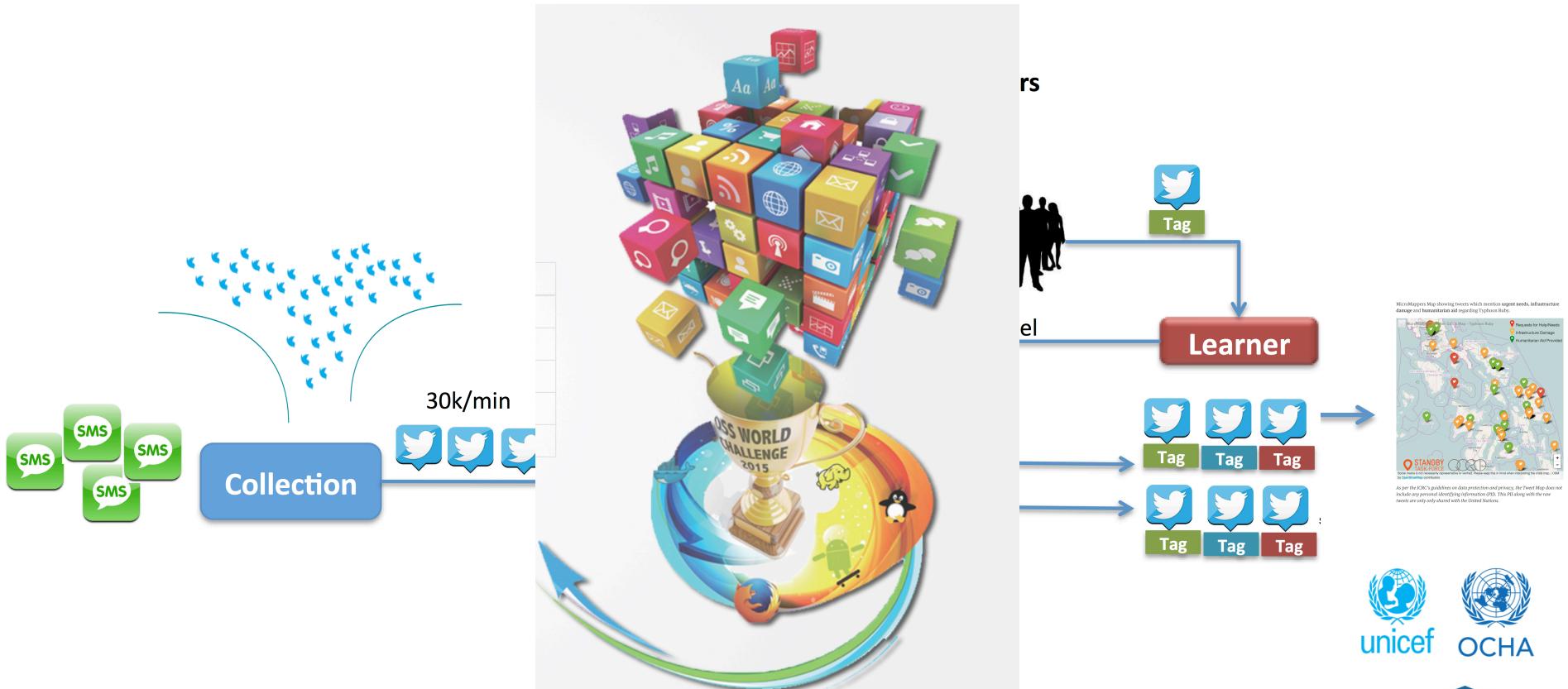


Need human-labeled examples

Real-time Classification of Social Media Data



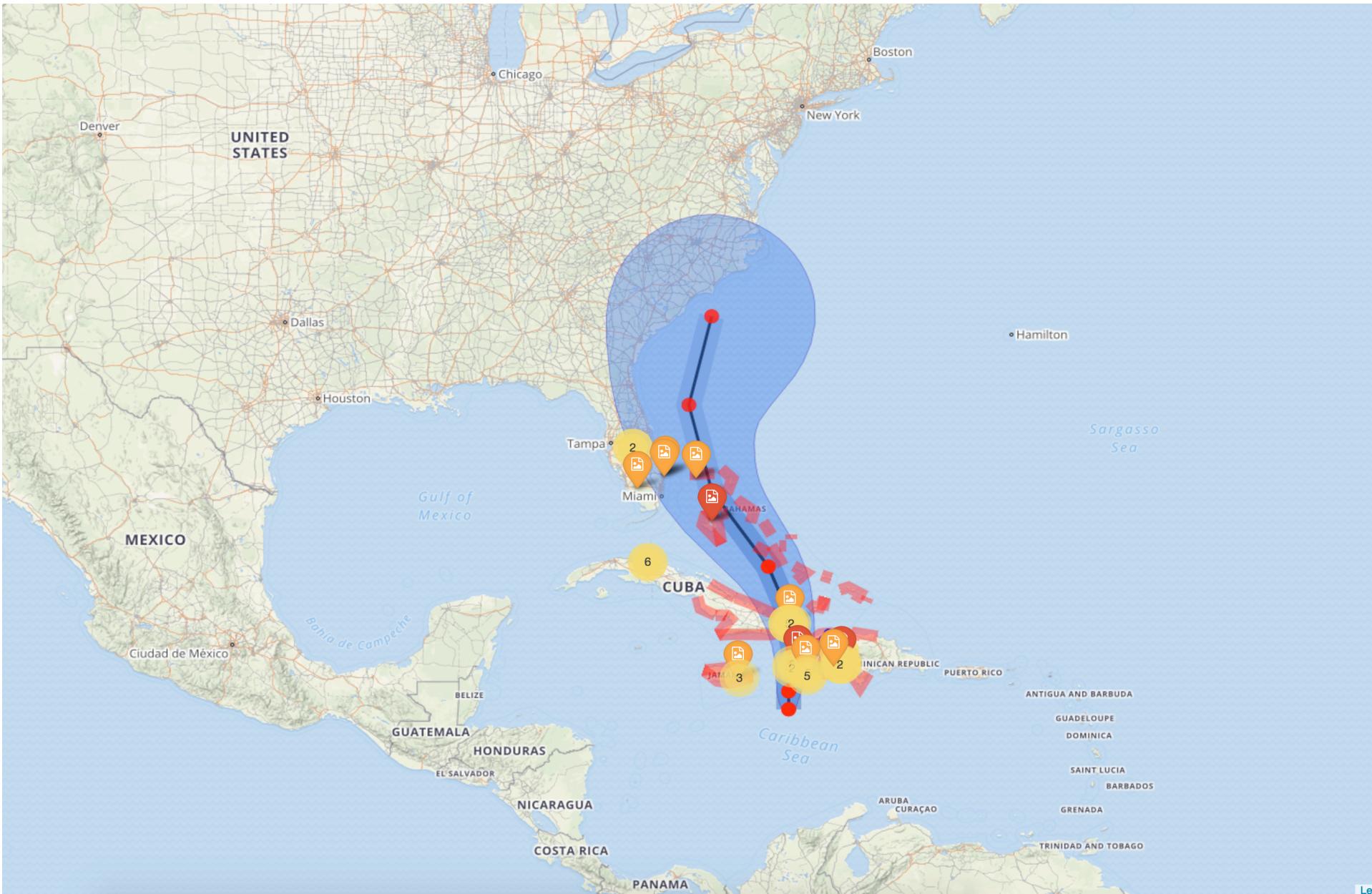
Real-time Classification of Social Media Data



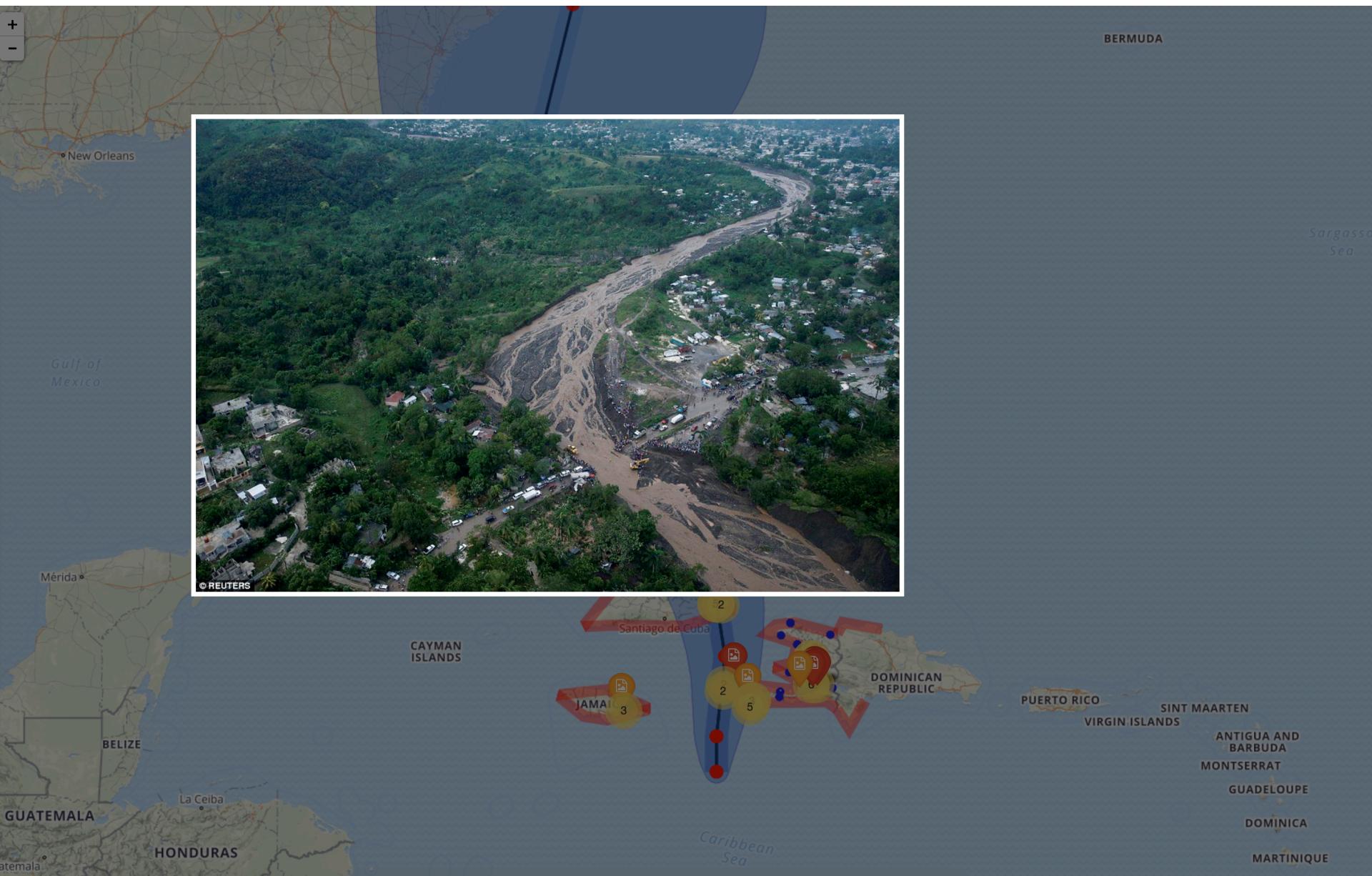
Grand Prize Winner from the Open
Source Software World Challenge 2015



Hurricane Matthew 2016



Hurricane Matthew 2016



“A picture is worth a thousand words.”

Nepal
Earthquake



Ecuador
Earthquake



Hurricane
Matthew



Damage Assessment from Images

How much damage do you see in this picture:



1

None

2

Mild

3

Severe

Relevancy Filtering



Examples of irrelevant images showing cartoons, banners, advertisements, celebrities, etc.

Blurred and unblurred



With and without text



Cropped

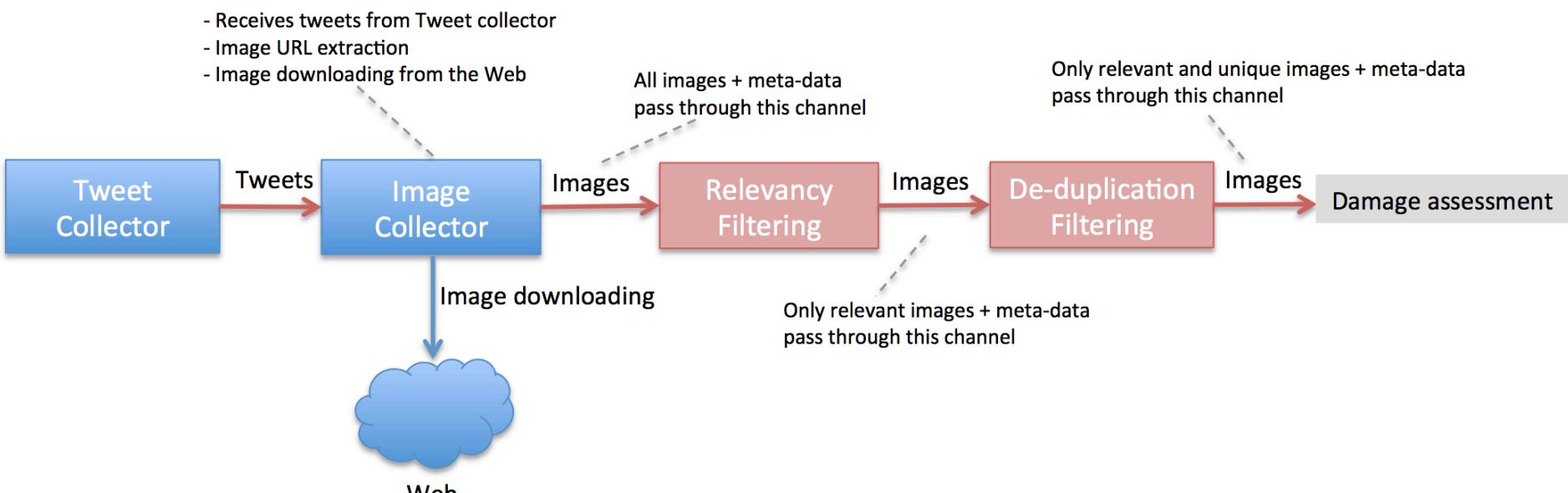


Re-sized

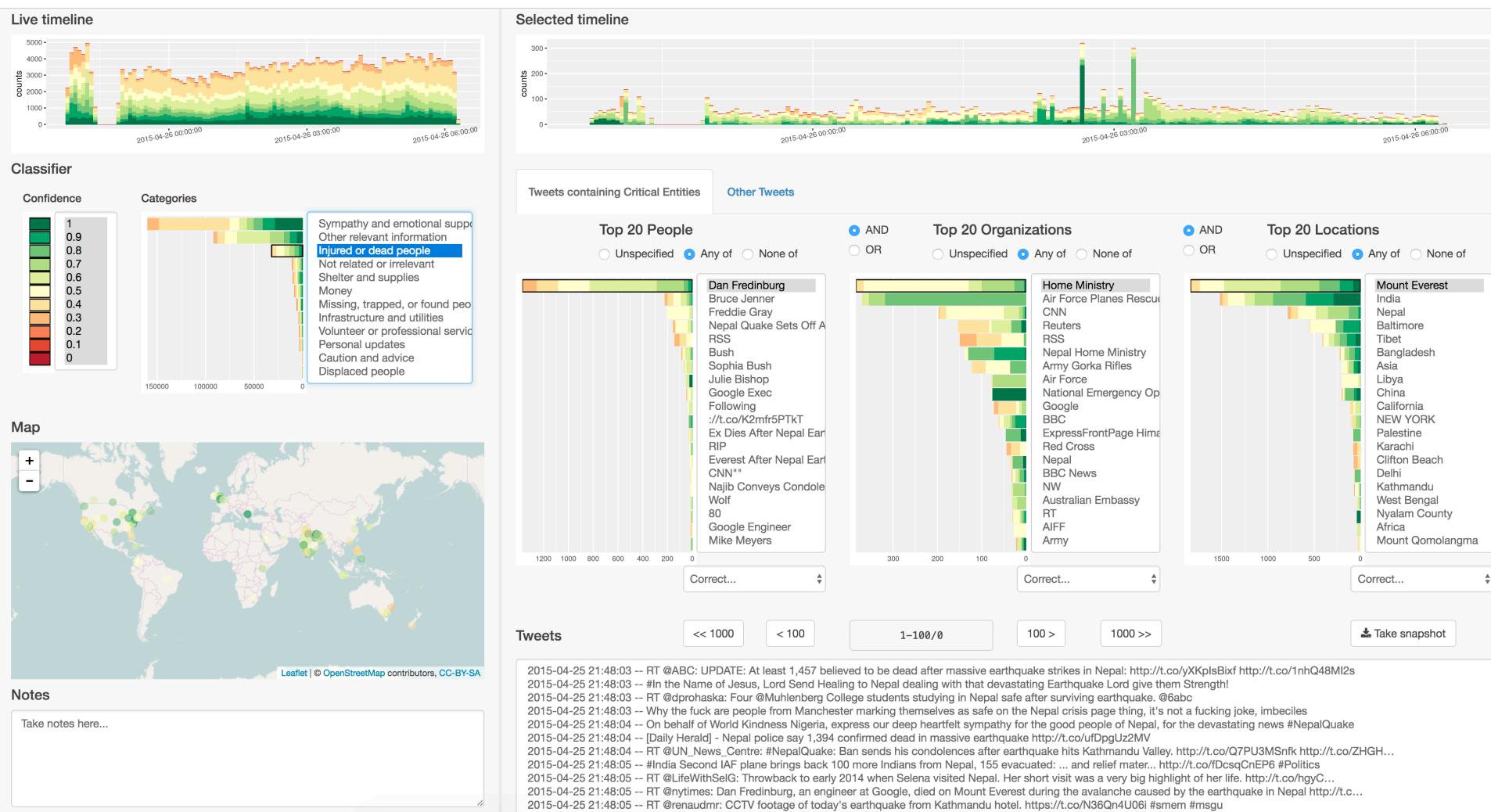


Examples of near-duplicate images

Automatic Image Processing Pipeline



Real-time Situational Awareness Using Interactive Dashboard



Media Coverage

nature Forbes



Mashable

WIRED.CO.UK

New
Scientist

THE WALL STREET JOURNAL.
WSJ

VOA
Voice of America

BROOKINGS

GULF TIMES

Qatar Tribune
First with the news and what's behind it
Nation • Business • Sports • Chill Out

The Peninsula
Local focus. Global vision.
QATAR'S DAILY NEWSPAPER

Potential Applications of AIDR

- Event monitoring and management
- Outbreaks detection, monitoring, and learning about symptoms and treatment
- Insurance claims verification
- Airplanes fault detection in real-time
- Patients to medical center assignments and prioritization

Thank you!
Q & A