

# CHANGING MINDS & SAVING LIVES

Qatar Computing Research Institute demonstrates how its crisis-development focus is seeking to promote the next generation of humanitarian-centered technologies.

**T**hese days, when we want to capture a moment in time, whether in words or pictures, most of us reach for our mobile phones. This common reflex has shaped our view of many headline-grabbing events in recent history, particularly the often-shocking images recorded in the wake of natural disasters, or even during them.

With millions of us utilizing social networks during humanitarian crises, the new challenge for aid organizations is two-fold: handling vast quantities of user-created content in real-time and correctly parsing through such information to pinpoint credible data for crisis responses.

Humanitarian technology is the field of research committed to applications of social computing and big data analytics to better inform humanitarian responses and the international development community at large.

Dr Patrick Meier, Director of Social Innovation at Qatar Computing Research Institute (QCRI), is the world's foremost expert on humanitarian technology. Prior to QCRI, Dr Meier co-founded and co-directed the Harvard Humanitarian Initiative's Program on Crisis Mapping and Early Warning, and is the co-founder of the

CrisisMappers Network.

"All of the projects that I work on at QCRI are projects that are intended to have high social impact," says Dr Meier. "Right now, the social impact that we're looking at is in a humanitarian context. My role is to identify the major challenges from this angle and then see whether solutions that come from advanced computing can be customized to solve them.

"The idea is that at QCRI we go after the biggest challenges, those which other institutes or organizations don't have the resources or expertise to tackle. The two major problems that exist in the humanitarian context are the big-data-crisis challenge and what I call the 'big credible data' challenge."

As more and more of us share our experiences through social-media platforms, humanitarian groups are facing an increasingly overwhelming task – finding credible and vital information in the huge volumes of data that are now so big that they are beyond the means and expertise of organizations to parse.

"Humanitarian organizations are facing more and more data sets that are becoming impossible to manage, and they're completely unprepared," says Dr Meier.

"When you think of Hurricane Sandy, there were more

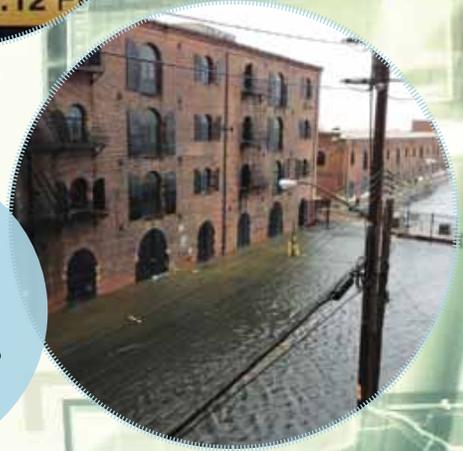
## FAKE

During Hurricane Sandy, representations from disaster movies were falsely posted as genuine shots from New York.



## REAL

Genuine images of the devastation went viral, though fake images also gained traction online.



## FAKE

Though some fake shots were based on human error, others contained inserted elements, such as this shark.



## REAL

This viral image captures the devastation that sea water floods caused to the Ground Zero construction site in Manhattan.



**The accuracy of information, particularly that supplied by members of the public via social media, needs to be authenticated quickly to prevent the risk of hoaxes spreading.**



**Dr Carlos Castillo, Senior Scientist at QCRI (left), working closely with Dr Patrick Meier, Director of Social Innovation.**

than 20 million tweets sent during that week. For the earthquake and tsunami in Japan the year before, at one point there were 2,000 related tweets being sent per second; humanitarian organizations can't handle 2,000 tweets per day.

"That creates a huge data challenge, and there are at least two ways that I have learned we can address this – human computing and artificial intelligence.

"How do you program algorithms to find the information that you're looking for in real-time? One of the things that we've been able to do at QCRI is automatically identify tweets that are cries for help, so that we can pass that information to aid organizations."

One of the most exciting platforms being developed at QCRI is Veri.ly, a partnership with the Masdar Institute of Science and Technology that applies best practices in time-critical crowd-sourcing for natural-disaster responses.

As Dr Carlos Castillo, Senior Scientist at QCRI, explains, such developments are needed to bridge the gap between social-media users and humanitarian organizations, many of which don't see any value in participating on social-media platforms.

"The first step is to convince those who are not participants in social media that they provide a huge amount of valuable

information during disasters, and that this information is helpful," says Dr Castillo.

"In the case of Hurricane Sandy, there were literally millions of messages that were related to the disaster, and most of them were sent by well-intentioned people who wanted to help. The information that they provided cannot be substituted; it is unique. These people are there before the journalists, the military, and the response teams."

Bridging such a gap is a challenge that Dr Meier knows only too well, and it is the main driver of his work at QCRI.

"Most humanitarians are not on Twitter,

“Information is the most perishable commodity, even more than food and water. After a few hours, information is rotten and no longer useful.”

and they believe that most people get on Twitter to tweet about their breakfasts," he says.

"So we have been doing some rigorous, empirical social-science research that is data-driven to demonstrate that, in some examples, as much as 65 percent of tweets sent during a disaster were actually informative. We need to quantify the opportunity cost to them of not getting on board and using this data."

As Dr Castillo explains, his role is the "first line of defense" tasked with filtering the data before it reaches the humanitarian community.

"If you were to look at a Twitter timeline at any time you would find it flooded with irrelevant information," he says.

"We place computational methods in front of these timelines, and the first line of defense are computer algorithms that group data into themes and filter out what is irrelevant.

"The second line of defence is when humans enter the process. Their work is to categorize the data and see what is accurate."

**While Dr Castillo** and Dr Meier are developing innovative solutions at QCRI, they accept that unless and until the solutions become part of government

policy, there is a limit to what they can achieve.

He cited the situation in November 2012, when the government of the Philippines used Twitter during disasters, and they even created two different hashtags for people to report information via Twitter.

Says Dr Meier: "That's enlightened leadership, and if you do that you will get more and more information. That is the first government that I am aware of to promote the active use of Twitter as a form of crisis communication."

Meanwhile, past experience shows that skepticism of today's social-media platforms compared with traditional forms of communication could be misplaced.

"If calling 999 or 911 in an emergency was never advertised, they would get no calls, yet they have become policy," says Dr Meier. "The British were the first to invent the idea of a national emergency hotline 75 years ago, and now that's got to trickle down to different media channels.

"Only 25 percent of 999 calls in the UK are actually genuine. A clear majority are hoaxes. In New York City, more than 10 million 911 calls received each year are hoaxes. I'm fine with humanitarians blasting social media, but the alternative is not perfect, either."

**Listening to Dr Meier** and Dr Castillo, it is clear that their wish to advance the viability of next-generation solutions during humanitarian crises is a call to action, not just to the humanitarian community but to the brightest minds in advanced computing.

"We want people to realize that QCRI is not only a world-class institute that conducts cutting-edge research in multiple areas of advanced computing, but that we also have a humanitarian crisis-development focus," says Dr Meier.

"The fact is, the humanitarian sector has nothing like QCRI. There are no other think-tanks or computer-research institutes that have such a dedicated focus and mission to be the R&D arm of advanced computing for humanitarian institutions.

"We have the resources here in Qatar that simply do not exist in other places, and in terms of humanitarian innovation, we need to be able to experiment. Having never been part of a computing institute before, it is a luxury for us to be able to experiment and possibly fail, but learn



and fail forward to keep moving forward. "We're just getting started in this idea of next-generation humanitarian technologies. We're talking about the concepts, we're blogging, we're doing the R&D, and now we're doing the prototyping. Until we complete that prototyping, and see if the baby can swim, we won't be able to change too many minds during the R&D process.

"Once proofs of concepts from QCRI are out there, the humanitarian community simply won't be able to ignore them."

**The Red Balloon challenge tested the value of information from social media.**



## FINDING A SOLUTION

The 'needle in a haystack' problem can be solved through human computing, with perhaps the most cited example of crowd-sourced results coming from the 2009 'DARPA (Defense Advanced Research Projects Agency) Network Challenge', a prize competition in which teams had to locate 10 red balloons situated somewhere across the United States through the use of real-time communication in the form of social media.

Teams had to deal with false submissions and validate balloon sightings. The contest was won in nine hours, which was much less time than DARPA had expected.

"The 'Red Balloon' challenge is an example of time-critical mobilization of the crowd in order to carry out a well-defined task," says Dr Meier.

"We don't have the same luxuries

during natural disasters, because information is the most perishable commodity, even more than food and water. After a few hours that information is rotten and no longer useful.

"So we're looking at different ways to not only accelerate the means to test the quality of such information, but also to verify it. DARPA developed an interesting methodology around their challenge, which we think can be replicated within a humanitarian context."

Dr Castillo adds: "All of the crowd-sourcing technology systems that exist right now are very preliminary, so this is all in the early stages. We call it crowd-sourcing now, but maybe in 10 years we will just call it 'work'."