TRANSCRIPT EPISODE 1

Even Big Data Starts Small

A. UNDERWRITER ANNOUNCE 00:15

Announcer, over music:

"THE CROWD & THE CLOUD" is made possible by NSF, the National Science Foundation, Where Discoveries Begin."

1. TEASE
THIS IS …*TODAY'S* CITIZEN SCIENCE…
PEOPLE PURSUING THEIR PASSIONS…
…AND AT THE SAME TIME GENERATING DATA THAT'S USEFUL FOR RESEARCH.

Stephanie Mumma, Smartfin:
I love surfing, I love science, and I get to go surfing for science.

Chris, CLO:
Technology is a way to really get people outside and to look more carefully at the natural world.
THERE ARE NOW MORE MOBILE PHONES ON EARTH THAN PEOPLE ON OUR PLANET.
AND NEW TECHNOLOGIES CAN HELP SOLVE MAJOR CHALLENGES.

Talip Kilic:
Every single data point has a human story.
NOW COMMUNITIES CAN *USE* SCIENCE TO TACKLE LOCAL PROBLEMS.

Deb Thomas:
The state doesn't come out and say, "You gotta clean this up", so we started on the Bucket Brigade.

THEY'RE LINKING *SENSORS* AND *CITIZENS* TO FIND *SOLUTIONS*…

Cassandra Martin:
I'm learning about toxins, I'm learning how to teach other people to do what I do. So they can do it for themselves.

Dawn Sirek:
Asthma is a lonely disease. The Propeller sensors are going to revolutionize asthma treatment.

COLLABORATING VIA *THE CLOUD*, *THE CROWD* CAN SAVE TIME …SAVE MONEY …AND SAVE LIVES.
WE'RE SURELY …"SMARTER TOGETHER."
I'M WALEED ABDALATI, HOST OF "THE CROWD & THE CLOUD."
I'VE STUDIED EARTH'S ICE SHEETS FROM SATELLITES AND AIRCRAFT…
…AND I WAS NASA CHIEF SCIENTIST AT THE TIME WHEN "CURIOSITY" LANDED ON MARS.
SO I KNOW BIG DATA AND BIG SCIENCE.
BUT I'M ALSO CONVINCED THAT *CITIZEN-GENERATED* DATA HAS AN IMPORTANT ROLE.
NO LONGER IS "SCIENCE" SOMETHING ONLY DONE BY PROFESSIONALS IN LABS.
NO MORE IS "DATA" JUST THE PROPERTY OF CORPORATIONS AND GOVERNMENT.

Waleed on camera:
For years you've watched science on public television.

Now you're invited to DO science!

B. SERIES & EPISODE TITLE (00:30)
1. Even Big Data Starts Small

Waleed on location, CU Boulder:
So, who's the crowd?
Well, that's you, me, all of us…
SOME ARE PASSIONATE SPORTS-MEN AND WOMEN, OUT IN NATURE…
…AND WORKING TO KEEP IT PRISTINE…
OTHERS ARE VOLUNTEERS ON THE JERSEY SHORE, SURVEYING HORSESHOE CRABS …AND COLLECTING IMPORTANT DATA THAT SHAPES CONSERVATION POLICIES.

Waleed to camera:
What's "the cloud"?
THAT'S SHORTHAND FOR OUR CONNECTED WORLD, ALL THE DATA WE SHARE WHEN WE UPLOAD INFORMATION…
…AND THE DIGITAL TRACES WE LEAVE BEHIND, WHEN WE USE OUR MOBILE PHONES TO COMMUNICATE, CHECK TRAFFIC, TAKE PHOTOS, OR PASS THE TIME WITH GAMES.
Put the crowd *together with the* cloud *and you're living in a new world with some incredible opportunities…*
This program is called EVEN BIG DATA STARTS SMALL. We're looking at how individuals*, regular people, can contribute to some pretty important activities, like alerting neighbors to flash floods, or helping people far away recover from disaster.*
We call this "citizen science" but those two words cover a very broad range of activities.
AUDUBON'S "CHRISTMAS BIRD COUNT" STARTED IN 1900.
NOW TENS OF THOUSANDS PARTICIPATE EACH YEAR, SHARING SPECIES NUMBERS VIA APPS AND THE WEB.
I SAW THIS FIRST-HAND IN THE FLORIDA EVERGLADES.
AND THAT BIRD COUNT DATA REVEALS TRENDS IN CLIMATE OVER TIME.

L3:
Jose Barros:
It's data that has been available to the scientific community, which has been consistent for many, many years.

SOME PROJECTS ARE RECENT START-UPS.
SMARTFIN PUTS SENSORS ON SURFBOARDS TO CAPTURE TEMPERATURE AND OCEAN ACIDIFICATION DATA IN TURBULENT NEAR-SHORE WAVES.

L3
Benjamin Thompson
The data will move from the fin, to the phone, and then from the phone to our servers. And then you have a surfer hitting a few buttons has done legitimate science.

THEN THERE'S "*CROWD-SOURCING*."
…WE'LL SEE HOW THE CROWD CAN MAP *CITIES* AFTER AN EARTHQUAKE…
…AND MAP *BLOOD VESSELS* IN LIVING BRAINS, SEARCHING FOR A CURE FOR ALZHEIMER'S.
These kinds of projects speed up *research by putting more eyes on issues,* cutting the time *to make discoveries.*

Text over graphics:
CrowdAndCloud.org/EvenBigData

LOOK FOR URLS INDICATING WHERE TO FIND MORE INFORMATION ON OUR WEBSITE.
1. COCORAHS

Waleed intro: open with mountains bgd:
Waleed to camera:
In 1997 a tragic flood struck here in the Foothills of the Colorado Rockies.
Waleed CU:
And no one saw it coming.
Stops walking and speaks direct to camera:
Waleed VO:
BUT ONE MAN HAD THE IDEA TO ENLIST CITIZEN SCIENTISTS IN WHAT'S BECOME AN ARMY OF WEATHER WATCHERS…
On camera:
…to help reduce the risks of this ever happening again.
To drone shot of Nolan walking to rock above Fort Collins.
Play on footage and sound: text super

"CoCoRaHS"

Volunteers vs. Extreme Weather

L3
NOLAN DOESKEN
Colorado State Climatologist
Nolan:
Where we're seated here today is very close to where a very, very, very heavy, localized storm occurred back in 1997.
Map showing varying levels of rain, from 2" to 14":
…up to 14 inches of rain is what was about to make a major disaster.
SPRING CREEK, NORMALLY A PLACID STREAM, BECAME A RAGING, DEADLY TORRENT.
Nolan at Spring Creek marker:
People here weren't aware of this huge surge of water that was about to arrive.
Within a matter of minutes a culvert unplugged, water rushed through underneath, water flowed over the top of the railroad, swept a train, a few cars off.

Man #1, holding child, in blanket:
Right to our doorstep… no warning… no nothing

Man #2:
I was asleep, I woke up, and everything was floating away…
NEIGHBORS LIVING CLOSE BY WERE ASTONISHED.

L3:
ANNE DESHON
Neighbor, Fort Collins, CO
Anne Deshon:

It was only about a half a mile away that the five people who perished in that flood were living …we got very little rain."

L3:
BOB DESHON
Neighbor, Fort Collins, CO
Bob Deshon:
We didn't really have much indication that there was lethal flooding going on very close to our house.

Anne:
It was something that was just unbelievably startling, to know that people were dying just right down the hill from all this water.
THE 1997 FLOOD, AND THE EXTREME VARIABILITY OF LOCAL WEATHER ALSO SHOCKED PROFESSIONAL METEOROLOGISTS LIKE NOLAN DOESKEN.
HE'D ASSUMED NOAA'S NEWLY DEVELOPED WEATHER RADAR WOULD PROVIDE SUFFICIENT WARNINGS, SO HE'D CHOSEN NOT TO SOUND AN ALARM.
Screens in CoCoRaHS offices, and NOAA radar imagery of severe storms:

Nolan:
There was this great sense that technology was going to answer all of our challenges, when it came to flood prediction, flood warning…

Daytime flood shots and chopper sound fx:
Nolan:
Seeing the helicopters the next morning, hovering over, the sound that always tells you you've had a disaster, and knowing that I could have done something.

And that has stuck with me.

Deshon B-roll, checking the rain gauge.
Bob:
Still drizzling, actually…
WHAT NOLAN AND COLLEAGUES STARTED IS NOW CALLED "CoCoRaHS", THE "COMMUNITY COLLABORATIVE RAIN HAIL AND SNOW NETWORK."
Deshon family B-roll, at the rain gauge on the deck:

Anne:
How much?

Bob:
Looks like about 1/100th…
TODAY CITIZEN SCIENTISTS ALL ACROSS NORTH AMERICA MAKE DAILY MEASUREMENTS OF PRECIPITATION, JUST LIKE THE DESHON FAMILY.
Bob Deshon, VO and to camera:
We've been doing this for, gee, 17 years now, and it's become such a regular part of our routine…
No burden of having to do this!
Nolan and the people at the CO State Wx Station, plus some teaser shots of snow in Canada and Skyler in TX:

Nolan to the group:
Zeroes matter, traces matter!

COCORAHS INCLUDES MORE THAN 20,000 VOLUNTEERS, EXTENDING NORTH TO CANADA'S SNOWY MARITIME PROVINCES, AND DOWN SOUTH THROUGH SOMETIMES DRY REGIONS LIKE TEXAS.

Skyler Flake goes about his daily routine, speaking VO and to camera:
L3:
SKYLER FLAKE
Rancher, Midland TX

Skyler:
I'm actually a 7th generation rancher. Come from a long line of ranchers.
Been around ranches from the time I was knee high to a grasshopper till now.
CLOSE TO MIDLAND, WEST TEXAS, SKYLER FLAKE HAS BEEN A COCORAHS OBSERVER FOR SIX YEARS.
Collecting his horse and loading into a trailer, and then at the rain gauge:
Skyler to camera and VO:
After we get done, y'know, feeding the horses and checking on stuff around here that needs to be tended to in the morning, walk out here every morning and check this rain gauge.
See if we were lucky enough to receive any precipitation throughout the night.
Skyler VO and to camera:
Lot of zeroes here, but we did have a good rain …we had three days of good rain back in the middle of March.

Quick shots of Dan, Skyler (with the main gauge) and the Deshons:
TO ENSURE UNIFORM MEASUREMENTS, EACH OBSERVER PAYS $30 FOR A STANDARD RAIN GAUGE.

Skyler Flake ranching scenes:
Skyler:
Without rain we're out of business. Our livelihood is directly affected by how much rain the Good Lord blesses us with.

Skyler:
It's pretty easy to have one rainstorm dump one inch on this end of the ranch and not get anything on the far west end of this, just because of how the rainfall came.
If there's more of these CoCoRaHS gauges around it's easier to see the weather pattern instead of one National Weather Service station that just collects the rain that falls at that station.
TOO LITTLE RAIN…
OR TOO MUCH RAIN…
BOTH ARE PROBLEMS WHEN YOU CAN'T SEE WHAT'S COMING.
Nolan mountain intervie, and map showing 1997 wx stations:

Nolan:
On the night of July 28th of 1997, there was only one rain gauge in the middle of town and a couple on the edge of town.
Rainfall:
None of them were reporting real-time weather conditions.
1997 flood scenes:
But our goal was to make sure that if another storm like that happened…

On camera:

…that we would have an immediate sense of where the rain was falling and a way of communicating that information quickly and efficiently.

IN ADDITION TO REGULAR DAILY REPORTS, COCORAHS OBSERVERS ARE ALSO TRAINED TO MONITOR EXTREME WEATHER CONDITIONS WHILE THEY ARE OCCURRING.

B-roll of NOAA Skaggs building. Exterior shot and then CUs of the two other controllers:
IN REAL TIME, THE REPORTS REACH THE NATIONAL WEATHER SERVICE SO THAT NOAA CAN ISSUE TIMELY FLOOD WARNINGS.

Waleed and Chad interact in front of large monitors displaying weather data:
Chad, to Waleed:
"…the quasi geotrophic equation for vertical motion…"
Waleed and Chad walk through the Forecast Center.
ONE OF THE FIRST FORECASTERS TO SEE THE VALUE OF THIS NEW SOURCE OF DATA WAS CHAD GIMMESTAD.

L3:
CHAD GIMMESTAD
Senior Forecaster, National Weather Service, NOAA
Chad:
We're constantly evaluating, you know "Do I need to issue a warning for this storm or not?"
Waleed, off camera:
Right…
Chad:
If we think the storm is going to become severe, we want to get a warning out as quickly as possible.

Hail stock footage:
WHILE COCORAHS STARTED WITH MEASURING RAINFALL, THE "H" IN ITS NAME STANDS FOR HAIL.
VO Zach with the hail pads:
OBSERVERS MAKE STANDARDIZED HAIL PADS—STYROFOAM COVERED WITH FOIL—TO RECORD THE NUMBER AND OF HAIL STONES, FROM GRAINS OF RICE UP TO GOLF BALLS, AND EVEN BIGGER.
Observers at training, interacting with Nolan at the computer:
THEY'RE ENCOURAGED TO REPORT LARGE HAIL RIGHT AWAY.
Hailstones in hand:
FORECASTERS NOW PAY SPECIAL ATTENTION TO THESE REPORTS OF SIGNIFICANT WEATHER SINCE LARGE HAIL IS AN INDICATOR OF TORNADOES AND STRONG STORMS WHICH ALSO SHOW UP ON RADAR.

Waleed and Chad interact at the NWS computers:
Chad:

What the radar's telling me is there's this much energy return from the radar, but that's not the same as having the human with the eyeballs and the ruler, because that human knows exactly what I want to know.

The same radar picture could be ½" diameter hail, or it could be 1 and ½ inch diameter hail.
Cross talk between Waleed and Chad:
Waleed:

So I see an alarm popped up there.

Chad:

Yeah, now an alarm goes off. So I click on this alarm, and I see the report right here.

It says “Morgan County, Colorado, Fort Morgan.” It gives me the latitude, longitude. Tells me his largest hail is one and a quarter inches in diameter.

My criteria for issuing a warning is 1” so that means I need to have a warning out.

And in just a few clicks of the button, I can draw this box on the map where I want the warning to be.

Screen CUs:

And I’ll quickly click the hazards so I can say like “60 mile an hour winds,” and here’s the “one and a quarter inch diameter hail.”

Hit create text, and I get a window that pops up with the text of the warning, right here.

Chad and Waleed on camera:

And as soon as I press that button, it goes out to the news media, to NOAA weather radio.

If it’s a flash flood warning …it’ll interrupt the programming on most commercial radio stations and cable TV outlets in the warning area.

Waleed:

So in effect, one person can make an observation, and within just a couple minutes, that can result in a banner across the bottom of a television screen, with a warning?

Chad:

Absolutely. The whole point of that is that person’s helping out their neighbors by sharing that information…

Waleed:
Right… right.
Rainfall:
COCORAHS STARTED WITH RAINFALL AND A FOCUS ON COLORADO.
CoCoRaHS “Hail” training video:
BUT THEN OBSERVERS SUGGESTED MORE…
Nolan:
Once we started with rain, people said, “If we can measure rain, we can measure snow.” And I knew enough about snow to say, “That’s a lot harder.”

Snow plow on road:

IN CANADA’S MARITIME PROVINCE OF NEW BRUNSWICK, OBSERVERS DAN MATTHEWS AND LESLIE GRATTON, HAVE DOCUMENTED SNOWFALL DURING A LONG, HARD WINTER.
Dan:
It’s certainly not been a typical winter here. Christmas it was +12°.
Leslie chips in:
Raining!
Dan:
And raining …and by New Year’s Day we had 12 cm of ice on the pond and were able to have our polar dip.
Peering over the snow bank:
Leslie:
Then the snow started.

Digging, and snow-blowing scenes:
Dan:
Without Leslie I'd be having a hard job keeping the measurements going, she's got lots of stamina… loves using the snow blower.

L3:
LESLIE GRATTON
CoCoRaHS Observer, New Brunswick
Leslie: (laughing)
Usually wait until often the snow stops before you start digging because "He who shovels early shovels twice."
See him walking to the gauge, and checking the snow posts:
Dan:
The process is a 365 day a year program and you trudge out in the morning, and then you're all bundled up because it's minus 20.
And I do my snow calculations, read the readings off the snow posts, get the snow depth.
Dan, on location:
"That stake over there is 48" tall, and there's 3 inches sticking out of the ground…"
Nolan VO over actuality shots of Dan at work, and to camera:
Nolan:
Snow is a more complicated beast. It varies in its water content and its density. It's blown around by wind.

Dan coring to find old snow:

And we have had volunteers diligently digging through deep layers of old, icy snow or fresh snow to identify not only how deep is it, but how much water is in that snow.

There's a big difference between two feet of fluff, and two feet of aged ice.

Dan energetically pushing his snow core down into the snow bank:

Dan:

I dig down and the bottom 10 inches of the snow is big snow crystals, snow grains. Well, to the scientist that means something. That means that the system of thaw is starting to develop.

Y'know, all this information is important and it's not reported by a machine.

When you get your sample in your tube, you take it in, and you put it on the scale, and you weigh it, and you're done.

Lamppost almost covered with snow:
JUST AS WITH HAIL AND RAIN, INCREASING THE NUMBER OF DATA POINTS DRAMATICALLY IMPROVES THE QUALITY OF FORECASTS.
Dan:
Now it won't make the world news but this sort of things enhances the weather reports.
And it's nice to know…

L3:
DAN MATTHEWS
CoCoRaHS Observer, New Brunswick
OK

You look at the map and there's *thousands* of dots all over, where people are doing the same thing you're doing and you're part of it. You're making a contribution and that certainly makes it worthwhile.

Full screen CoCoRaHS USA map on computer screen: Waleed, at the NWS office:
Waleed:
All of those dots on the map are individuals submitting daily data, filling in gaps through which extreme weather events might otherwise flow unnoticed, until it's too late.
Waleed, MCU:
Add to those citizen science observations Big Data from satellites and supercomputers and you've got a powerful Early Warning System.
Waleed VO:
IN 2013 ANOTHER DANGEROUS STORM HIT THE FOOTHILLS.
THIS TIME, EXTREME RAINFALL IMPACTED MORE COMMUNITIES THAN JUST FORT COLLINS, INCLUDING BOULDER, WHERE NOAA'S FORECAST OFFICES ARE SITUATED.
FLOOD WATERS WERE OUT OF CONTROL.
HALF A YEARS RAIN FELL IN JUST A COUPLE OF HOURS.

Chad:

In the 2013 flood, we had a lot of reports from CoCoRaHS observers here around Boulder, and so we were able to ramp up what we were doing quickly.

2013 map of CoCoRaHS observers:

Nolan:

We had close to 1,300 volunteers submitting rainfall reports during and after the flood. We were able to have a map, day by day, as that storm was progressing,

NWS B-roll: CU Chad hands and keyboard, and the other forecasters:
Police cars, see first responders:
Chad:
We worked with the emergency managers to help them understand how serious it was. That got them moving faster.

Using the radar data and the CoCoRaHS data, we were able to help them pinpoint, "Here's where it's the worst, and they can go evacuate those areas first."

And in those cases, sometimes a few minutes does matter.

Waleed:
Time is really critical, and what you're doing is you're giving time.
Nolan and the team: shots of them at the training and inside at the computer:
Nolan:

Any observation from any of our observers could, in fact, be the observation of the big storm.

And maybe those of us who suffered back in 1997 from a flood that we were ill-prepared for, maybe we really are making a difference …and that's the biggest satisfaction for me.

Waleed on camera at Spring Creek location flood marker:
Up there is where the flood waters reached in 1997.
Today Spring Creek is once again a placid, gentle stream. And thanks to a network of citizen scientists, using instruments like these, there's a better early warning system against future floods.

But crowdsourcing can also help people respond more quickly after a disaster, working together, online, with crisis mapping.

2. OPENSTREETMAP
Play on footage and sound: text super

OpenStreetMap

Responding to the Gorkha earthquake

Nama:
I was inside my house.
L3
Nama Budhathoki
Kathmandu Living Labs, Nepal
As soon as we're hit by the first shock, I could manage to escape with my little son, but other members of my family, my mother, my wife, they were still inside the building.
And then after the first shock, they came out and then we ran away from the building to a little open space near our house.
We're all gathered there, just holding the earth, because it's shaking so mad.
So many aftershocks, all powerful aftershocks. It was very scary.
I even don't want to remember that day.

CGI map animation: overlay PDS CGI
ON THE MORNING OF APRIL 25TH 2015, A 7.8 MAGNITUDE EARTH QUAKE HIT GORKHA, NEPAL, NOT FAR FROM THE CAPITAL CITY OF KATHMANDU.
ANOTHER FOLLOWED ON MAY 12th.
TOGETHER THEY KILLED MORE THAN 8,600 PEOPLE AND LEFT OVER 22,000 INJURED

Nama:
Nearly a million buildings are damaged, severely.
It was a pretty strong, violent earthquake.
WHEN THESE KINDS OF NATURAL DISASTERS HAPPEN, FIRST RESPONDERS NEED TO KNOW WHERE TO GO, AND HOW TO GET THERE QUICKLY.
BUT THAT'S NOT ALWAYS EASY.
Street sounds, cars beeping, bicycle bells…
Nama:
One of the big differences between U.S. and countries like Nepal is we don't have good maps.
If you look at Kathmandu, y'know, the navigation is a nightmare. We don't have house numbers.
Y'know, sometimes you spend hours to race to your destination.
Imagine you have to bring somebody to hospital and you are counting every minute. Navigation is super important, and that is particularly true in case of disaster because every minute is important after a disaster situation.
When we're hit by the earthquake, many of the earthquake-hit districts were not mapped well. They didn't know where to go, how to go, whether there is a road.
We desperately needed map.

Jenelle:
The geography of Nepal really created a lot of challenges for disaster responders.
Lots of people live in small villages that are only accessible by foot.

If you don't know the footpath to take or you don't know what size vehicle you can take in there, it's useless.
L3
Jenelle Eli
American Red Cross
In order to know where to get help to people in need, we needed to first put those people on the map and see where they were living.
So something like OpenStreetMap was really invaluable to disaster responders like the Red Cross.
Dale Kunce, interviewed in DC:

L3
Dale Kunce
American Red Cross
"Mapbox OSM edits" movie

Dale:
Open Street Map is a free and accessible map of the world. Think about it like Wikipedia for maps. You can edit, I can edit it and it basically reflects the world around us.
The map that we're trying to build in OpenStreetMap these days is a living, breathing document.
Nama:
In OpenStreetMap you can make changes. You can improve it.
Dale:
So humanitarian mapping really dates back to 2004 with the Boxing Day Tsunami in the Indonesian Ocean. When that earthquake and then later tsunami hit, it took weeks for actual maps of any value to be made.
BUT THE MAPPING DONE ON SITE BY TRAINED VOLUNTEERS, SHOWED THE POTENTIAL BENEFITS IF ONLINE PARTICIPANTS COULD ALSO CONTRIBUTE.
Dale:
Fast forward to 2010 in the Haiti earthquake. There was now OpenStreetMap existed, and there was a bunch of people that were impassioned to do their little bit.
And so the earthquake happened and immediately 600 volunteers from all around the world started mapping in Port-au-Prince. And very quickly in Port-au-Prince, the map filled out.
In a little over a month or so, there was about a million edits.
Dale:
Three years late, the Typhoon Haiyan hit the Philippines.
NASA imagery of Haiyan
The storm was so big and we could sort of see it coming that humanitarian mappers started mapping two days before.
Over the course of the next two months, 1800 people contributed 4.5 million edits.
So we're seeing this growth three years later of the number of edits.

Nama:
In OpenStreetMap we learn from every disaster. What went good, where are the things that we could improve? And we tried to improve that in the next disaster.
Himalaya scenes:
LOCAL RESIDENTS AND INTERNATIONAL AGENCIES LIKE THE WORLD BANK, KNEW A BIG QUAKE WAS COMING, GIVEN THE GEOLOGY OF THE REGION.
Nama:
People knew that the earthquake is coming in Nepal. But they didn't know when it was coming.
Map is a part of preparation for any disaster. If you look at the traditional way of disaster preparedness.

What it is, you give training to army, you give training to police, firefighters, you know. Which is good, we need to continue to do that. … You also need to prepare in terms of information.
Dale:
Fast forward again to 2015 in the Nepal Earthquake. And there's been a lot of effort in mapping in Nepal for many years now
OSM scenes on computer screens:
Nama:
After the Nepal earthquake, nearly 9,000 people from all over the world contributed to mapping.
We got more than 2,000 people just within the first couple of days.
DURING THE FOLLOWING FIVE WEEKS OF THE RESPONSE, 1.4 MILLION BUILDINGS WERE TRACED, WITH VOLUNTEERS DOCUMENTING UP TO 75 BUILDINGS PER HOUR.
Dale:
We were doing a million edits a day. We basically made the amount of data that's in the map of Nepal, 15 times bigger.
Waleed and Mikel Maron in DC:
I MET UP WITH MIK-ELL MARON, ONE OF THE FOUNDERS OF THE "HUMANITARIAN OPEN STREET MAP PROJECT", IN WASHINGTON DC.
THIS WAS JUST A FEW DAYS AFTER ANOTHER SERIOUS QUAKE, THIS ONE IN ECUADOR.

Waleed:
How does somebody who's *not* on the ground contribute?
L3
Mikel Maron
Co-Founder, HOT
Humanitarian OSM Team
Mikel:
Anyone, anywhere can contribute as part of the OpenStreetMap community.
So this is the OpenStreetMap website. It's pretty simple for anyone to get started, and sign up.
Waleed:
Can we go now to Ecuador, and show me the mapping that's going on there?
Mikel:
Sure. So I am opening the Humanitarian OSM Team Tasking Manager.
So lots of people at one time can go into a project., click one of these grid squares, lock it for themselves, and you can have dozens of people working on the same area at the same time. And they are not stepping on each others' toes.
I am going to select a square myself. When you are ready to contribute, you click "Edit with ID Editor", this brings us back to the OpenStreetMap site.
Waleed, off camera:
OK
Mikel:
I'm zooming in. Can add a building, right here.
I'll add in a road, starting from this point. Follow along the path of the road.
And the idea is to work through the entire area, in that boundary of that tile. You do that for an entire grid square. And once you're done, you click "Save" and it's now part of OpenSTtreetMap.
Waleed:
So could you show us somewhere on the ground in Ecuador, where there has been a substantive change due to these efforts.
Mikel:
Just picked a place called *La Providencia*. This is what was there before. Nothing at all.
And all of this has been added.

Waleed:
So is it possible to do this work without the help of the crowd?
Mikel:
People are essential, and the network is essential. We need people to spend time and effort on this. It takes a human eye both to look at satellite imagery and accurately understand what's there, and especially to apply local knowledge.
TODAY, THOUSANDS OF SO-CALLED "ARMCHAIR MAPPERS" AROUND THE WORLD LOG ON AND CONTRIBUTE TO OPEN STREET MAP BOTH BEFORE AND AFTER DISASTERS.
THIS GRAPHIC SHOWS SOME OF THE MILLIONS OF EDITS MADE ONLINE IN 2013.
DC Mapathon scenes:
BUT SOMETIMES MAPPING BECOME ON-SITE, IN PERSON AND SOCIAL.
IN LATE 2015, BOTH NAMA AND DALE WERE IN WASHINGTON DC FOR A MAPATHON, A MAPPING MARATHON.
Nama:
A mapathon is a gathering of people. So basically everybody is mapping a city, and this is an opportunity to meet fellow mappers face-to-face, interact, learn from each other, share experience.
Dale:
We have events where there's five people, and we've had events where there's 250 people, and we've had events where there's 900 people all at Mapathon.
Nama:
Typically you spend 3-4 hours, … they give them training. It's learning, it's sharing ideas, working together, meeting people. It's not very formal.
CGI shows places around the US and worldwide:

MAPATHONS FOR NEPAL WERE DONE IN SEATTLE, PORTLAND, DENVER, LOS ANGELES, WASHINGTON, NEW YORK, AND SAN FRANCISCO.
INTERNATIONALLY THESE CITIES AND MORE PARTICIPATED:
BERLIN, GRENOBLE, LONDON, VALENCIA, CALGARY, PUNJAB, INDIRANAGAR AND TROMSO.
BUT FOR ALL THE INVALUABLE ONLINE AND REMOTE WORK, MORE DETAILED DATA MUST BE ADDED.
THAT MEANS MAPPERS OUT ON THE STREETS.
Back to Nepal scenes:
Nama:
We can use the remote sensory imagery for remote mapping.
Dale:
And then we actually go out and we do the mapping. And we go out to that community and we blanket the community people with people that are from the community, or from the local Red Cross branch, and we map that community.
We can map a community of around 50 to 60 thousand people in a week. And when I say "map," I mean that means every building, every sewer drain, every fire hydrant every telephone pole, everything about that community that allows the Red Cross to be able to do our work.
Jenelle:
And what I really love about mapping efforts and the mapping story is that it's people coming together from a really positive place and working together to help their own neighborhood, or it could be to help somebody all the way across the world.
Nama:
It generates a feeling that we have to do it collectively because the problem is too big, no single organization or individual or even a government alone can handle the situation.
Jenelle:
OpenStreetMap really helped us. We were able to see whether these villages existed, whether there was damage to houses and whether people were even still there.

People checked these maps every day and were able to get the right aid to the right people quickly.
CTA over B-roll:
Text super:
CrowdAndCloud.org/CrisisMapping
Dale:
Knowing that that map, that somebody in the field is going to look at the map for one second, make a decision and move on. That one second made their job 10 minutes easier. That for me is an exciting thing.
Nama:
A lot of people contributed to OpenStreetMap. They were not just mapping they were trying to save lives of people, relieve the sufferings of the people. We saw that firsthand in Nepal. People did that. That's… that's amazing.

3. EYESONALZ
Earthquake aftermath shots, and then Waleed on camera in DC:
WHEN THE EARTH SHAKES, THE CROWD CAN CONTRIBUTE.
Hawthorne scenes:
WHAT ABOUT WHEN OUR MINDS BEGIN TO FAIL?
ONE IN THREE SENIORS DIES WITH ALZHEIMER'S DISEASE, OR ANOTHER KIND OF DEMENTIA.
Waleed to camera, Koshland Science Center shoot:
In Alzheimer's we lose the memories that make us who we are. We lose the capabilities to live independently.
And, as of yet, there's no certain cause, and no sure cure.
But just as the crowd can map cities around the world, crowdsourcing can speed up essential research, this time by mapping the vessels in the brain.
To the intercut stories of two AD families, black, female and elderly, and white, male and "early onset":
Play on footage and sound: text super

"EyesOnALZ"

Speeding Up Alzheimer's Research

Deidre Lovell waiting for her Mom to return by bus from the NYC Memory Center:
Deidre:
So it's like waiting for the kids, coming home from school. Y'know… (laughs.) "Hey, Mom!"
When my mother was diagnosed with Alzheimer's, we didn't believe it, really. "Her? Never, it'll never happen."
Waleed VO:
FOR REASONS STILL NOT FULLY UNDERSTOOD, ALZHEIMER'S IMPACTS AFRICAN-AMERICANS MORE THAN CAUCASIANS, AND WOMEN MORE THAN MEN.
Deidre continues:
She has been in control of a lot of things, for a very long time. Her mind is certainly something that she is not going to lose her control over.
She's too stubborn. It's just not gonna happen.
Deidre, background:
Where are we?
Deidre helps her mother into the dining room. Evadene shrugs her shoulders in an uncomfortable way:
And then, one day, you notice, something is really not right. I think it's an expression in the face, where… where they are. Or what it was, what it is that they…
And they… and they *know* that they don't know.
Shock cut to face of Steve Johanson: he speaks with hesitation and confusion:

L3:
Steve Johanson
Alzheimer's patient
Steve:
I was a constru.. sher… um…
(Judy whispers off camera)
…"project"…
Steve, looking down and away from camera:
Steve:
Project… project…
Judy begins VO and then on camera:
Judy Johanson.
The diagnosis came, early October 2011. By the end of October, he finished up work, and left his job.
Family scenes:
Judy continues:
As you can see, looking at Steve, the face of Alzheimer's is not just a 95-year-old person, drooling in a nursing home.
L3:
Judy Johanson
Wife and caregiver
Judy on camera:
It's the face of many people.
Steve looks at grandkids:
Judy, VO:
In 2016, there are 5.2 million people in the United States living with Alzheimer's. That's projected to go to 13.6 million, by 2050.
Currently it is costing our country 236 billion dollars a year to provide care for people living with Alzheimer's. And that does not include what it's costing caregivers out of pocket costs.
Our country is going to go bankrupt if we do not deal with the costs of Alzheimer's.
Transition from family footage to the scientific research at Cornell:
Chris Shaffer:
In our Lab we are focused on trying to understand why brain blood flow is reduced in patients who have Alzheimer's Disease.
And although people have known about this big blood flow reduction to the brain for about 50 years, the mechanisms that lead to it have been unclear.

Nozomi:

And then also we're finding that the Alzheimer's disease causes the changes in blood flow. So that means that once you get any of these things going, it actually feeds back into itself and makes both the blood flow worse, and the Alzheimer's disease.

Place location super:

Cornell University

Ithaca NY

Waleed VO:

CHRIS SCHAFFER AND NOZOMI NISHIMURA RUN ONE OF THE WORLD'S MOST ADVANCED BIOENGINEERING LABS, USING INNOVATIVE OPTICAL SYSTEMS TO PROBE DEEPLY INTO LIVING BRAINS.

Nozomi:

And so our hope, then, is if we can improve the blood flow, it'll actually slow down this whole progression, and perhaps help slow down the whole disease.

Grad student writing on clear glass board:

Schaffer:

Alzheimer's disease looks to be caused by a small molecule in the brain called amyloid beta.

Now individual molecules of amyloid beta don't cause cell injury, or death, or any problems, but amyloid beta is a molecule that's very self-sticky.

And if several of these molecules stick together, they form this big, sticky mass that binds to all kinds of things in the brain and kind of mucks up the works.

And all of those things lead to loss of cognitive function.

Lab assistant holds up container of lively GM mice: one shot also shows the opening in the skull that allows live (in vivo) imaging of blood vessels:

Schaffer:

We study these diseases in mice that have been genetically engineered to get Alzheimer's disease.

So they develop the amyloid plaques, the neural death, and the loss of cognitive function analogous to that found in humans with the disease.

Student places anaesthetized but living mouse in the microscope platform:

So in these mice, we remove a section of their skull and replace it with a thin piece of glass. And then use advanced microscopes that we've developed that allow us to image down deep into the brain.

And then it turns out the imaging we're doing, we can see blood vessels.

Text super:

Live mouse brain & blood vessels

Schaffer:

We can see blood cells inside blood vessels. And so across several images in vessels that are flowing, we'll see those blood cells move from frame to frame, while in a vessel that's stalled the blood cells basically stay in place.

Schaffer:

Now we've worked hard to develop automated image processing routines that could distinguish those flowing from stalled blood vessels, but weren't successful.

See Pietro and students looking at laptops:

We were never able to get an accuracy that was high enough to answer the scientific questions.

Nozomi:

So it turns out that the human visual system, and I think human intuition, is something that we still haven't been able to mimic in sort of the best computing algorithms that we have.

Half dissolve of student looking at scoring task:

Schaffer:

Humans are very good at pattern recognition, at picking up things that are moving versus things that are staying still, inside a cylindrical blood vessel like this.

Post-doc Mohammed and others score lab imagery:

Schaffer:

And so, the way that we've handled this analysis is by having large numbers of undergraduates, and graduate students, and post-docs …just go through and manually score individual capillary segments as flowing or stalled.

And at this point, we've manually scored over 100,000 individual capillary segments as flowing or stalled.

Blackboard scribble spinning slowly counter-clockwise:

Schaffer:

It takes more than a week of work to analyze the data associated with just one two hour imaging session.

NEW SHOT:

So right now, for us to acquire the data that could answer one hypothesis, it would take us about a week.

To analyze it, would take almost a year.

Lab scenes:

So, this data analysis is the primary bottleneck in the research we're doing right now.

First Meeting of EyesOnALZ
March 2016

THIS WAS THE FIRST FACE-TO-FACE MEETING OF THE EYES-ON-ALZ INITIATIVE.

See Pietro as meeting lead, and both Andy and Robert, and Sebastian (on video links) and Amy:

PIETRO MICHELUCCI BROUGHT TOGETHER TEAMS FROM TWO INNOVATIVE AND SUCCESSFUL CROWDSOURCING PROJECTS, EYEWIRE AND STARDUST@HOME …TO SEE HOW THEIR APPROACHES MIGHT HELP SPEED UP THE BRAIN RESEARCH.

Stardust spacecraft still:

L3

Andy Westphal

Project Director, Stardust@Home

Andy Westphal, VO:

When the Stardust spacecraft came back to Earth in 2006, it brought back the very first samples of extraterrestrial material ever brought back by a spacecraft from beyond the moon.

RESEARCHERS FACED A DAUNTING TASK: FINDING MICROSCOPIC TRACES OF INTERSTELLAR PARTICLES IN THE "AEROGEL" DETECTORS OF NASA'S *STARDUST* SPACECRAFT.

THEY TURNED TO "THE CROWD" FOR HELP.

Box the lo-res Stardust video

Text super

Stardust@Home virtual microscope

Andy W:

Purely out of desperation, because we really didn't know how else to do it, we decided to recruit the help of amateurs, of volunteers who could help us to search these images that we collected with an automated microscope.

When we were first approached about the idea of applying the Stardust@Home technique to Alzheimer's research, we were frankly a bit skeptical.

Scenes of Andy and Robert in the meeting:

Andy:

As I learned more about the project, I realized that this is actually the perfect platform…

Split screen graphic shows Live Mouse Brain to left and Space Dust to right:

…because the imagery looking at mouse brains, turns out to be perfect for the Stardust@Home infrastructure.

L3

Pietro:

I immediately went back to Chris, and I said, “You know, I’ve got some *great* news. Let’s get started.”

And Chris said, “Wait. There’s another piece to this puzzle.”

He said, once we understand which blood vessels are flowing or stalled, we have to place that in the context. Because to answer our research questions, we need to know how these blood vessels are connected to each other.

What the impact of a stall in this one blood vessel is on the rest of the blood vessels.

So he shows me this picture of all these blood vessels in the brain, like, this big complex spaghetti network. And, and I looked at it and I said, YOU KNOW “I can’t believe this!”

Pietro:

I think this problem has been solved.

Eyewire cue begins:

“EYEWIRE” HAS BECOME ONE OF THE MOST POPULAR AND WIDELY PLAYED “PUZZLE GAMES” FOCUSED ON REAL SCIENTIFIC PROBLEMS – MAPPING THE BRAIN IN THREE D.

L3

Amy Robinson Sterling

Executive Director, EyeWire

Amy Robinson Sterling:

A big challenge in neuroscience is actually mapping out the structure of these cells. It takes us tens of hours just to map one neuron, and there’s 80 billion of them in just one brain.

Examples of the game interface of EyeWire, showing leaderboard, etc:

So we’ve turned the data analysis process into this 3D puzzle game, and now we have a quarter of a million gamers, puzzle gamers from all over the world, 150 different countries, who solve these 3D puzzles, mapping out the structure of neuron branches.

Which allows us to then model their function, identify new cell types, and put this in a better position to ask questions about how the brain does what it does.

Meeting scenes of Chris and Pietro:

Pietro:

The most exciting part is when Chris and I sat down and we did the napkin math. And we were trying to figure out much is this going to speed up the research?

And what we realized that a year's worth of research could be compressed into two weeks, and just the impact that was going to have on the progression of the work, obviously we were thrilled. We were very excited.

Place super

Hawthorne at Leesburg, FL

IN LATE 2016 EYESONALZ RELEASED ITS "STALL CATCHERS" GAME, BASED ON THE "STARDUST" INTERFACE AND INVITING THE PUBLIC TO HELP CROWDSOURCE THE ANALYSIS OF BLOCKED BLOOD VESSELS.

SOME OF THE FIRST PLAYERS WERE IN CENTRAL FLORIDA.

THEY WERE RETIREES WHO'D CHOSEN THE WARM CLIMATE, AND A COMMUNITY WITH PLENTY TO DO.

Coralee:

How many of you have family, friends, somebody close to you that either has or did have Alzheimer's?

Or you have it?

Just about everybody, huh.

If only the scientists worked on this, it might take as much as 30 years.

For most of us, it's not going to be a big benefit.

This is what the game looks like.

And you can get it on your phone, your tablet, your laptop.

Audience member:

Does the game change every day?

Coralee:

Yes, they keep going, they keep putting… ???

What do you think?

Burble:

Coralee:

How many think it's flowing???

How many think it's stalled? Shall we find out???

Muffled "yes" from audience.

OK…

Audience claps:

Thank you very much.

There we go…

Coralee:

Every time we find a stalled one that is really stalled, we are helping big time.

L3

Bobb Vergiels

Resident, Hawthorne at Leesburg

One of the things I like about this research is that we can help my mother's generation.

I am 64, I can help my Mom but this is gonna help, I call them, "kids" my age.

Hawthorne scenes, including dancing:

EYESONALZ WILL KEEP ON REFINING ITS GAME PLAY INTERFACES, BUT ITS GREATEST IMPACT ON ALZHEIMER'S RESEARCH MEANS TAPPING THE LIMITLESS POWER OF THE CROWD.

Schaffer:

With this project, people can donate their time, their expertise to help us be able to solve this really challenging image processing problem.

I think, in order for it to be really successful, it needs to become a household name. It needs to become as familiar as Coca-Cola or Angry Birds.

It needs to be when YOU say, "WeCureALZ," everyone knows what you mean. And,

Screen CU, hands tapping, cut to face shot, he smiles to camera!

to me, success will be, if you're riding the train to work or you're just standing around in line, you look over and someone is on their phone playing WeCureALZ. That's what I'll consider success.

Fade black and up on family footage:

Evadene Lovell, looking down.

Mmmmm… memories.

Deidre begins VO:

The hardest part for me is watching her have to give it up.

Riffling through the family photo album:

You never know if they are going to remember.

Evadene:

Those were taken Needmore, Pennsylvania.

Deidre:

No, that's you and Dad.

Evadene:

Huh???

Deidre:

That's you and Daddy.

Evadene:

No, it's not.

Deidre:

Yes, it is.

You don't recognize yourself, Evadene, as gorgeous as you were that day?

Evadene looks up and around, perhaps with just a touch of recognition.

That's you, honey. That is you, and Calvin.

Dissolve to the Johansons, also looking at a photo album:

Judy:

We want to spend these next years, surrounded by our children and grandchildren, and laughing and singing and hiking. Making memories for our grandchildren.

Grandkids and their parents sing "This Land Is Your Land":

Creating a lifetime of memories for them, with their Gramps, in these short years, is really important.

Because they have the best Gramps in the world.

She turns and looks at him, and there's a slight nod of recognition:

Evadene maneuvers her walker down a long corridor.

Pietro, VO and to camera:

When you get to the end of your life and you look back, y'know, the things you remember are those special moments that you have with the people you care about. And Alzheimer's disease starts to take those away from us, one at a time.

Pietro on camera, for sure:

It's just not fair. I want to see that end.

Waleed to camera, CU, not seeing the background:
It really isn't fair. But perhaps crowdsourcing will speed up the data analysis and the search for a cure. With Alzheimers the challenge is tackling the vast amounts of information generated by researchers' sophisticated new tools.
But sometimes it's the lack of information that's the problem.

4. PUBLIC LAB

Today, inexpensive sensors developed by Makers and hackers are helping citizens monitor threats to the environment, keeping corporations and government accountable.
This is how one such group got started.

PUBLIC LAB

The BP Spill & Aftermath

ON APRIL 20TH, 2010, AN EXPLOSION ON BP'S *DEEPWATER HORIZON* OIL RIG IN THE GULF OF MEXICO KILLED 11 WORKERS AND INJURED 17 OTHERS.

L3

Scott Eustis

Gulf Restoration Network

Public Lab

Scott:

A lot of the easy-to-get oil in the Gulf has been gotten already and so companies like the super-majors, the pressures of profit, push them to go further and further offshore and drill in more and more extreme situations.

Stills of Honore at the time of Katrina:

Crisper

LIEUTENANT GENERAL RUSSELL HONORE WAS A HERO TO MANY AFTER HE BROUGHT ORDER TO NEW ORLEANS IN THE AFTERMATH OF A *NATURAL* DISASTER… HURRICANE KATRINA.

L3

Lt. General Russel Honore

US Army (Ret.)

LTG Honore:

Myself and many other people, we were surprised that they were doing what they were doing at such depths. But little did we know that so many people were taking so much risk with so little response capacity.

SCOTT:
That is the stage that was set for BP's drilling disaster in 2010.
Montage of news footage summarizing disaster:
DEEP BENEATH THE SURFACE, A BLOWOUT PREVENTER FAILED, SPEWING MASSIVE QUANTITIES OF OIL INTO THE GULF OF MEXICO.

LTG Honore:
When BP happened, it was like watching a bad movie…
C-Span news clip
"There was a culture that evolved over the years that seemed to ignore risk, tolerate non-compliance and accepted incompetence."
BY THE TIME THE LEAK WAS SEALED ALMOST FOUR MONTH LATER, AN ESTIMATED TWO HUNDRED AND TEN MILLION GALLONS OF OIL HAD FLOWED INTO THE GULF.
IT WAS THE WORST SPILL IN U.S. HISTORY.
BUT WHILE THE OIL WAS *SPREADING*, INFORMATION WAS *CONTAINED*.
LTG Honore:
Then there was access to the information, as if they had some right to privacy. Because they were now worried about liability.

Shannon:
One of the things that we noticed was that information sources, what to trust and what to believe was very, kind of shadowy, I guess.
ALTHOUGH BP AND THE COAST GUARD CLAIMED NO SUCH POLICY EXISTED, MULTIPLE NEWS OUTLETS WERE INITIALLY TURNED BACK FROM DOCUMENTING THE SPILL.
Text:
CBS footage with reporter VO:
"This video was shot by the local parish government in South Pass. When we tried to reach the beach, seen here, covered in oil, a boat of BP contractors, with 2 Coast Guard officers on board, told us to turn around, under threat of arrest."
Man on boat, with subtitles:
"This is BP's rules, not ours."

Jeff:
They were actually controlling access to the site, stopping journalists from photographing and investigating. These are public beaches, you know, public land.
Scott:
Right away we knew there was a desperate need for watchdogs, a desperate need to elevate the voices of people on the ground.
WHILE THE AUTHORITIES SAID THAT EXCLUDING THE PRESS AND THE PUBLIC WAS A MISTAKE THAT THEY SOON CORRECTED, SHANNON DOSEMAGEN, A MEMBER OF A ENVIRONMENTAL NON-PROFIT CALLED THE "LOUISIANA BUCKET BRIGADE," SENT OUT A CALL TO COLLECT DATA ON THE SPILL.

Shannon:
I started working with public health students at Tulane University to do crisis mapping of the oil spills, y'know, asking people to submit if they were smelling certain things, if they were seeing things when they were out on their boats.

Jeff to camera, with CGI of texts:

Jeff:
But, a lot of the reports would just be like a text, ya know, sorta like a short thing… and not necessarily even a photograph. Hard to build a really comprehensive picture based on that.
JEFF WARREN ALREADY HAD EXPERIENCE USING LOW-COST, OFF-THE SHELF CAMERAS FLOWN BENEATH BALLOONS AND KITES TO DO WHAT HE CALLED "GRASSROOTS MAPPING", CAPTURING HIGH RESOLUTION, CLOSE-UP IMAGERY.
WHEN HE HEARD ABOUT WHAT WAS HAPPENING IN THE GULF, HE SAW AN OPPORTUNITY TO HELP.
Jeff:
I was like, "Hey, we have this way of taking aerial photographs. Is that something that would be useful?"

Shannon:
During the oil spill, one of the restrictions that we were working against was that there was a 3,000-foot flight cap that was put over the Gulf.
THE TEAM WANTED TO CAPTURE AERIAL IMAGES TO DOCUMENT THE SPILL, BUT THREE THOUSAND FEET WAS TOO HIGH TO GET QUALITY PHOTOGRAPHS.
THAT'S WHERE JEFF'S BALLOONS AND KITES CAME IN.
Shannon:
So in essence, we were going from below, and keeping our cameras and balloons and kites under that flight cap…
…capturing images of the Gulf that showed a very striking picture of how the oil is moving into different areas.
SHANNON, JEFF AND COLLEAGUES WANTED ANYONE, ANYWHERE TO BE ABLE TO DO THIS KIND OF MONITORING.
THAT MEANT SENSORS HAD TO BE SIMPLE, AND RELATIVELY INEXPENSIVE.
POINT-AND-SHOOT CAMERAS ARE SUSPENDED FROM LARGE BALLOONS, WITH A MODIFIED SODA BOTTLE SERVING AS BOTH HOUSING AND STABILIZER.
SET THE SHUTTER TO TAKE PHOTOS CONTINUOUSLY, AND THEN FLY THE BALLOON AT ABOUT TWO THOUSAND FEET TO RECORD HIGH QUALITY AERIAL IMAGES.
Shannon:
It was just so fast paced. We were working all day, every day.

THEY COLLECTED THOUSANDS OF IMAGES AND IMPORTED THEM INTO SOFTWARE DESIGNED BY JEFF.
THE PHOTOS CAN BE LOOKED AT INDIVIDUALLY BUT ALSO STITCHED TOGETHER TO MAKE HIGH-RESOLUTION PICTURES.
THE RESULT IS EXTREMELY *LOCAL* DATA, SHOWING INDIVIDUAL PLANTS AND BIRDS, SOMETHING EVEN THE BEST COMMERCIAL SATELLITE IMAGERY DOESN'T DELIVER.
Jeff:
There's something different about a big aerial photo in terms of the kind of evidence, the sense of authoritative evidence.

Scott:
The balloon photography really helped put the damages to the marsh in a broader perspective.

Shannon:
People would be on the ground focused an individual bird or a nesting population. Taking images from above showed a much broader landscape.
NYT website, captured from online:

Jeff:
They were widely published. They were published in the *New York Times*, the *Boston Globe*. Very quickly, the Wikipedia page about the BP oil spill featured prominently the photo that we took.
So people got to see firsthand really dramatic, concerning photographs about what was actually happening, which, remarkably were not really being published by anyone else.
SIX YEARS AFTER THE BP SPILL, I TOOK A RIDE WITH SCOTT EUSTIS OUT TO AN AREA OF THE GULF WHERE HE'S CONTINUING TO USE PUBLIC LAB TOOLS TO DOCUMENT WETLANDS RESTORATION.

Waleed during boat trip:
Can you tell me why the need for watchdogs?
Scott:
Some of the work that I have been able to do with a kite, that we haven't been able to do with an airplane, involves some of these coal export terminals.
With a kite, we were able to stand on public property, and put a kite in the air and take an oblique shot, of what was happening underneath their dock.
They were spilling so much coal and petroleum coke into the Mississippi River that it was forming a pile, y'know, bigger than this boat.
And that is unacceptable, that is a violation of the Clean Water Act, under the laws of the United States.
So with that photograph, we were able to communicate very well with the government agency, and push them to action.
And our hope with Public Lab is that, as a community, we can talk amongst each other and develop some low cost environmental monitoring tools that can do the job that everyone thinks that Government does, and that government people usually think the industry should do.

Barn-raising scenes:
EACH YEAR, PEOPLE INTERESTED IN PUBLIC LAB GATHER FOR WHAT'S CALLED A BARNRAISING, NAMED FOR THE PRACTISE OF NEIGHBORS GATHERING TO HELP NEIGHBORS BUILD SOMETHING TOO CHALLENGING FOR ONE FAMILY ALONE.
MEMBERS TEST OUT TOOLS, PRACTISE AERIAL MAPPING, AND SHARE EXPERIENCES.
WHAT BEGAN WITH GRASSROOTS DATA COLLECTION IN THE GULF HAS GROWN INTO SOMETHING MUCH LARGER AND LONGER LASTING.
Aerial and IR images of the Gowanus spill:
Text super:
Gowanus Canal
New York City
PUBLIC LAB AFFILIATES HAVE DETECTED SPILLS INTO NEW YORK'S GOWANUS CANAL THAT WOULD OTHERWISE HAVE BEEN UNKNOWN TO THE EPA.
CGI zoom out from US map and names of PL affiliates, and several overseas locations.
THEY'VE GROWN TO THIRTEEN STATES ACROSS THE U.S. AND TWELVE OTHER COUNTRIES.

Jeff:
So what Public Lab is trying to do is not only make it possible to collect information about pollution that's affecting you, but also make it easier, make it an everyday sort of thing.
PUBLIC LAB IS ABOUT MUCH MORE THAN NEW TOOLS.
URL HERE: CrowdAndCloud.org/Watchdogs
ITS COMMUNITY-FOCUSED APPROACH AND COLLABORATIVE STRUCTURE FOR MONITORING THE ENVIRONMENT IS A CHALLENGE TO TRADITIONAL WAYS OF DOING SCIENCE.

Shannon:

The structure of Public Lab is helping to democratize science. Making sure the people are able to understand and are able to interpret what the data is saying and be able to use it.

Waleed:
NOW RETIRED FROM THE U.S. MILITARY, HONORE HAS SET UP WHAT HE CALLS A "GREEN ARMY", SHARING WAYS TO HELP COMMUNITIES FIGHT BACK.

LTG Honore:
I do think environmental protection is a part of our national security. There's a perception that we can look the other way: we can no longer look the other way because it's affecting everybody.
Citizens have a big role. The ultimate definition of patriotism is service in your community. Patriots take care of their community. They act where they live…

5. WRAP

The New Faces
of Citizen Science

VO shots from the program:
Waleed, VO:
INCREASINGLY OUR CONNECTED BRAINS AND NEW KINDS OF TOOLS ARE DELIVERING DISRUPTIVE CHANGE.
IN "THE CROWD & THE CLOUD" WE'VE SEEN HOW WE CAN TACKLE DISASTERS BOTH SLOW AND SUDDEN, EXTREME WEATHER, AND EVEN SPEED UP OUR UNDERSTANDING OF THE BRAIN.

Chris Schaffer:
Everybody wants to cure Alzheimer's Disease. Here's another avenue where people can help, can become involved…
CrowdAndCloud.org/Alzheimers

Chris VO:
…now by contributing your time and your expertise to helping us with the data analysis.
Pietro Michelucci:
Used to be in villages, if you had a problem that you couldn't solve, the village would get together. Everyone would pile on and we'd solve the problem.

DC Mapathon wide shots, seeing PEOPLE!!!... not the WeCureALZ meeting:

So, today, the Internet has made that village a planetary village.

Amy and representative shots: Smartfin, eBird, West Oakland, and more:
Amy Lee Sterling:
The potential of crowdsourcing in Citizen Science is limitless.

B-roll:

I mean, as creative as you can possibly be with sensors, and iPhone cameras, and all sorts of data collection, data analysis.

Solving puzzles, to formulating new approaches to science, to creating entirely new hypotheses and eventually being able to test them.

Amy, on camera:

Really the only limit is our imagination.

Scott Eustis
Everybody has a supercomputer in their pocket.
Scott, on camera:
And we could use it to do frivolous things, or we could use it to do really meaningful and powerful things. The device stays the same.

Text super over Barn-raising scenes.
CrowdAndCloud.org/Watchdogs

Public Lab Barn-raising scenes:
What matters is really the organizing that goes into building communities of care, so we can take care of ourselves, advocate for ourselves…

Scott on camera:
…and live in a safe and clean environment.
Nepal landscape:

Nama:
A lot of people in open mapping talk about "map," in the product. That is important, but at the same time, the *process*.

Nepal Mapathon:
Putting something on the map is also as important as the map itself.
CrowdAndCloud.org/Weather

Dan:

The citizen science part of the CoCoRaHS program really appeals to my inherent need to contribute something, to be doing something, something that counts.
Anne to camera and over shots of Nolan measuring rainfall in his gauge:
Anne Deshon:
Just knowing you're a part of something that is maybe is going to help protect people, in terms of tornadoes, in terms of severe hail damage, whatever. But just knowing that you're helping.
Waleed to camera:
But citizen science, crowdsourcing, "public participation in scientific research"—call it what you will—can also contribute to public health, track air and water pollution… and even help protect our planet. That's next.
For THE CROWD & THE CLOUD, I'm Waleed Abdalati.

Text and voice over still frame from main titles:
To learn more about THE CROWD & THE CLOUD and the stories in this series please visit CrowdAndCloud.org

END CREDITS
Underwriter announce: 00:15
"THE CROWD & THE CLOUD" is made possible by NSF, the National Science Foundation, Where Discoveries Begin."
APT outcue (~2 secs)