Part Three: Groups and Social Processes

11 Using the Power of Crowdsourcing to Map Radiation

01:01:32:05 --:--:--:--
- Now tracking the spread
of radiation in Japan

01:01:34:10 --:--:--:--
eight months after the tsunami
caused a nuclear accident.

01:01:36:29 --:--:--:--
Japanese people are using
new technology

01:01:38:29 --:--:--:--
and the power of crowd sourcing
to find hot spots.

01:01:41:07 --:--:--:--
Here's our science correspondent
Miles O'Brien

01:01:43:15 --:--:--:--
as the second in a series
of stories from Japan.

01:01:45:20 --:--:--:--
- In Japan,

01:01:46:12 --:--:--:--
you never know where you're
going to find a hot spot.

01:01:48:22 --:--:--:--
[Geiger counter crackling]

01:01:58:22 --:--:--:--
We are at a highway rest stop

01:02:00:06 --:--:--:--
halfway between Tokyo
and Fukushima,

01:02:02:02 --:--:--:--
and we're looking
for the kind of hot spot

01:02:04:00 --:--:--:--

you'd just as soon avoid.

01:02:06:27 --:--:--:--
- On the roof, the cesium didn't
really stick very well,

01:02:09:07 --:--:--:--
so it all flushed down
and when it hit the concrete

01:02:11:08 --:--:--:--
or the stone here,
it bonded.

01:02:12:09 --:--:--:--
So this is like a micro hotspot.

01:02:14:23 --:--:--:--
- It's just another Sunday drive
for Pieter Franken

01:02:17:01 --:--:--:--
and his Safecast team
of volunteer radiation

01:02:19:03 --:--:--:--
contamination gumshoes using
inspiration, perspiration,

01:02:21:20 --:--:--:--
sensor technology
and the Internet

01:02:23:08 --:--:--:--
to paint
a much clearer public picture

01:02:24:27 --:--:--:--
of the Fukushima fallout.

01:02:29:02 --:--:--:--
It is crowd sourcing
of science in action.

01:02:32:22 --:--:--:--
- We are about 60 kilometers
to Fukushima.

01:02:34:18 --:--:--:--
We should be there

in about an hour.

01:02:36:08 --:--:--:--
We should be there around 12:30.

01:02:38:23 --:--:--:--
- We were heading north
to the evacuation zone

01:02:40:22 --:--:--:--
around the Fukushima Daiichi
nuclear plant,

01:02:42:17 --:--:--:--
about 40 miles away.

01:02:43:10 --:--:--:--
We gather radiation readings in
the air and on the surfaces

01:02:45:18 --:--:--:--
with Geiger counters in
and outside of the vehicle.

01:02:47:23 --:--:--:--
Using a handful of devices, we
measured raw radiation levels,

01:02:50:12 --:--:--:--
counts per minute,

01:02:51:12 --:--:--:--
as well as becquerels
and microsieverts,

01:02:53:08 --:--:--:--
which calibrate the raw numbers
to their impact on human beings.

01:02:56:18 --:--:--:--
- So these are
the microsieverts.

01:02:58:05 --:--:--:--
You can see
they're considerably lower

01:02:59:26 --:--:--:--
than they were
just a few minutes ago.

01:03:02:14 --:--:--:--
- Sean Bonner is one of
the founders of Safecast,

01:03:04:17 --:--:--:--
an all-volunteer organization
that has plotted

01:03:06:22 --:--:--:--
the most detailed maps of
radiation contamination in Japan

01:03:09:06 --:--:--:--
since the nuclear meltdown
in March.

01:03:29:17 --:--:--:--
- Radiation doesn't fit that
nice, neat little disk

01:03:31:21 --:--:--:--
they want to paint on the map,
right?

01:03:14:22 --:--:--:--
- Right.
Yeah.

01:03:16:14 --:--:--:--
Radiation isn't looking at
a compass radiating outward.

01:03:21:11 --:--:--:--
- It's a very arbitrary thing.

01:03:24:05 --:--:--:--
- Yeah, there's, like, wind
and topography

01:03:26:00 --:--:--:--
and this crazy stuff
that ends up playing into it.

01:03:28:19 --:--:--:--
- Wherever they go,
they draw a crowd,

01:03:30:07 --:--:--:--
a curious, nervous,

thankful crowd.

01:03:31:23 --:--:--:--
In a restaurant parking lot
in Nihonmatsu,

01:03:33:19 --:--:--:--
about 60 kilometers
from the nuclear plant,

01:03:35:13 --:--:--:--
we met Hiroko Ouchi.

01:03:57:16 --:--:--:--
- [speaking Japanese]

01:03:36:08 --:--:--:--
- "I'm worried about my children
and grandchildren," she told us.

01:03:39:03 --:--:--:--
"Thank you for measuring.

01:03:40:13 --:--:--:--
"Thank you for your hard work.

01:03:41:26 --:--:--:--
"The government doesn't release

01:03:43:08 --:--:--:--
the accurate figures
of radiation."

01:03:45:12 --:--:--:--
- Thank you very much.

01:03:46:16 --:--:--:--
Thank you for working so hard.

01:03:48:01 --:--:--:--
Thank you.

01:03:49:21 --:--:--:--
- But it's not just
a lack of data.

01:03:51:07 --:--:--:--
There is also a tradition here
of not sharing it.

01:03:54:18 --:--:--:--
- Japan is notoriously bad about
certain types of transparency.

01:03:57:11 --:--:--:--
And it's not--
this isn't a new thing,

01:03:58:27 --:--:--:--
that TEPCO covers things up.

01:04:01:06 --:--:--:--
- Joi Ito sparked
the birth of Safecast

01:04:02:25 --:--:--:--
in the desperate days right
after March 11.

01:04:04:19 --:--:--:--
Director of the MIT Media lab,

01:04:06:01 --:--:--:--
he naturally took to the
Internet to try to stay abreast

01:04:08:08 --:--:--:--
of events in his home country.

01:04:09:12 --:--:--:--
The scarcity of reliable
information prompted him

01:04:11:16 --:--:--:--
to reach out to experts
all over the world.

01:04:13:10 --:--:--:--
Things snowballed very quickly.

01:04:15:19 --:--:--:--
- Within days,
we had an email thread

01:04:17:08 --:--:--:--
that turned into a Skype channel

01:04:18:21 --:--:--:--
where all of us
were constantly there talking.

01:04:20:11 --:--:--:--
And it really became kind
of like a cross

01:04:22:05 --:--:--:--
between a sort of government
situation room and newsroom,

01:04:24:20 --:--:--:--
where we were collecting data

01:04:26:02 --:--:--:--
and just sort of
putting new things out,

01:04:27:25 --:--:--:--
and just trying to get everybody
involved that we could.

01:04:29:10 --:--:--:--
And it just kind of took a life
of its own.

01:04:31:06 --:--:--:--
We started to realize how
important it was

01:04:33:00 --:--:--:--
when it turned out
that the government

01:04:34:18 --:--:--:--
wasn't releasing data.

01:04:36:14 --:--:--:--
- The day before
we took our drive,

01:04:38:00 --:--:--:--
Safecast volunteers offered up
a seminar

01:04:39:22 --:--:--:--
on radiation detection in Tokyo.

01:04:40:29 --:--:--:--
It was standing room only
for the talk

01:04:42:19 --:--:--:--
and many stuck around
to get some advice

01:04:44:11 --:--:--:--
on how to accurately measure
the radiation around them.

01:05:32:10 --:--:--:--
Many Safecast volunteers come

01:05:33:21 --:--:--:--
from the computer hacker
community.

01:04:49:12 --:--:--:--
Their intuition and ingenuity
led them

01:04:51:04 --:--:--:--
to design and build
some novel devices

01:04:52:23 --:--:--:--
to gather radiation data.

01:04:54:14 --:--:--:--
Akiba--he doesn't use
his surname--

01:04:56:01 --:--:--:--
showed me what they call
a B-geigie.

01:04:57:12 --:--:--:--
What does that stand for?

01:04:59:07 --:--:--:--
- Bento geigie.

01:05:00:06 --:--:--:--
So when we originally
designed it,

01:05:01:24 --:--:--:--
we tried to design it to be like
roughly the same form and factor

01:05:04:10 --:--:--:--
as a bento, so that's easy

to carry around.

01:05:05:28 --:--:--:--
Like, a bento
is a Japanese lunch box.

01:05:08:19 --:--:--:--
- But instead of sushi, this box
contains a Geiger counter,

01:05:11:00 --:--:--:--
a GPS receiver,
and an S.D. Card.

01:05:12:22 --:--:--:--
It costs $850 to build,

01:05:13:25 --:--:--:--
but Safecast
is making them available

01:05:15:13 --:--:--:--
to volunteers for free.

01:05:16:10 --:--:--:--
During our drive north,

01:05:17:16 --:--:--:--
the Safecast team delivered a
B-geigie to Hideki Washiyama,

01:05:20:01 --:--:--:--
who lives about 90 kilometers

01:05:21:09 --:--:--:--
from the
Fukushima Daiichi plant.

01:05:23:01 --:--:--:--
- [speaking in Japanese]

01:05:22:17 --:--:--:--
- "It's hard to get high-quality
Geiger counter," he told me,

01:05:25:03 --:--:--:--
"but I don't want to use cheap
devices made in China or Korea."

01:05:27:17 --:--:--:--

There are plenty
of cheaply made,

01:05:29:02 --:--:--:--
yet disturbingly expensive
Geiger counters in Japan.

01:05:31:09 --:--:--:--
The Fukushima meltdown created
an instant global shortage

01:05:33:22 --:--:--:--
of good quality sensors.

01:05:34:29 --:--:--:--
Concerned people
in Japan and elsewhere

01:05:36:20 --:--:--:--
sparked overwhelming demand.

01:05:38:02 --:--:--:--
Dan Sythe produces good quality
Geiger counters

01:05:40:03 --:--:--:--
in Sebastopol, California.

01:05:41:06 --:--:--:--
He says that the shoddy devices
so commonly found in Japan

01:05:43:16 --:--:--:--
are extremely dangerous.

01:05:46:27 --:--:--:--
- Because people are waving
these over their food

01:05:49:01 --:--:--:--
and thinking the food is safe
to eat

01:05:50:20 --:--:--:--
or they're thinking that where
they're living is safe

01:05:52:26 --:--:--:--
and safe for their children
to go to school.

01:07:09:26 --:--:--:--
So it's--I think
it's almost criminal

01:07:11:15 --:--:--:--
to produce things
that don't work.

01:05:58:07 --:--:--:--
- Sythe's small company
is shipping out

01:06:00:02 --:--:--:--
as many Geiger counters
as it can,

01:06:01:17 --:--:--:--
giving priority to Japan,

01:06:02:23 --:--:--:--
and specifically Safecast.

01:06:03:16 --:--:--:--
Volunteer Joe Moross says more
comprehensive monitoring

01:06:05:28 --:--:--:--
is the first step to
understanding the real danger.

01:06:09:22 --:--:--:--
- I don't think
that ordinary people

01:06:11:12 --:--:--:--
can make a good valuation
of the risk,

01:06:13:03 --:--:--:--
because even the specialists are
in quite a bit of disagreement

01:06:15:20 --:--:--:--
as to what the real risk is.

01:06:17:07 --:--:--:--
- And so the reaction is,
I want none.

01:06:18:27 --:--:--:--
If you don't know,
give me zero, right?

01:06:21:15 --:--:--:--
- Well, everybody agrees,
no matter--

01:06:23:06 --:--:--:--
you can't find anyone
who doesn't agree

01:06:24:28 --:--:--:--
that lower is better,

01:06:25:29 --:--:--:--
that less radiation
is less harmful.

01:06:27:29 --:--:--:--
- Ironically, much of what we
know about the effects

01:06:30:05 --:--:--:--
of an acute dose
of radiation comes

01:06:31:21 --:--:--:--
from studying Hiroshima
and Nagasaki survivors.

01:08:05:20 --:--:--:--
But radiation contamination
at the level found here

01:08:07:27 --:--:--:--
is a ticking time bomb with a
fuse that burns for decades.

01:06:38:01 --:--:--:--
There is no question ionizing
radiation alters human cells,

01:06:40:17 --:--:--:--
which can cause cancer
and genetic defects,

01:06:42:13 --:--:--:--
but how much exposure
and for how long?

01:06:43:27 --:--:--:--
The science, like the readings,
is all over the map.

01:06:46:07 --:--:--:--
This is the town
of Minamitsushima.

01:06:48:04 --:--:--:--
We are about 28 kilometers from
the Fukushima Daiichi plant,

01:06:50:21 --:--:--:--
about one kilometer
from the police barricade

01:06:52:20 --:--:--:--
announcing the involuntary
exclusion zone.

01:06:54:11 --:--:--:--
This area, 20 to 30 kilometers,
is a voluntary exclusion zone.

01:06:57:03 --:--:--:--
And you don't see
anybody around,

01:06:58:15 --:--:--:--
for good reason.

01:06:59:14 --:--:--:--
[Geiger counter crackling]

01:07:00:12 --:--:--:--
- Yes, this is very high here,
really high.

01:07:02:09 --:--:--:--
We are looking at air one meter,

01:07:03:21 --:--:--:--
around 7.2--to 7 to 8
microsieverts per hour.

01:07:05:18 --:--:--:--
We're looking here at around
24,000 counts per minute

01:07:07:26 --:--:--:--
on the pancake and about roughly

01:07:09:09 --:--:--:--
about 800,000 becquerel
per square meter.

01:07:10:28 --:--:--:--
It's about 25 times what we're
seeing in Tokyo on the surface.

01:07:14:17 --:--:--:--
It was five microsieverts
per hour,

01:07:16:05 --:--:--:--
most likely cesium 137,

01:07:17:08 --:--:--:--
which has a half-life
of 30 years.

01:07:18:15 --:--:--:--
It's the equivalent
of six chest X-rays every day,

01:07:20:20 --:--:--:--
not a problem for us to be here

01:07:22:01 --:--:--:--
for a short while
in street clothes,

01:07:23:20 --:--:--:--
but how long before people
could live here again?

01:07:26:04 --:--:--:--
- If you wanted to get this down
to levels

01:07:27:28 --:--:--:--
that are considered normally
to be safe,

01:07:29:23 --:--:--:--
which will be under 0.3
microsieverts per hour,

01:07:31:24 --:--:--:--

you would probably look at much
more than 20 years or 30 years.

01:07:34:19 --:--:--:--
- But down the road, at the
exclusion zone checkpoint,

01:07:36:26 --:--:--:--
the police officers ordered to
be here are hoping for the best.

01:07:39:12 --:--:--:--
You don't worry?

01:07:40:11 --:--:--:--
- [speaking in Japanese]

01:07:41:20 --:--:--:--
- [speaking in Japanese]

01:07:41:23 --:--:--:--
- "They have told us there
that we're okay,

01:07:43:13 --:--:--:--
so we just need to trust them."

01:07:45:05 --:--:--:--
- I agree.

01:07:46:23 --:--:--:--
- Do you trust them?

01:07:47:25 --:--:--:--
- [speaking in Japanese]

01:07:47:24 --:--:--:--
[laughter]

01:07:48:18 --:--:--:--
- [speaking in Japanese]

01:07:50:00 --:--:--:--
- "That is what our bosses say,

01:07:51:08 --:--:--:--
so we need to trust our bosses,
yes."

01:07:53:20 --:--:--:--

- But Safecast believes people
should trust in the data,

01:07:56:01 --:--:--:--
and the more people who
are gathering it, the better.

01:07:58:05 --:--:--:--
Volunteers are designing a new,
sleek,

01:07:59:27 --:--:--:--
inexpensive Geiger counter

01:08:01:08 --:--:--:--
that they hope to begin
distributing in the spring.

01:08:03:05 --:--:--:--
But the nonprofit is not
stopping there or here.

01:08:06:00 --:--:--:--
- I think the goal really is,

01:08:07:11 --:--:--:--
when we started to try to solve
the data scarcity problem

01:08:09:23 --:--:--:--
about
Japan,

01:08:10:19 --:--:--:--
we realized that there
was a systemic problem

01:08:12:19 --:--:--:--
in the way that data
is collected

01:08:14:04 --:--:--:--
and disseminated
and interpreted everywhere.

01:08:14:26 --:--:--:--
And we're already starting
to think about,

01:08:16:22 --:--:--:--

how do we measure pollution,
how do we measure

01:08:18:18 --:--:--:--
all kinds of other things?

01:08:19:19 --:--:--:--
And so I think a lot of things
will come out of this incident.

01:08:22:08 --:--:--:--
And so this democratization
of science

01:08:24:02 --:--:--:--
is really, really important

01:08:25:13 --:--:--:--
in fixing the world's problems,

01:08:26:28 --:--:--:--
because it's not going
to happen top-down.

01:08:29:05 --:--:--:--
- Are you guys anti-nuclear,
or do you take a position?

01:08:31:16 --:--:--:--
Or are you just...

01:08:33:12 --:--:--:--
- No.
No, not at all.

01:08:35:21 --:--:--:--
- You're just pro-data.

01:08:37:22 --:--:--:--
- We just know that there's data
that exist

01:08:39:17 --:--:--:--
and there's data
that should exist.

01:08:41:01 --:--:--:--
And creating it,

01:08:41:27 --:--:--:--

the data doesn't take
a side one way or the other.

01:08:43:26 --:--:--:--
And so if we just
can get the data

01:08:45:09 --:--:--:--
and give it to the people

01:08:46:15 --:--:--:--
that are being immediately
affected by it,

01:08:48:10 --:--:--:--
then that's a good thing.

01:08:49:27 --:--:--:--
- With light dimming,

01:08:51:01 --:--:--:--
our Sunday drive for data ended
here in the town of Katsurao,

01:08:53:15 --:--:--:--
adding about 12,000 readings

01:08:54:26 --:--:--:--
to a database of
more than 1.25 million.

01:08:56:00 --:--:--:--
No one is here,

01:08:56:25 --:--:--:--
only the police,
making sure we were not looters.

01:08:58:23 --:--:--:--
And so it is hard to say

01:08:59:24 --:--:--:--
if this lonely dog
will ever see its owners again.

01:09:01:27 --:--:--:--
Do we have anything to feed him?

01:09:03:13 --:--:--:--
Sadly, no amount

of data-gathering

01:09:05:00 --:--:--:--
can change that fact
or erase this scene.