from punk rock to radiation data

Agnès Villette in conversation with Sean Bonner

I ordered my first Geiger counter a month ago from Safecast. It cost me $600, more than the average one you can find online. A Geiger counter is a simple apparatus: a tube filled with gas put under high voltage in order to detect radioactive emissions, most commonly beta particles and gamma rays. Safecast's bGeigie Nano sits in a plastic box that can be fixed outside your car. It connects to your phone via Bluetooth, and the recordings are uploaded to data maps on the Safecast website. The maps are open source, decentralised, produced by volunteers all over the world, and constitute the biggest set of radiation data available for the planet. The bGeigie Nano comes in a kit; I had to take a couple of hours to assemble it myself. Edouard Lafargue, activist volunteer at Safecast, told me it's an effort to make you relate differently to the machines you use: it's a way of understanding how the counter worksand in that spirit belongs to the DIY culture that influenced Safecast's founder and CEO, Sean Bonner, whom I recently spoke to over Skype.
The maps of Safecast tell fascinating stories. Levels of radioactivity are signalled by a color grading from blue to yellow, transforming a ubiquitous, invisible presence into a sensual experience to be explored and understood. They render visible nuclear politics, sites of catastrophe, natural levels of radiation contained in rock beds. The maps around disaster zones such as Chernobyl or Fukushima remind us of the sustained half-life of isotopes - they take years to disappear. Decades after those events hit the news, nature is still quietly coping with high levels of radiation, processing the pollution. However, Safecast does not take sides, its official stance is decidedly apolitical. The project simply collects data and lets people decide for themselves what kind of world they inhabit.

Agnès Villette / Safecast is a cross-project between IT, engineers, nuclear physicists, eco-warriors, MIT researchers and open-source programmers.
As you have been at the head of the initiative since 2011, what's your background?
Sean Bonner / Before I started Safecast, I was into punk rock music, I had a label. I was also a hacker, based in Los Angeles, part of a hackerspace called Crash Space. I'm a media entrepreneur. I'm CEO of Bode Media Inc and publisher of Metblogs, the world's largest network of local media blogs. I've been part of grassroots journalism for years and often speak at conferences about blogs and media. I also ran an art gallery. I did a lot of creative and activist projects. The connecting point between all these activities is the diverse networks of people who come together to solve problems. In 2011, when the Fukushima earthquake happened in Japan, I did a lot of work there with my blog company, regarding hacking and start-up technology. It just made sense to get involved and see if we could help with a solution.

So Fukushima's disaster gave you the impulse to start Safecast, connecting all the previous experiences you had in the past.
Absolutely. As soon as the earthquake happened, I sent a message to a friend whose family was in Japan to check that they were okay. Most of what we were getting back was that people were very confused and could not find any information about what was going on. We jumped in kind of spontaneously, thinking we would just help collect some information that was available somewhere.
As days and weeks went on, it became clear that there was no information available – we were facing a much larger problem than we had anticipated. And that's when we formalised the organisation and gave ourselves marching orders to try to solve problems.

I guess the hacker background was an ideal position to understand that the Japanese government – like most governments – was totally unable to adequately react to the situation...
Yes, exactly, the hacker culture has a very strong Do It Yourself aspect. That was quite crucial for the first few days after the earthquake. The impulse from my end was not to wait until we knew where the solution was going to come from. We understood very quickly that if there was going to be a solution, we had to go and create it ourselves.

So how did you gather a team of people who had the specific knowledge regarding radioactive data recounting? You also needed IT technicians and engineers to design the Geiger and upload it online as a map.
At first we thought we just needed to find data that other people had. So we reached out into our networks, into friends' networks. We were just trying to find anybody who might know the subject. We ended up using Skype a lot, and created a chatroom where people converged, pulling new people in all the time. We were talking non-stop for days. At the time, I was planning an annual conference about startups in Tokyo called *New Context*. As soon as the earthquake happened, talkers and visitors to the conference were very concerned about their safety in Japan. We couldn't answer their questions. We didn't have any accurate data. So instead of cancelling the conference, we changed its theme. It became about recovery and reflecting on the next step to be taken after the earthquake. We brought as many of the people from the Skype conference as we could. We all came together in Tokyo and discussed for a few days what to do. We decided to attach a Geiger device to a car to drive around and collect data.The first devices were quite large, the size of a suitcase. There was a laptop connected to it and a separate GPS device.

There were cables outside the car and wires all over the place. We assembled them from whatever around, and they worked. We proved that we could collect a whole lot of data with very few devices. Over the following months, we refined the design to make it smaller and more useable.

It's quite impressive to think about the birth of the project knowing that, at present day, Safecast has gathered 16 million global radiation measurements.
It's actually the largest dataset ever collected on radiation. If you combine all the other data, private and governmental, it's still inferior to what Safecast has collected since 2011. Because we have put our data into the public domain, it's also the most accessible and useful set out there. It's a decentralised system, relying on many different individuals. Radiation is a very hot political topic - we didn't know what the reaction was going to be, so we designed it to be as decentralised and robust as possible. That way, no one could turn it off.

Reading about the concept of 'citizen science' – that is, research conducted by amateur or nonprofessional scientists – it's surprising to see that an independent organisation such as Safecast, can be quicker and better organised than the governments. What makes you faster and more reliable than any state-run data collection, private company or NGO?
I think that's actually a point worth discussing, in that we put our trust in these large governments and organisations and expect somebody to look out for us. But their systems are closed and there is a lot of bureaucracy involved. Our trust is sort of unfounded. Look at what's happening in the US right now: all the environmental data is being thrown out and people are being fired. Entire projects are being shut down. And there is a lot of upset over it, rightly so. At the same time, was it right to put all of this important information in the hands of the governments? Creating more open and shared systems might have been a more robust solution. It's a matter of numbers, too. Three or four people in a room can come to a decision faster than an organisation with hundreds or thousands of employees. Governments have checks and balances and a number of different funding options - that's why all those processes move slowly. In Fukushima, when the nuclear reactor started to melt, five days passed before the first official confirmation of a radioactive leak happened. For five days, people lived within the radioactive fallout. And it took significantly longer for any kind of contamination maps to be published. With our system, anybody, anywhere in the world, can have a reading from a sensor five seconds after it's taken.

Every nuclear catastrophe that ever happened has been wrapped in silence and censorship. Do you find that Safecast, as a citizen response, underlines the role of the common people in creating and distributing information, enabling them to act?
From the beginning, we decided that the entire system was broken and it was not worth our time and effort to change it. We chose to create an entirely new system that worked better and was more robust and defensible. For this, we rely on the web. The data is in the public domain without any licensing restrictions. This means that everyone can copy the data everywhere. There is no way to shut it down.

Radiation is a strange phenomenon. A lot of people are in denial and seem not to want to know too much about it. You are shaking them awake in a different way, by empowering them to get a Geiger and start recording radiation.
In our early conversations, we became aware of just how polarising discussions on radioactive data were and how much disagreement there was. We didn't want to take sides, neither pro- nor anti-nuclear. We realised that because there is no official agreement on radioactive data, if you take one stance over another, it opens a negative answer from half of the people who refuse to accept your information. Most of their time will be spent trying to discredit you. We didn't want to get involved with this polarisation. Our activism and our religion about nuclear is the data. We want data to be available, we want data to be open. What data says and how it's interpreted, we leave to the people.

Just after Trump nominated Scott Pruitt as the head of the US Government's Environmental Protection Agency, you sent a call for resistance to all researchers and national agencies to upload and save their data, for fear it will disappear from national agencies' websites and labs.
It's certainly scary and unnerving to know that we cannot rely on the EPA and other American agencies in our new political context. Again, I think it speaks to a larger problem. We have put too much trust and respect in governments to take care of environmental data. And we have not given it enough thought. We assumed that someone would take care of it. That kind of indispensable information on climate change, needing to be continually updated and addressed, reckons a call to action when a new politician comes into power and starts shutting down research and potentially deleting data. We have not had any contact with the EPA since Trump's inauguration. The few people that we know at the EPA are currently trying to figure out if they are going to get fired.
We have not presented any official position. At the end of the day, we are not really a lobbyist group, so it's not on our to-do list to have meetings with them. We would rather just work on our thing. We will continue to pursue our solutions and continue to publish data. At some point, these people will have to answer as to why our data is different from theirs!

Governments are unreliable, but corporations and private companies are similarly problematic...
Absolutely. We are doing a conference at MIT at the end of April called *Our World, Our Data*, and we will discuss these issues. The only force that cuts across all those boundaries is open data. If the corporations or the governments lock something behind closed doors, you cannot trust anything they release. You don't know if they are only releasing a piece of it, if they are holding something back. With radiation, it was a very large wake-up call – nobody, in 2010, was concerned about who was measuring radiation, or if there were radiation sets, or if there were radiation sets available. In Japan, there was some severe shock in March 2011, when people realised that there were not any sensor networks in place. It makes us look at the bigger picture and wonder what else we have taken for granted.

Which is exactly what you are currently doing with air quality data.
We have been talking about air quality data for the past two years. It was a natural progression: you cannot see radiation, and you cannot see air pollution. With air data, the systems are so chaotic, you can only get very vague information: one day air quality is good, another day it's at red level. It doesn't mean anything.

Yet, in places like China, air pollution, in a way, is clearly visible from the smog and the health issues.
There is much conflict because, in China, measurements of air quality are privatised. Individual groups have their own methods and do not share them.

You can have three or four different apps from China discussing the air quality and they will give different readings for the same place. As soon as we started to investigate air quality, we understood that there's no global standard on how to gather and publish data. With radiation, those questions were solved 100 years ago, 50 years ago with nuclear testing. Air pollution is such a new threat that there's still a lot of disagreement and conflict on how it's measured. So we are working heavily on creating a standard – similar terminology, precision, quality – for the independent groups measuring data as well as the manufacturers building the devices, so that the collected data can be compared against each other.

So this hasn't yet been agreed on?
Not yet. What's really confusing is that people are using the same terminology, but it means different things. With air pollution, people use the criteria PM2.5, which is referenced everywhere. Technically, it refers to the 2.5-micrometer diameter of inhalable particles, or Particulate Matter (PM). Yet there's no standard for how PM2.5 is standardised. Every single sensor has its own algorithm that decides how to evaluate it. One sensor takes a measurement saying that everything between PM2 and PM3 counts as PM2.5, another sensor measures more precisely and says that everything between PM2.4 to 2.6 is PM2.5. This is how you can have several different sensors giving readings of PM2.5 for the same place with different numbers.

I recently discovered images taken by a robot sent very close to the Fukushima melted reactor. The robot died after 2 minutes. What is your understanding of the current radiation levels there?
Actually, the good news is that the levels of Cesium-137, in the most contaminated areas, are decreasing faster than previously expected. The levels are not following the predicted models. The obvious reason is that environmental changes are hard to anticipate. You can do models based on isotopes and their speed of degradation, but it is very hard to account for rainfall, snowfall, leaves falling from trees, erosion. The environment has a built-in cleaning system working. However, there are some areas that are quite contaminated. The nuclear plant is still leaking; it's not stabilised yet. There are a lot of issues they haven't figured out, and there's still a lot of debate and work to be done.

Do you think that the Fukushima accident was a call for governmental agencies to clean up their act and prepare themselves for the next disaster?
Yes and no. I don't know if it really brought any changes or forced them to be more prepared. I think it made people look at their systems with more attention. Reactors are designed for a life of 20 or so years. When they hit 20 years, their use is extended for another few. Many reactors are now 15 to 30 years past the age they were designed to run until. It stays in the dark because nobody is asking questions or even looking at it. One agency fills out the form and someone else stamps it and sends it away. I don't think anybody has put forth a large sum of money to prepare for the future. Most agencies like to pretend that nothing will ever go wrong. That's their selling point. That's how they gain their market share and favour amongst politicians.

Most of your data comes from Western countries, where there is a threshold culture of transparency. Can you say more about places where censorship is common?
If you look at our maps on safecast.org, you can see the planet's coverage.

It paints an obvious picture about what data we are able to collect and from where. There's a lot of empty spots in certain areas. You could argue that our map is a representation of free speech. Where free speech is restricted, we have less data. When people feel safe collecting and publishing data, they do more of it. We haven't had any problems with people saying they were prevented from collecting data. It's done in public and Geiger counters are not specifically banned anywhere. One of the benefits is that the world collectively saw what happened after Chernobyl. For ten years, people were trying to cover up what had happened. I think, regardless of political stance, people are worried that they may face another Chernobyl. Nobody wants that. How that will translate into collecting and publishing air data, I don't know.

How is Safecast funded?
So far, we've been entirely self-funded. We sell Geiger counters, which are purchased by people who collect data on their own. The cost of producing new Geiger counters is covered entirely by the volunteers who build the devices and collect data. As for our organization, we are an NGO split into three agencies: one in the USA, one in the Netherlands and one in Japan. These NGOs are specifically tasked with fundraising. We get money from foundations and independent donations, which has funded us for the last three years. This has funded us for the last three years. We tend to get more funding from foundations that support open data science and open publishing, and less from the environmental organisations. We certainly wouldn't take any government money.

So your journey took you from punk music to radioactive data?
I'm still trying to change the world, just on a bigger scale.