

# Application of Blockchain Principles in Safecast's Open Radiation Sensors

**Pieter Franken**

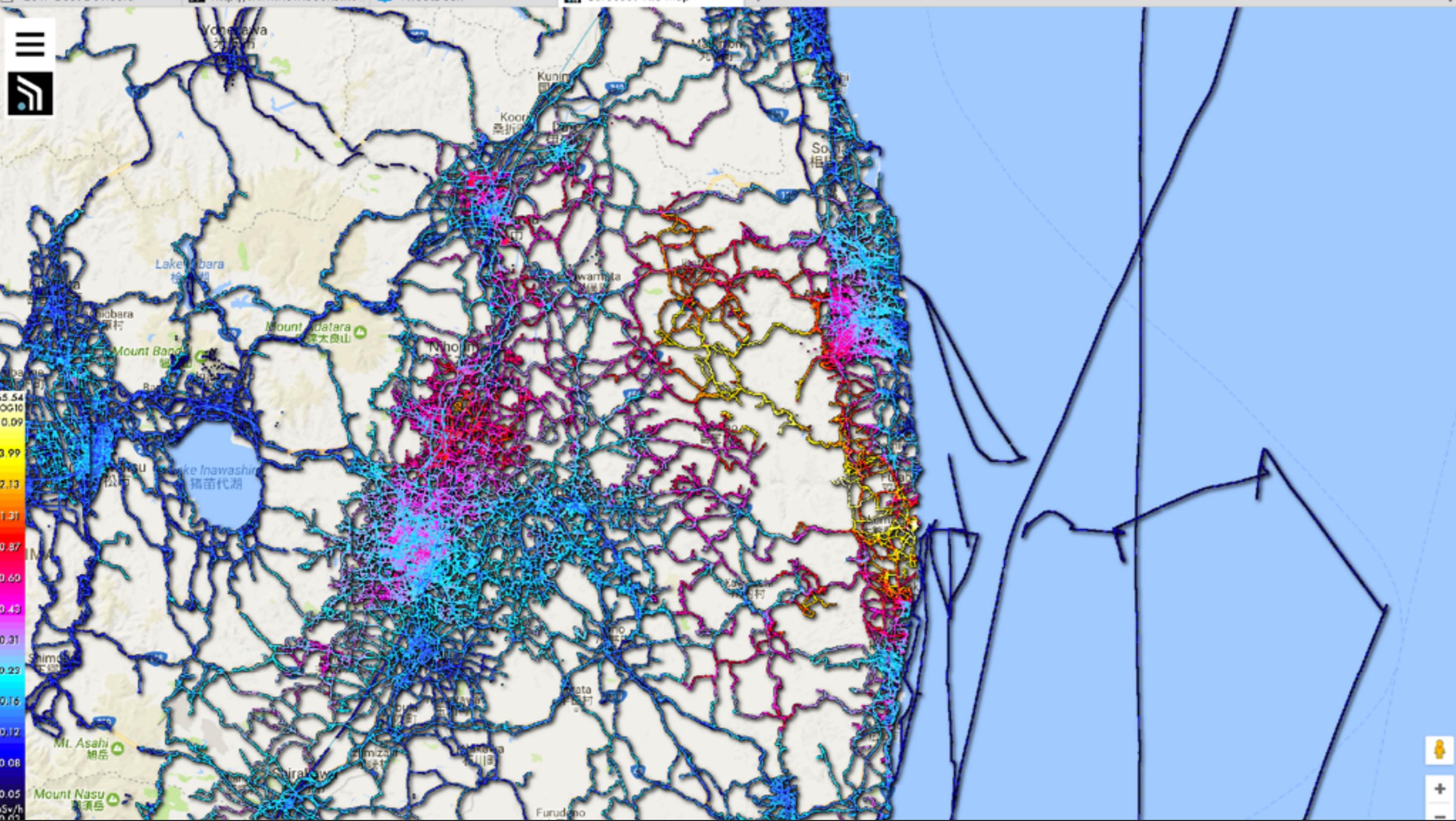
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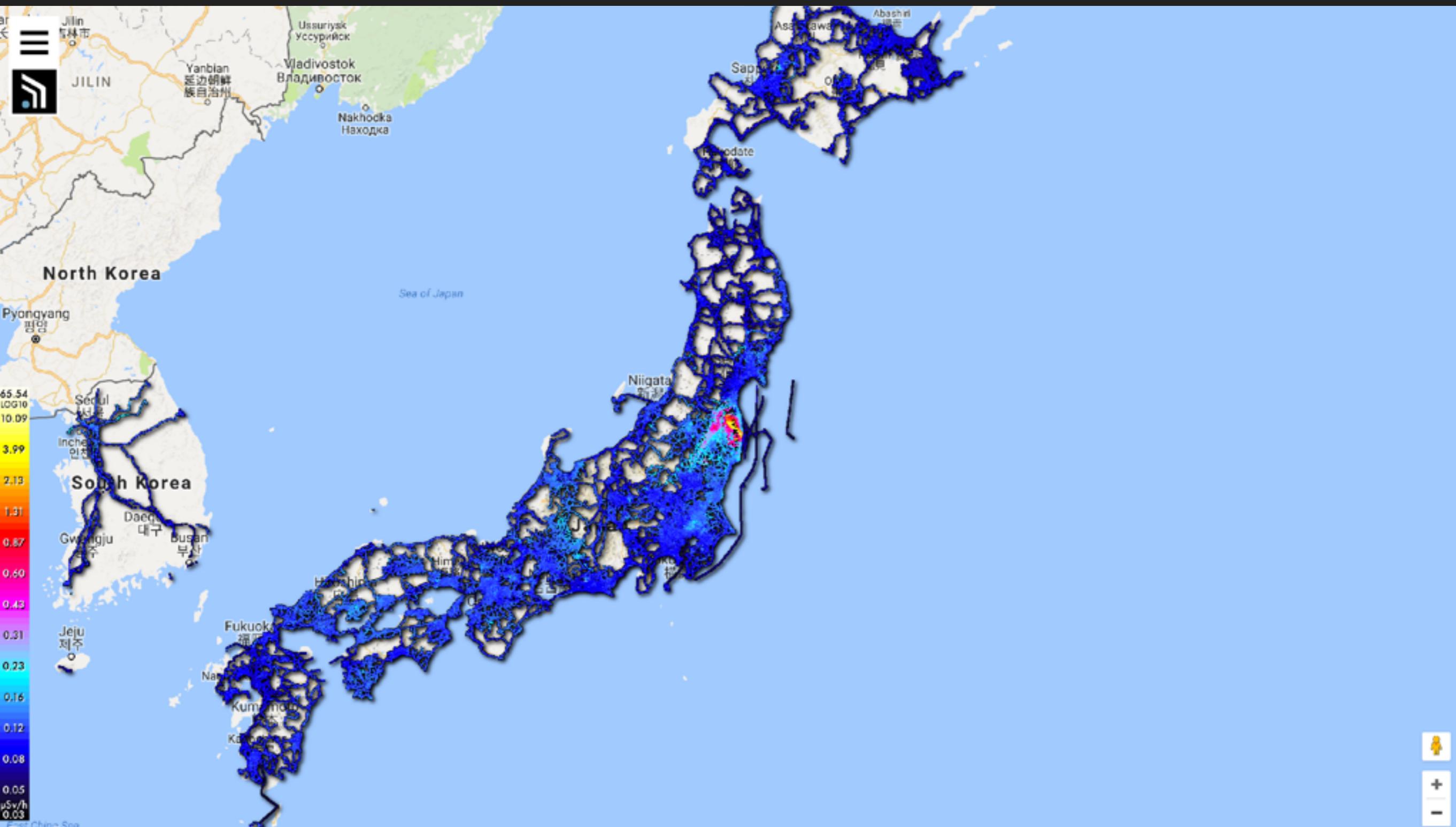


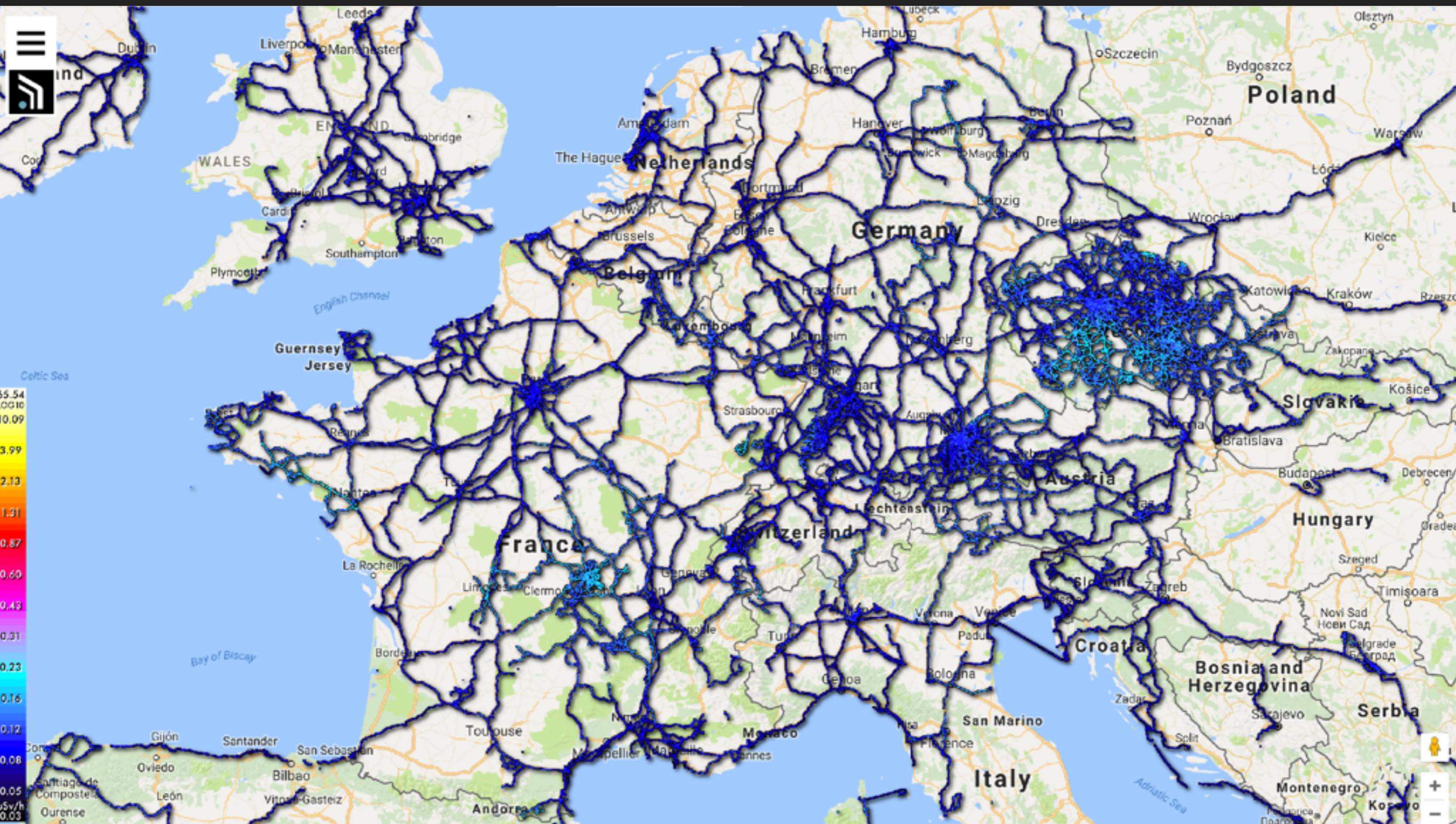
# The Safecast Project Today

- Collected over 70,000,000 measurements, adding 2,000,000 new measurements each month with contribution from over 100 countries
- Mobile and stationary sensors measuring radiation and air pollution
- Fully open data set (CC-0)

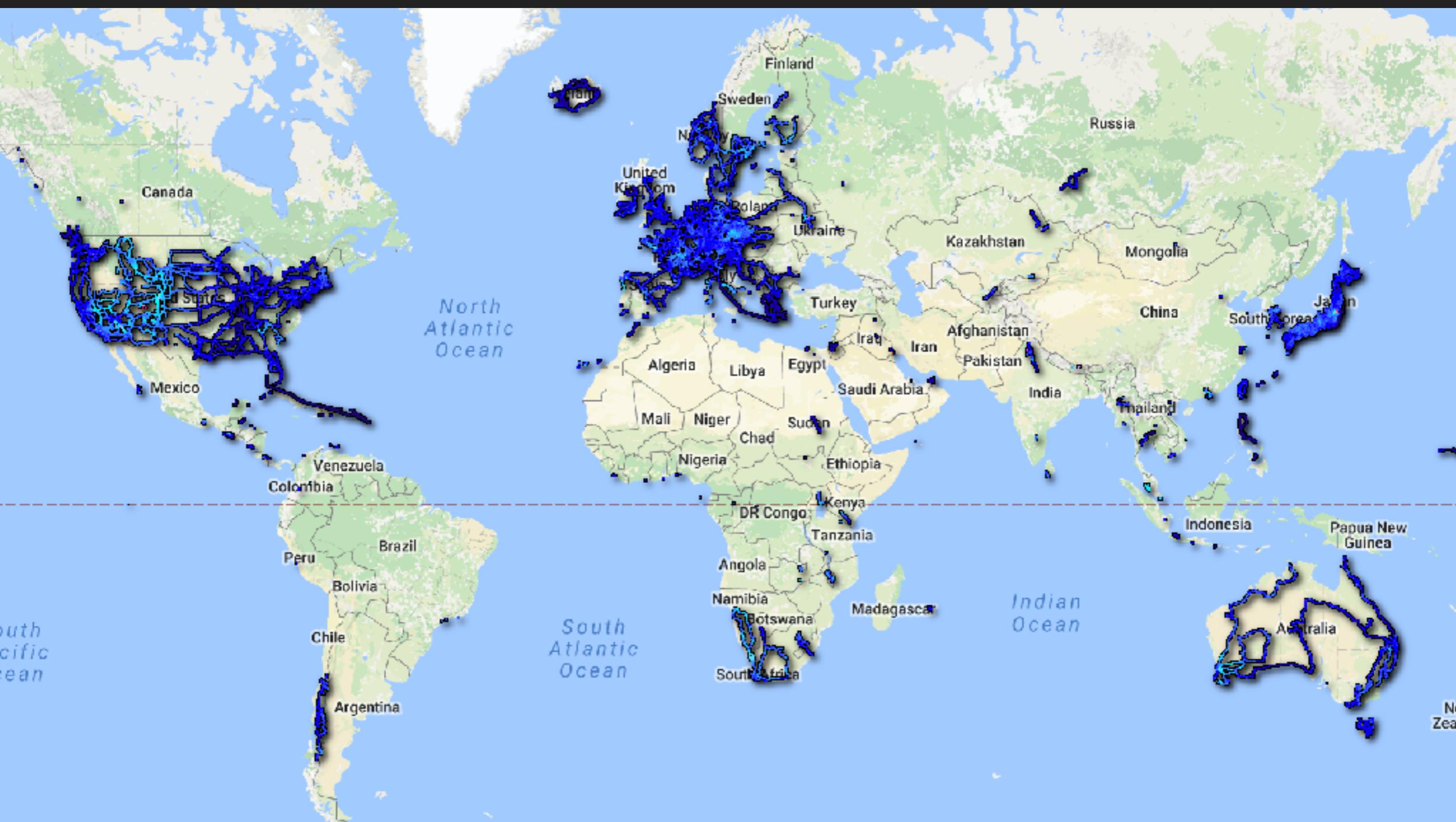
<http://map.safecast.org>











Whiplash  
How to  
Survive Our  
Faster Future

Joi Ito  
Director,  
MIT Media Lab  
and  
Jeff Howe

9プリンシブルズ  
加速する未来で勝ち残るために

MITメディアラボ著  
伊藤穰一  
ジェフ・ハウ  
山形浩生 訳

Whiplash  
How to Survive  
Our Faster Future  
Joi Ito and Jeff Howe

IoT/AI時代を牽引する、  
**伊藤穰一**  
待望の本格的著作。

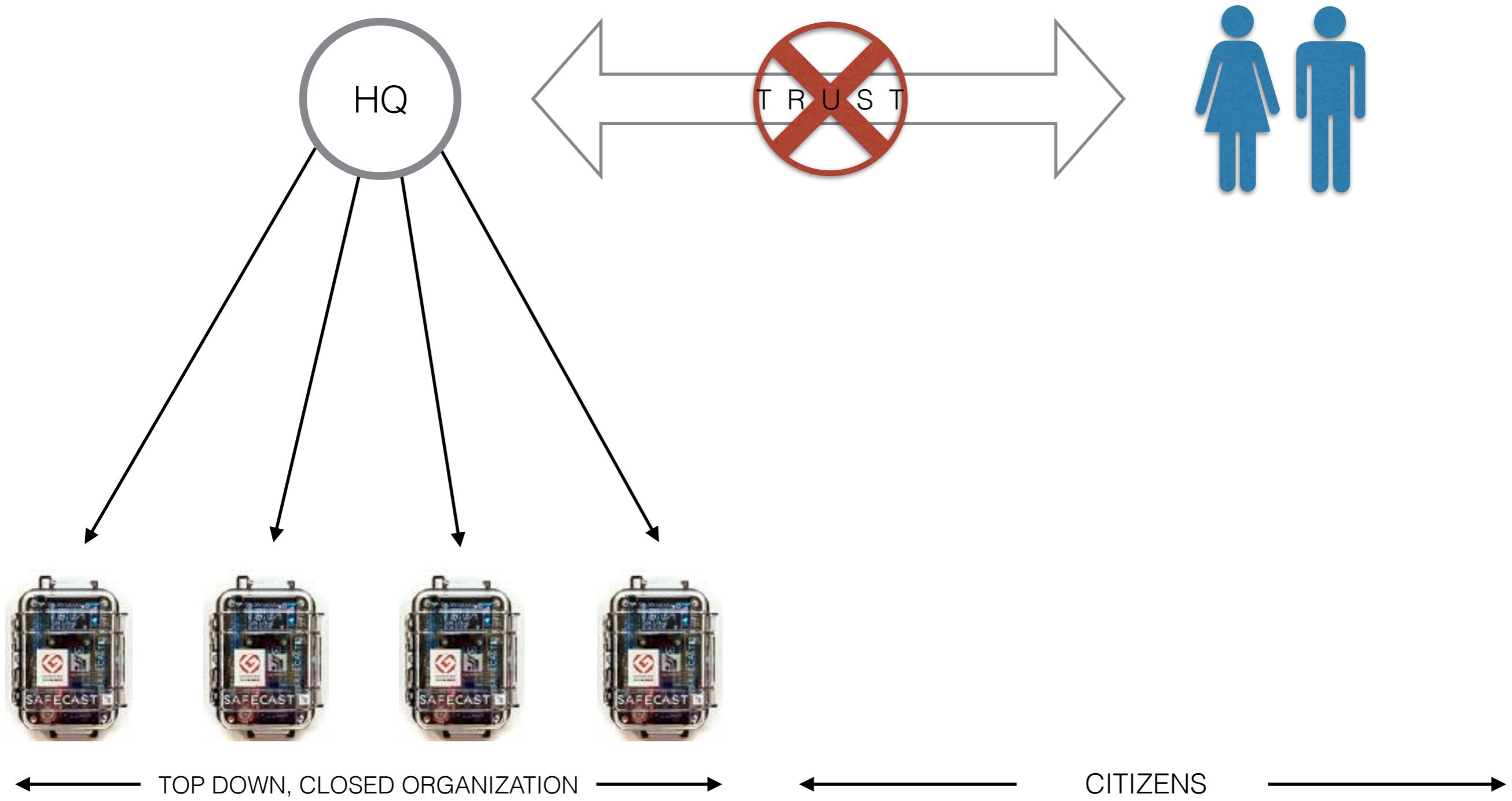
めまぐるしく変化する  
現代を生き抜くための、  
「9つの原理(9 Principles)」とは?  
MITメディアラボ所長が贈る、  
21世紀のユーザーズマニュアル。

著者  
(伊藤穰一)  
来日!



翻訳権独占○早川書房

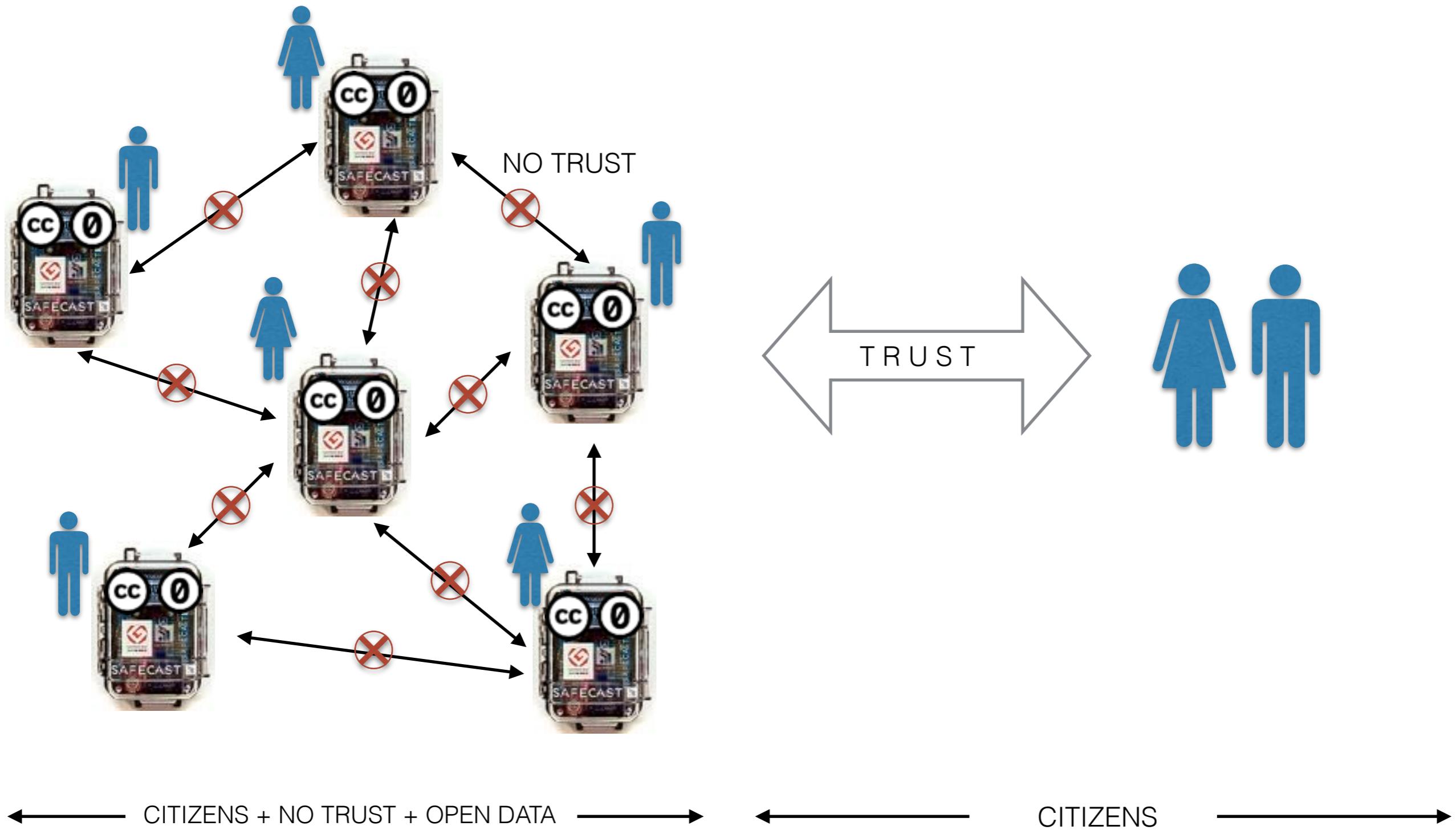
# Top-Down, Closed Organizations Lost Citizens Trust





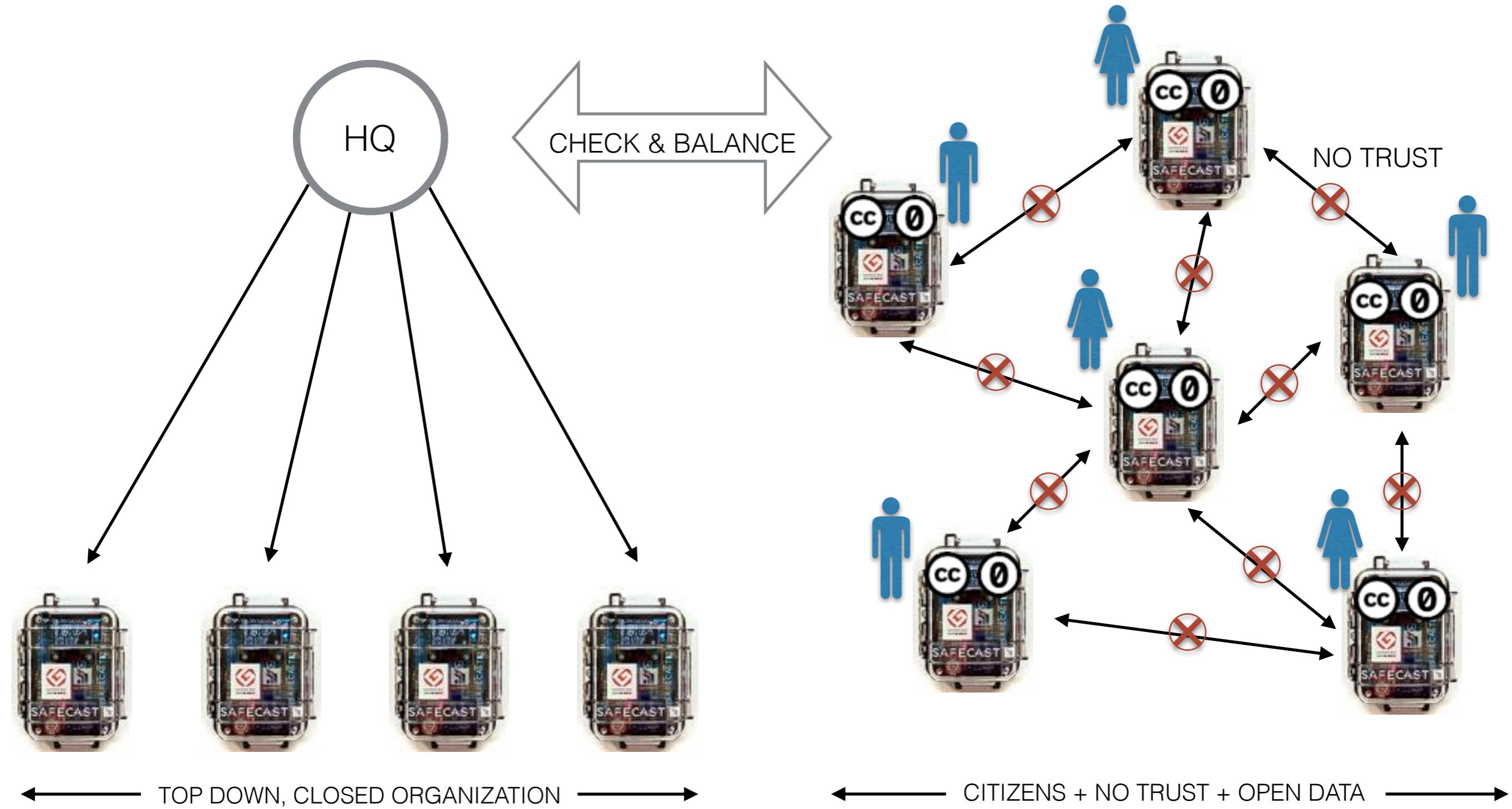
TRUST NO ONE

# Power of the Crowd: Building *Trust* from *No Trust*





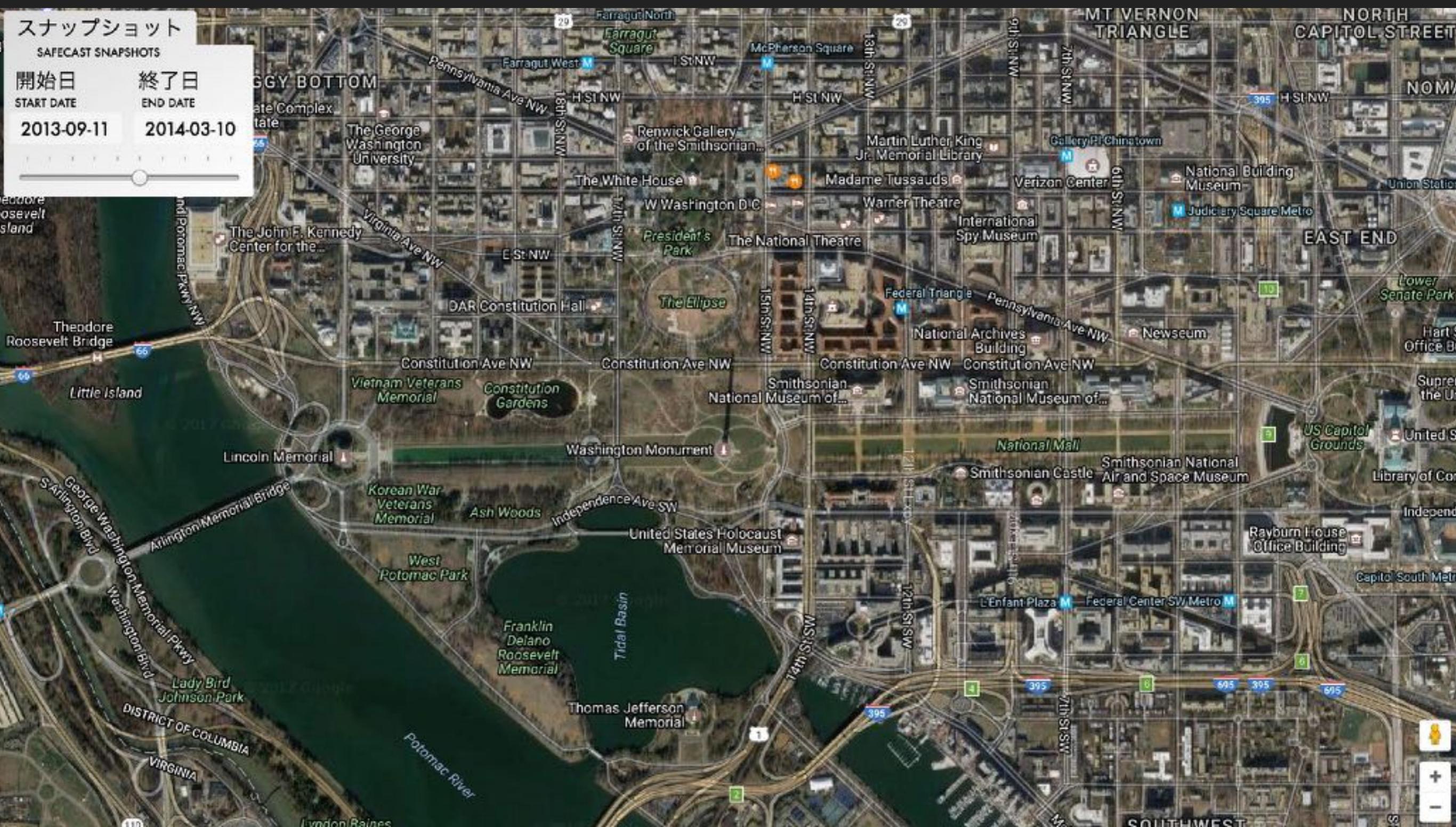
# Bring Check and Balance



## スナップショット

SAFECAST SNAPSHOTS

開始日 終了日  
START DATE END DATE  
2013-09-11 2014-03-10



## スナップショット

SAFECAST SNAPSHOTS

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# Research Paper

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Radiological Protection

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## Safecast: successful citizen-science for radiation measurement and communication after Fukushima

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### Article information

#### Abstract

The Fukushima Daichi Nuclear Power Plant disaster, which began on 11 March 2011, provided a crucial opportunity to evaluate the state of preparation on the part the powerplant operator (TEPCO), relevant Japanese government agencies, and international oversight bodies, to gather necessary information on radiation risks quickly and to share it with those tasked with emergency response as well as with the general public. The inadequacy of this preparation and the chaotic nature of inter-agency and inter-governmental communication has been well noted in several official reports on the disaster. In response, Safecast, an international, volunteer-based organization devoted to monitoring and openly sharing information on environmental radiation and other pollutants, was

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#### Abstract

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[2. Method](#)

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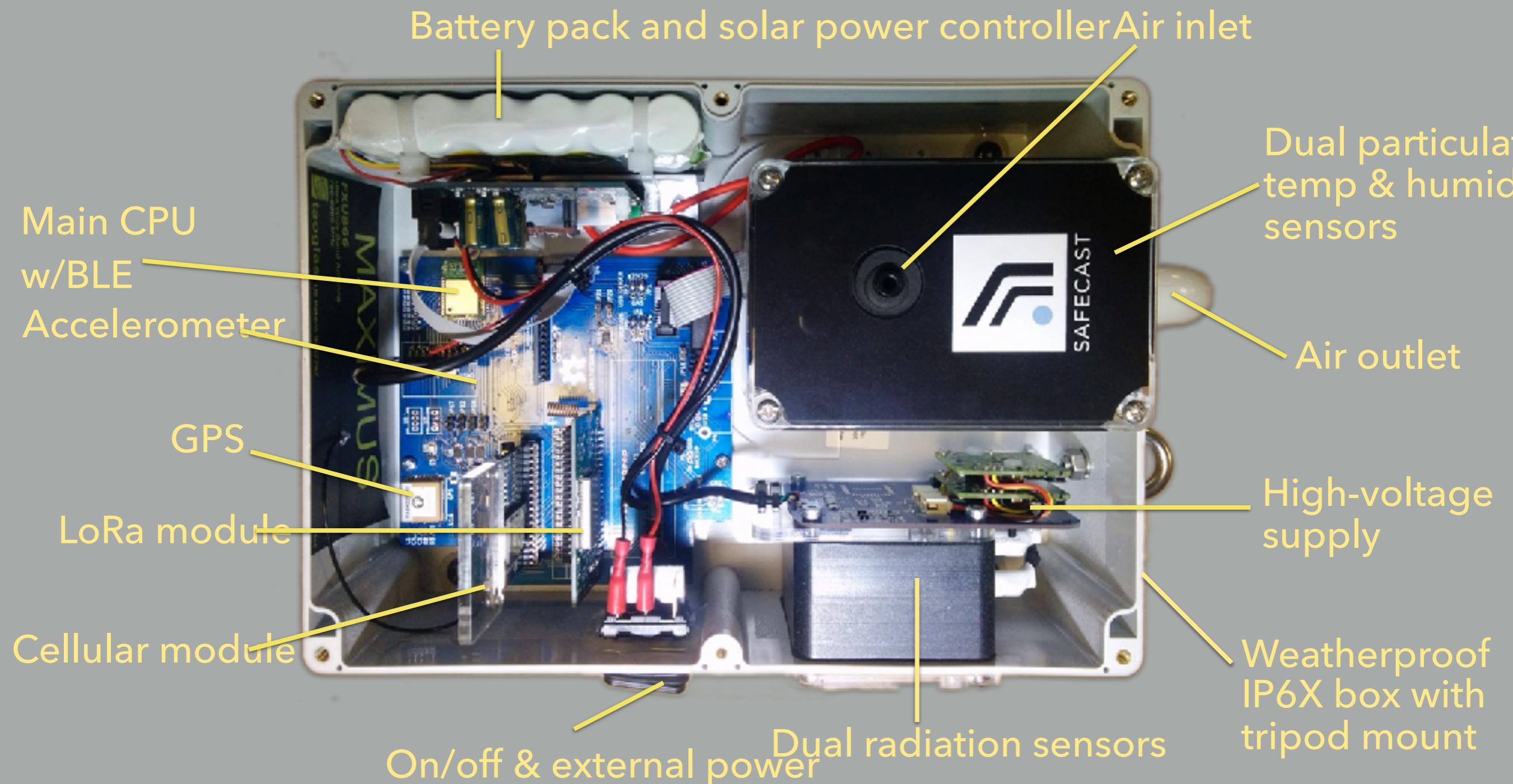
Looking for citizen-centered communication: dialogues between radiological protection or nuclear safety specialists and media professionals

How did media present the radiation risks after the Fukushima accident: a content analysis of newspapers in Europe

# Today's Challenges

- How to detect broken sensors
- How to detect “rogue” sensors
- How to ensure provenance of data collected - preserve history
- How to have no dependency on central database
- How to prevent “bricked” devices
- How to ensure network is autonomous and fully decentralized

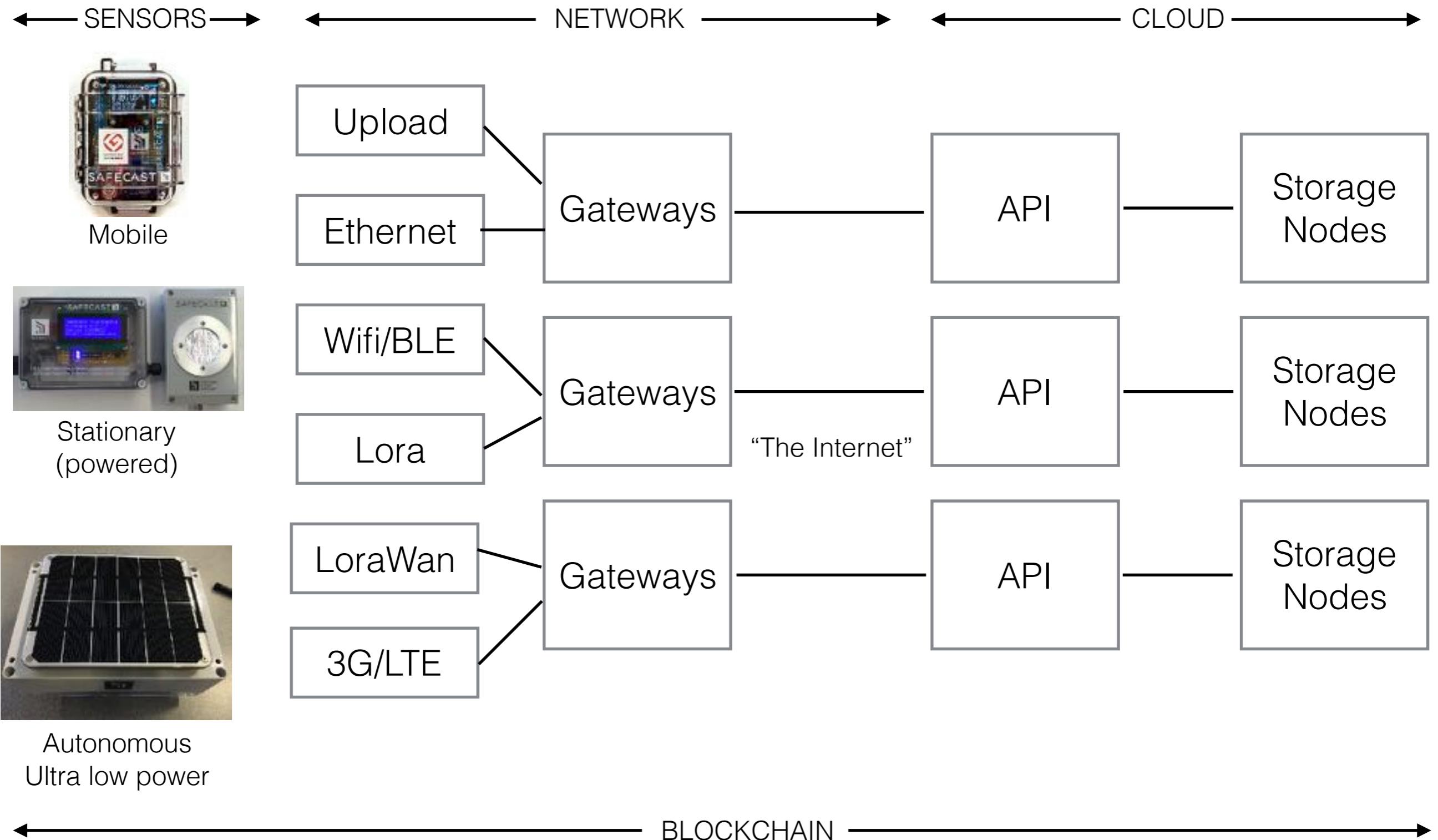




# Apply Blockchain Principles

- Distributed Trust
- Distributed Database
- Provenance
- Decentralized control
- Autonomous network

# Blockchain application across the Ecosystem



# Research Solution Space

- (lightweight) digital signature for integrity
- excluding irregular data from malicious sensor
- strength and weakness of each approach (including non blockchain, centralized solutions, consensus based, byzantine, public/private key)
- Provenance between sensor and CPU in end point (e.g. bGeigie)
- how to deal with (lack of) trust in the network
- how to handle amendments
- how to leverage citizen driven network (no single owner, openness, distributed trust, detect rogues)
- Reputation management for each sensor / participant
- algorithms that work with super low power CPU's
- Trusted Execution Environments
- how to handle broken sensors, offline data (store and forward), corrections, fault tolerant
- hack sensors - try to break the system from outside / Bsafenetwork
- economic incentive across network to enable autonomous processing (at endpoint, nodes)

# Applicability of Research

- IoT
- large open data sets
- self governance
- autonomous systems
- Device security
- News / Social Media

# THANK YOU