Citizen's participation in post-accidental recovery: "citizens in science" for dose measurements, improving health and well-being (SHAMISEN SINGS project)

ISGlobal
Barcelona Institute for Global Health

Institució CERCA
Centres de Recerca de Catalunya

A partnership of:

"la Caixa" Foundation

Clínic Barcelona Hospital Universitari · Parc de Salut Barcelona · MAR · Universitat de Barcelona · upf. Universitat Pompeu Fabra Barcelona · Generalitat de Catalunya · Gobierno de España · Ajuntament de Barcelona · Fundación Ramón Areces

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1. Citizen-Science participation: history and examples
2. SHAMISEN SINGS Project (CONCERT)
3. Ethical issues related to citizen-science participation
4. Benefits and challenges of citizen-science participation

I. Citizen-science participation: history & definitions

A definition of ***citizen-science***:

"**A citizen scientist** is a **volunteer** who collects and/or processes data as a part of a scientific enquiry"

by Jonathan Silvertowm

Source: Silvertowm, J. (2009). A new dawn for citizen science. *Trends in Ecology and Evolution*, 24(9): 467-471

Citizen-science participation

History of citizen-science participation:

200 years before: many scientists gained money by other professions ->

Examples:

Benjamin Franklin (1706-1790, an *inventor of lightening rod; demographical and population studies*) was a printer, diplomat and politician

Charles Darwin (1809-1888, *not a professional naturalist*) sailed on the *Beagle* as unpaid companion

Citizen-science participation

Some of the earliest projects:

USA (1900): *Christmas Bird Count* (run by the National Audubon Society)

UK (1932): The British trust for Ornithology was founded with a purpose of harnessing the efforts of amateur birdwatchers for the benifit of science and nature concervation -> contribution to the database held by National Biodiversity Network

More examples of projects on the next slide:

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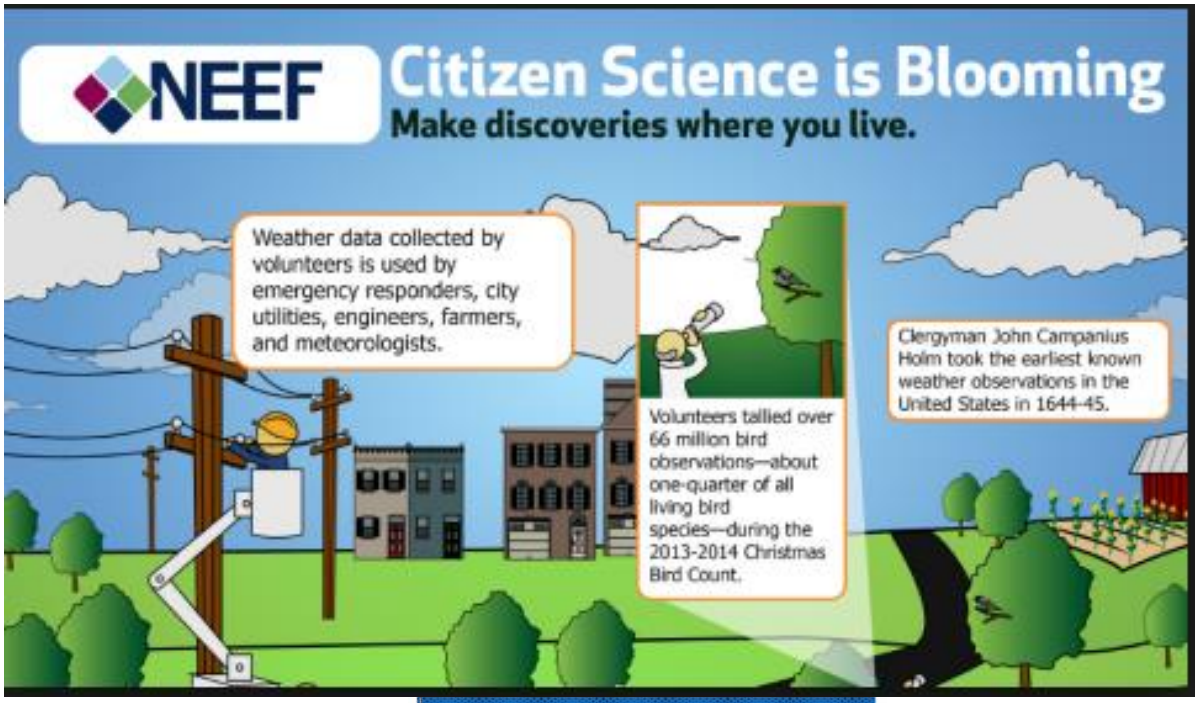
SHAMISEN SINGS
Stakeholder Involvement in Generating Science After Nuclear Emergencies

Table 1. A sampling of citizen science in ecology and evolution

Hypothesis-driven research		
Evolution MegaLab	Range-wide survey of shell polymorphism in banded snails in Europe, comparing new records with historical data to test for evolutionary change in response to climate warming and changes in predation pressure. See Box 1.	http://www.evolutionmegalab.org
Peppered moth	National survey of evolutionary change in peppered moth polymorphism carried out by first-year undergraduate students of the Open University in the UK.	[15]
Project PigeonWatch	Investigation of assortative mating and other behaviours in feral rock doves to test mechanisms that could maintain plumage polymorphism.	http://www.birds.cornell.edu/pigeonwatch
Volunteer mapping and monitoring		
British Trust for Ornithology	Nongovernmental organisation dedicated to using volunteers who follow statistically designed sampling strategies in research on birds.	http://www.bto.org
Christmas Bird Count	Annual bird survey run by the National Audubon Society (USA) for over a century. See Box 1.	http://www.audubon.org/Bird/cbc
OPen Air Laboratories (OPAL)	Consortium of universities and other institutions in England that is involving the general public in environmental research on water and air quality, soil science, climate and biodiversity. See Box 1.	http://www.OPALexplorenature.org
Citizen Science Canada	Citizen science site concentrating on ecological monitoring and run by Environment Canada.	http://citizenscience.ca
Invasive species survey	Mapping invasive species in the continental US.	http://www.citsci.org
National Biodiversity Network	Repository for UK biodiversity data, much of it collected by volunteers. Offers web services that enable other websites to dynamically access the data.	http://www.nbn.org.uk
Protea Atlas Project	A completed project that employed nearly 500 volunteers to map 377 species of Proteaceae in the Cape Floristic Region. The data have since been used in several ecological studies of the Cape flora [6–8].	http://protea.worldonline.co.za
Swedish Species Gateway	Well-designed site that collects observations of birds, butterflies, mammals, plants, fungi, fish and marine invertebrates from the public in Sweden.	http://www.artportalen.se
Chicago Wilderness Project	For volunteer conservationists in the Chicago area. Includes links to several citizen science projects.	http://www.chicagowilderness.org
The Lost Ladybug Project eBird	Survey of native and alien coccinelid beetles. Website for North American birders to record and contribute personal sightings to a continental database. More than 4.3 million records were submitted in 2006.	http://www.lostladybug.org http://ebird.org
Tools, guidance and resources		
Citizen Science Toolkit	A systematic guide to designing a citizen science project, including links to existing projects and resources.	http://www.birds.cornell.edu/citscitoolkit/toolkit
CyberTracker	Widely used, customisable freeware for data capture in the field. Runs on PDAs and certain mobile phones.	http://www.cybertracker.org
Discover Life	A miscellany of online keys for identification of various North American and some tropical taxa.	http://www.discoverlife.org
Earthwatch	International organisation that matches volunteers with approved environmental research projects.	http://www.earthwatch.org
Electronic Field Guide iSpot	Open source software for producing hierarchically structured keys. New social networking site for natural history observations. Links beginners with sources of help for identification.	http://www.electronicfieldguide.org http://www.ispot.org.uk
Mushroom Observer	Website for recording observations of fungi and lichens and getting help with identification.	http://www.mushroomobserver.org
The Volunteer Monitor	Newsletter of the Volunteer Watershed Monitoring project run by the Environmental Protection Agency (USA) and published for 20 years. The summer 2008 issue, available from the website, contains several articles of general interest including a list of scientific publications generated from volunteer data.	http://www.epa.gov/owow/monitoring/volunteer/issues.htm

Source: Silvertown, J. (2009). A new dawn for citizen science. *Trends in Ecology and Evolution*, 24(9): 467-471


Citizen Science
STARDUST @ HOME
CLEAN BOATS CLEAN WATERS
vital signs
Operation Spider
Clean Annapolis River Project
NestWatch
redmap
REDMAP.ORG.AU
WILDLIFE WATCH
Great Swamp Watershed Association
nature's notebook
eBird
GREAT World Wide STAR COUNT
Operation Magpie
COAST
BIRD Sleuth
Project FeederWatch
Operation Bluetongue
ADIRONDACK INVENTORY ALL-TAXA BIODIVERSITY
Calflora
House Finch Disease Survey
Golden-winged Warbler Atlas Project
Birds in Forested Landscapes
FBC
Fresno Bird Count
The Last Ladybug Project
JAY WATCH
A CITIZEN-SCIENCE PROGRAM
RIS
www.CelebrateUrbanBirds.org
CORNELL LAB of ORNITHOLOGY
H2O CHELSEA
NYC Cricket
GREAT LAKES WORM WATCH
OAKMAPPER
Monitoring Sudden Oak Death
Project BudBurst
www.budburst.org
prbo
JOURNEY NORTH
TheCornellLab of Ornithology
Program Development & Evaluation


NEEF
Citizen Science is Blooming
Make discoveries where you live.
Weather data collected by volunteers is used by emergency responders, city utilities, engineers, farmers, and meteorologists.
Volunteers tallied over 66 million bird observations—about one-quarter of all living bird species—during the 2013-2014 Christmas Bird Count.
Clergyman John Campanius Holm took the earliest known weather observations in the United States in 1644-45.


CITIZEN SCIENCE
JOIN THE CLUB!
Citizen Science Club Summary:
The citizen science club connects middle school teachers and students with hands-on science projects – projects in which club members collect data for scientific investigations. The club is co-led by a math teacher and a science teacher. Club members will complete basic fieldwork at various sites in this fall, and will use winter club sessions to analyze data and create a related research question that can be investigated during spring field work.
Members will upload collected data, share experiences with other club members and analysis research projects posters at a research symposium late spring 2017.
JOIN TODAY!
How can I get involved? All students interested in becoming a Citizen Science Club member please contact:
Teacher Name
in Room 123
NYC
Department of Education


Verizon
10:23 PM
79%
Blogger
BlogPress
PLoS
Citizen Science
Galaxy Zoo
Natur...ebook
CreekWatch
Project Noah
Counter
WildObs
Observer
Roadkill
WildLab Bird
Redwoods
Tempe...Blast
Instant Wild
Starmap

Citizens-science participation in radiation

Citizen-science in radiation field:

The results of peer reviewed publications show a small proportion (0.02%) related to radiation topic with citizen-science approach: 18 publications were detected by PubMed search with key words "citizen-science" or "citizen science" and "radiation" -
5 inputs with "nuclear disasters" and 2 for "dosimetry".

After checking the abstracts for their context, it was found the only relevant publication by Brown et al. (2016) concerning to the tool and program "Safecast: successful citizen-science for radiation measurement and communication after Fukushima".

J Radiol Prot. 2016 Jun 6;36(2):S82-S101. [Epub ahead of print]

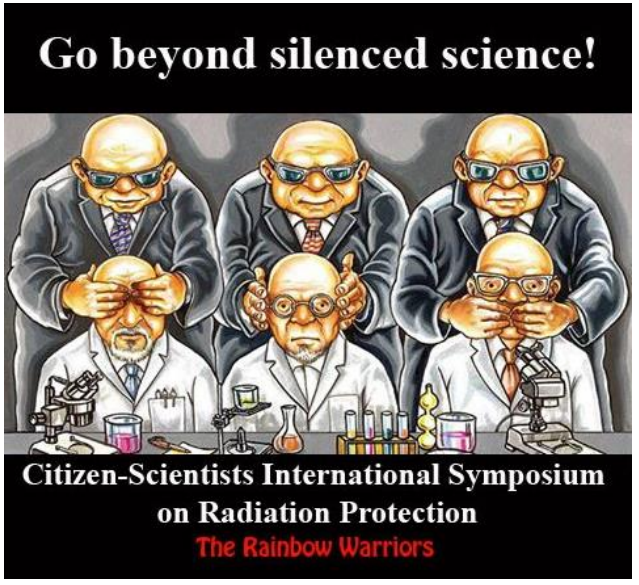
Safecast: successful citizen-science for radiation measurement and communication after Fukushima.

Brown A[1], Franken P, Bonner S, Dolezal N, Moross J.

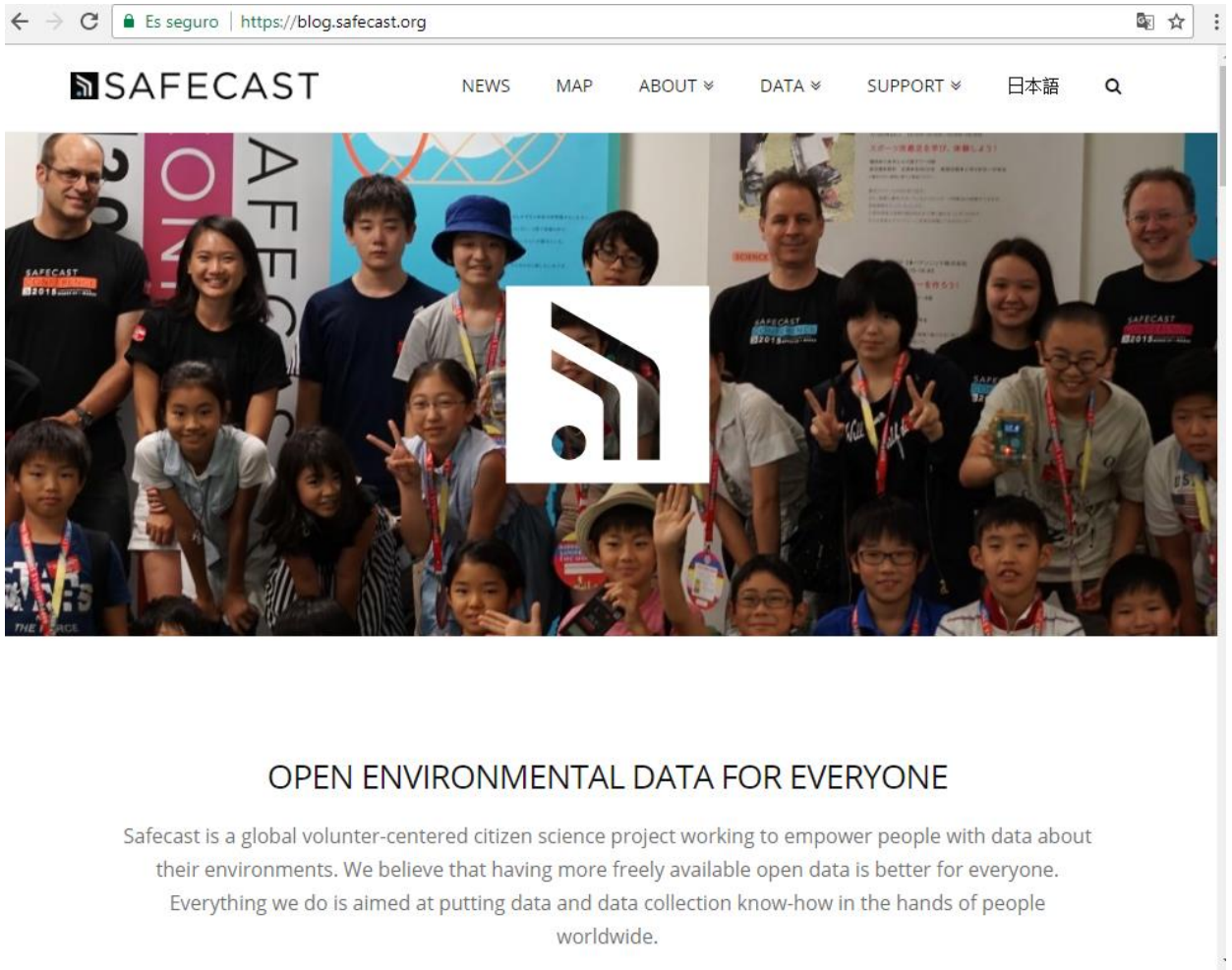
Author information

Abstract

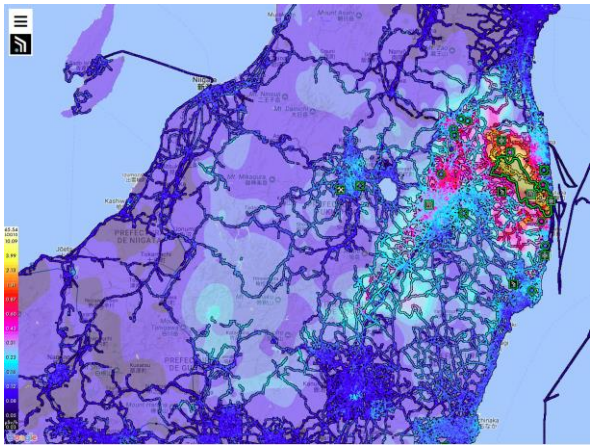
The Fukushima Daichi Nuclear Power Plant disaster, which began on 11 March 2011, provided a crucial opportunity to evaluate the state of preparation on the part the powerplant operator (TEPCO), relevant Japanese government agencies, and international oversight bodies, to gather necessary information 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 initiated on 12 March 2011, one day following the start of the accident. Since then the group has implemented participatory, open-source, citizen-science-centered radiation mapping solutions developed through a process of collaborative open innovation. The information Safecast provided has proven useful to experts, to policy makers, and to the public. This paper briefly describes the methodology and toolsets Safecast has developed and deployed, as well as organizational and social aspects, and summarizes key results obtained to date. In addition, it discusses appropriate criteria for evaluating the success of citizen-science efforts like Safecast, and places it in context with other non-governmental radiation monitoring efforts.



Citizen-science participation



https://blog.safecast.org/



ISGlobal Barcelona Institute for Global Health

Citizen-science participation

SHAMISEN SINGS Stakeholder Involvement in Generating Science After Nuclear Emergencies

http://realtime.safecast.org/

Search

Location	ID	Time of Capture (GMT)	µSv/h	cpm	Latitude	Longitude	On/Offline
China, Hong Kong, RadHealth	157	5 mins ago 2018-01-10T10:42:40.000Z	0.228	76	22.28482	114.14	Online
Japan, Chiba, Ichikawa City, JAM	100162	4 mins ago 2018-01-10T10:43:50.000Z	0.083	10	35.74591	139.91815	Online
Japan, Chiba, Ichikawa City, JAM	100161	4 mins ago 2018-01-10T10:43:50.000Z	0.093	31	35.74591	139.91815	Online
Japan, Chiba, Joe SCnano	330141	9 mins ago 2018-01-10T10:39:07.000Z	0.090	30	35.74585	139.918213	Online
Japan, Chiba, Joe SCnano	330142	9 mins ago 2018-01-10T10:39:07.000Z	0.116	14	35.74585	139.918213	Online
Japan, Fukushima, Fukushima-shi, Funabacho	100322	6 mins ago 2018-01-10T10:41:59.000Z	0.108	13	37.752099	140.470826	Online
Japan, Fukushima, Aizu Wakamatsu, Eyes Japan							
Japan, Fukushima, Date							
Japan, Fukushima, Date							
Japan, Fukushima, Fukushima City, Kamata Azatsukinowayama							
Japan, Fukushima, Fukushima City, Kamata Azatsukinowayama							
Japan, Fukushima, Fukushima City, KunKunClub							
Japan, Fukushima, Fukushima City, KunKunClub	100421	1 min ago 2018-01-10T10:46:32.000Z	0.144	48	37.7233303	140.4767968	Online

Location	ID	Time of Capture (GMT)	µSv/h	cpm	Latitude	Longitude	On/Offline
USA, DC, Washington, NRDC	201002	2 years ago 2016-05-20T02:55:50.539Z	0.000	0	38.905002	-77.034823	Offline long
USA, DC, Washington, NRDC	201001	2 years ago 2016-05-20T02:47:46.685Z	0.000	0	38.905002	-77.034823	Offline long
USA, NH, Gilford, Ray SC5	300051	3 hours ago 2018-01-10T07:49:46.000Z	0.012	4	42.565056	-70.783592	Offline long
USA, CA, Palo Alto, Triple EI (2)	106	7 mins ago 2018-01-10T10:41:01.533Z	0.075	7	37.442836	-122.128094	Online
USA, MD, Kensington, NRDC office 2	200022	1 year ago 2016-12-07T15:00:27.000Z	0.066	8	41.3323	-73.837	Offline long

Citizen-science participation

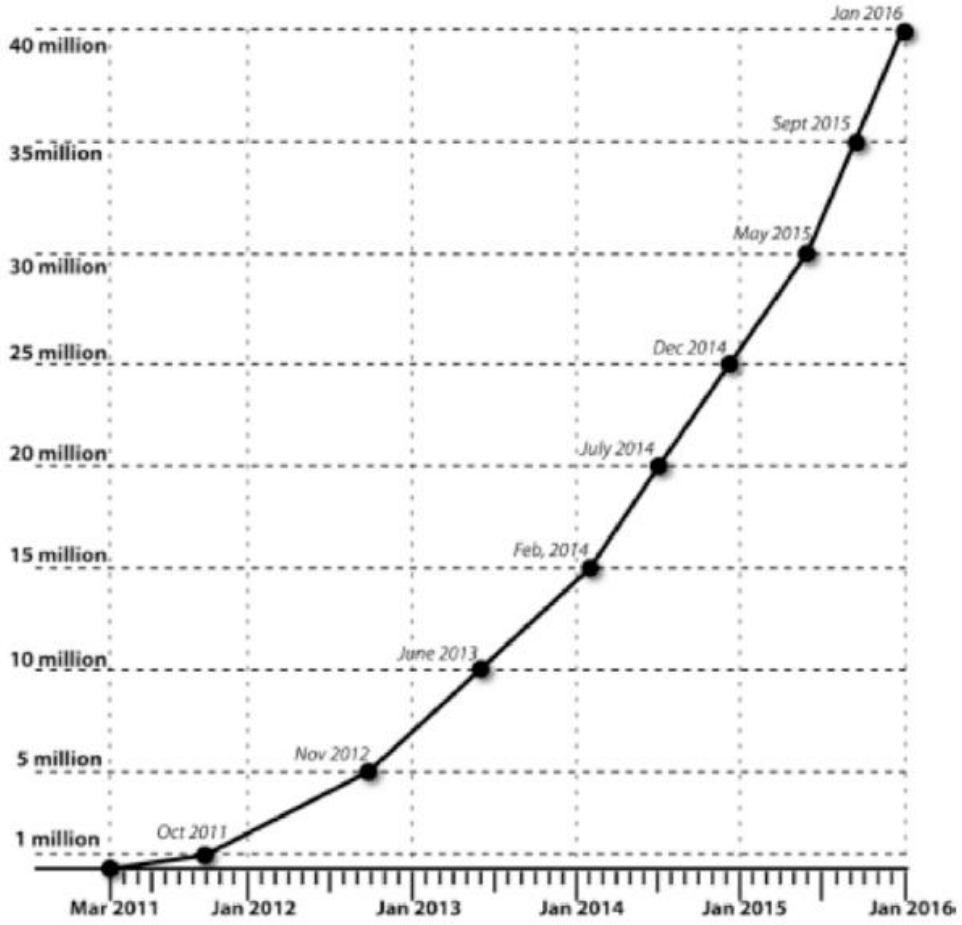
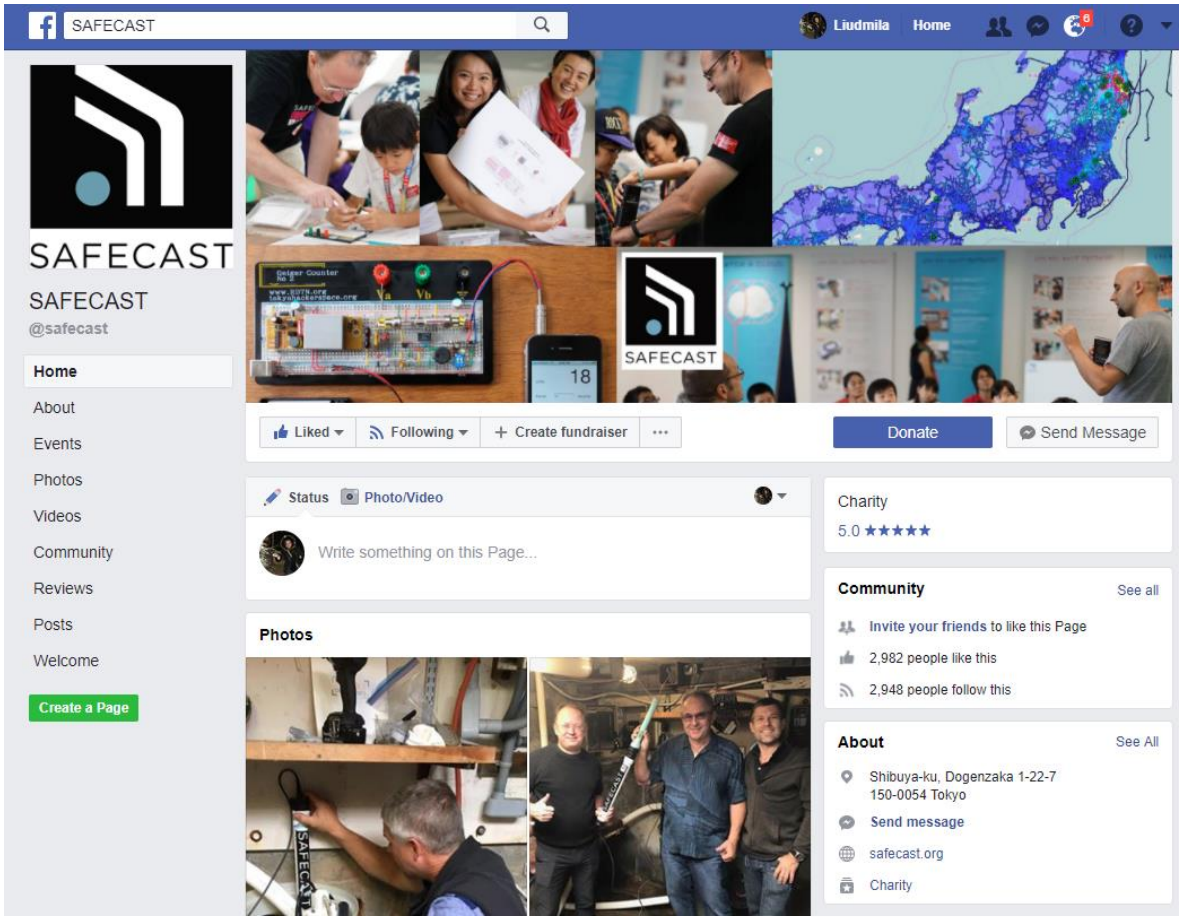


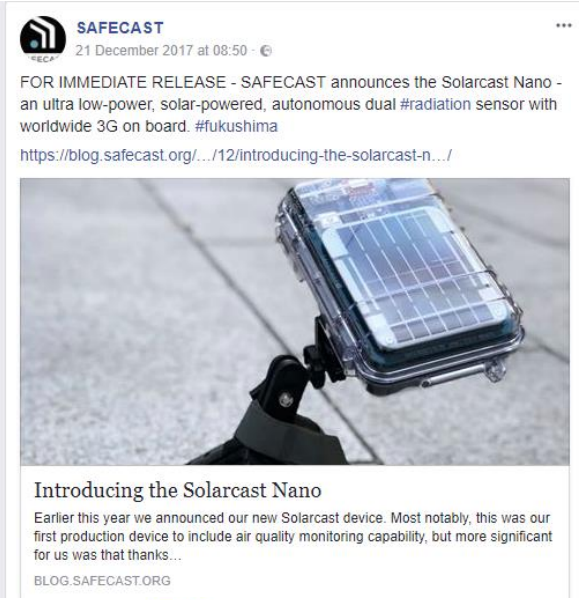
Figure 5. Growth of Safecast dataset.

Source: Brown et al. 2016

Citizen-science participation

Safecast on Facebook



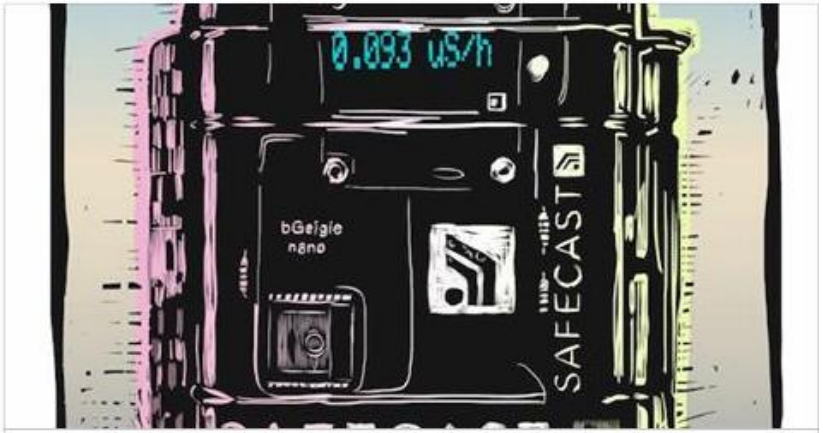


Citizen-science participation

SAFECAST
4 October 2017 ·

HOT FROM THE #SAFECAST PRESS: The Safecast Report 2017 has just been released. Part 1 covers everything about the project progress and plans. Part 2, which covers all aspects of the Fukushima disaster itself, is to follow soon!

https://blog.safecast.org/.../safecast-report-2017-part-1-no.../



Safecast Report 2017, Part 1 now available

Part 1 of the Safecast Report 2017 is now available for download as a print-quality PDF. The report has grown in size, and in contrast with previous years, we are making it available in sections fo...

BLOG.SAFECAST.ORG

1.12 Always Improving

Safecast is the work of volunteers, and is by no means "finished", "perfect" or "the final word". Some would say it's nothing to boast about—lots of work to do! There's plenty of room for improvement and "wouldn't-it-be-nice-ifs." This applies to the Safecast Report as well. The information provided here represents the best data we have found, and the best of our understanding and knowledge, but, as a Dutch proverb says, "Don't skate over one-night ice." We encourage readers and volunteers to check the data and information themselves and form their own opinions about the environment we're living in. "Is it safe?" is a question whose answer differs from individual to individual. Our daily lives are full of risks, but we shouldn't let that paralyze us. However, being aware will hopefully allow us to make better decisions, and to focus our individual actions to better improve our environment and our lives.

If you see anything you think could be done better, needs fixing, or can be complemented, or if you simply want to help out or to contribute, let us know.

And if you want to learn how to make your data open and more useable (as a citizen, company, university, or government body), we're here to help.

Get in touch: info@safecast.org and @safecast on twitter

II. SHAMISEN SINGS PROJECT PRESENTATION

SHAMISEN SINGS project (PI: Elisabeth Cardis)
SHAMISEN (**N**uclear **E**mergency **S**ituations - **I**mprovement of dosimetric, **M**edical **A**nd **H**ealth **S**urveillance) - **S**takeholder **IN**volvement in **G**enerating **S**cience (SINGS)

Web: http://radiation.isglobal.org/index.php/en/shamisen-sings-home

SHAMISEN SINGS
Stakeholder Involvement in Generating Science After Nuclear Emergencies

EUROPEAN JOINT PROGRAMME FOR THE INTEGRATION OF RADIATION PROTECTION RESEARCH
CONCERT

ISGlobal
Barcelona Institute for Global Health

GOALS

The general goal of SHAMISEN SINGS is **enhancing Citizen Participation in the aftermath of a radiation accident**
through the collection of data on ***dose measurements*** and on ***health and well-being*** indicators.

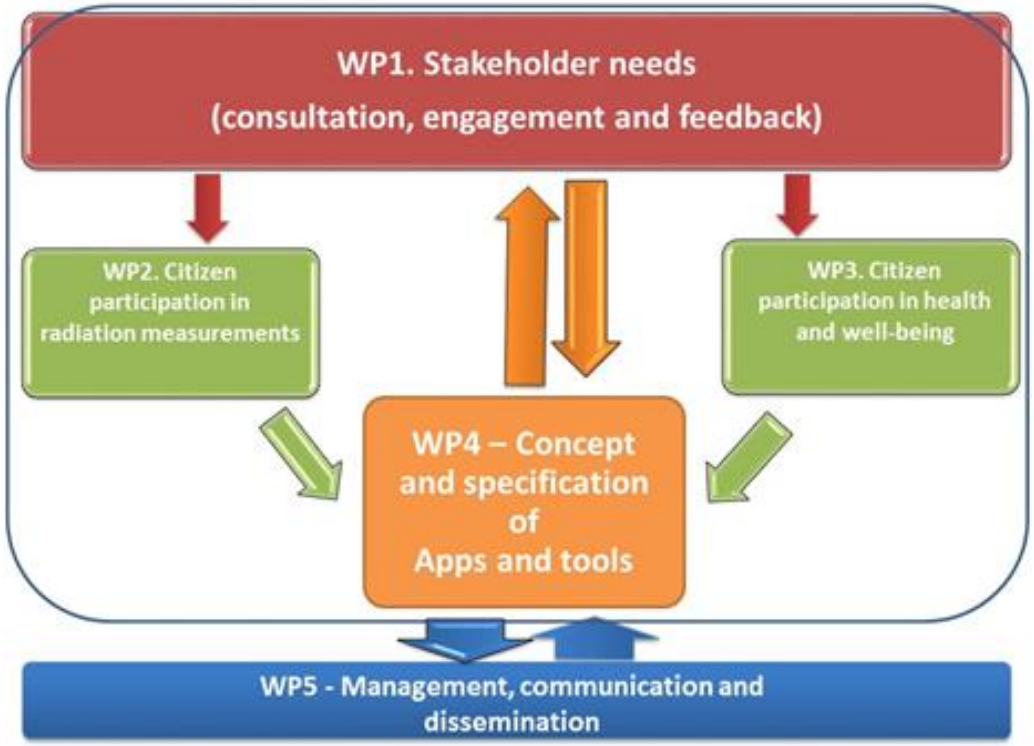
Specific objectives:
-**Interact with stakeholders** (including citizens and experts) to assess their needs and interest in contributing to global dosimetry and health measurements.

-**Review existing APPs** related to: 1) citizen-based dose measurements & 2) for health monitoring (including social and psychological issues of a radiation accident).

-**Assess ethical challenges** and implications of both the APPs and citizen science activities by co-reflection between natural and social scientists, public, authorities and other stakeholders.

GENERAL STRUCTURE

The project's structure:



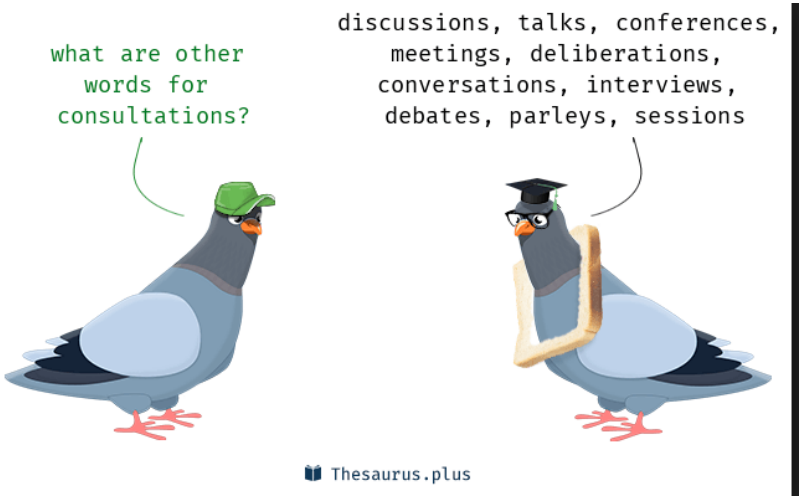
WP1 objectives & tasks

WP1. Stakeholder needs (consultation, engagement and feedback on proposals)
Lead: ISGlobal, Partners: WIV-ISP, NMBU, CEPN, ISS, IRSN, Experts: V. Chumak (Ucraine), Ph. Pirard (France), N. Novikava (Belarus)

Objective:

-to engage stakeholders (representatives of local populations, teachers, medical personnel, authorities) to identify their needs (immediate and long-term phases of an accident), and

- propose a tool (or framework for a tool) using new information technologies.



WP1 objectives & tasks

WP1. Stakeholder needs (consultation, engagement and feedback on proposals)

Task 1.1. Stakeholder meeting and consultation to identify unmet needs (reunions + on-line)

Task 1.2. Focus group assessment of proposals *(from WP2 and WP3)* ***by stakeholders***

Task 1.3 SHAMISEN-SINGS Consensus Workshop *(Lead NMBU)* (to address the **societal, ethical** and **technical challenges** with APP development and use, as well as its contribution to Citizen Science)

WP2 objectives & tasks

WP 2 – Citizen participation in radiation measurements
Lead: ISS; Partners FMU, IRSN, UAB, ISGlobal; Expert: V. Chumak (Ukraine)

Objectives:
-to improve the usage of devices and apps able to turn smartphones (other tools) in radiation detectors for self-measurements by different categories of population, and

-to provide the collection and feed of data, essential for dose reconstruction.



WP2 objectives & tasks

WP 2 – Citizen participation in radiation measurements

Task 2.1 Critical review of existing plug-in's and apps to turn smart devices in radiation detectors

Task 2.2 Improvement of the appropriateness (accuracy, robustness and user friendliness) of self-measurements. Integration *of citizen measurements* ***into existing monitoring networks*** *at the national and European level*

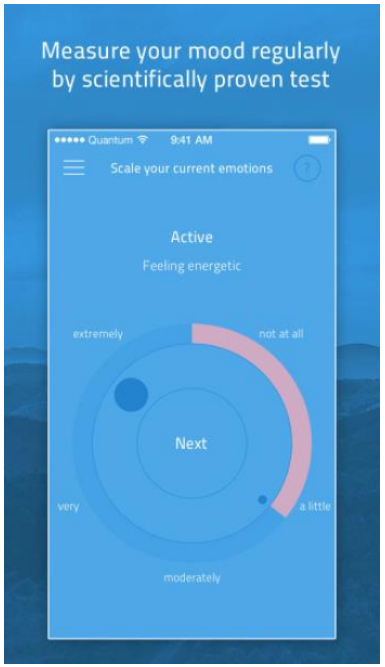
Task 2.3 Improve or develop interactive platforms *or tools* ***for communication and dialogue*** *on radiation measurements and results (based on needs learnt from WP1 stakeholder consultation)*

Task 2.4 Optimization of proposals *based on WP1 feedback*

WP3 objectives & tasks

WP 3 – Citizen Participation in health and well-being monitoring

Lead FMU. Partners: ISGlobal, IRSN, WIV-ISP, NMBU, CEPN, Ph Pirard (expert)



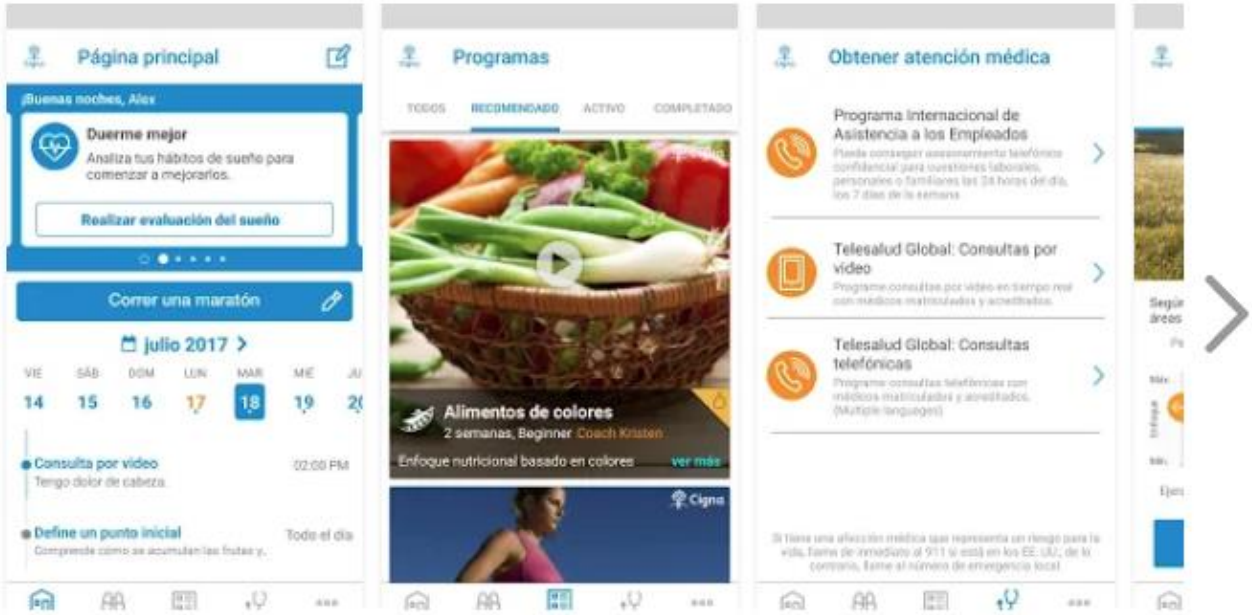
Cigna Wellbeing

Cigna **Salud y bienestar** ★★★★☆ 3

PEGI 3

Esta aplicación es compatible con todos tus dispositivos.

Añadir a la lista de deseos **Instalar**



WP3 objectives & tasks

WP 3 – Citizen Participation in health and well-being monitoring

Task 3.1 Review *of existing apps and tools on the monitoring of health and well-being*

Task 3.2 Incorporate communication and dialogue on radiation effects on health *within the App or tool (based on consultation from WP1)*

Task 3.3 Adapt the tools *identified to gather information on health and behaviour of populations exposed to radiation (based on stakeholders needs identified in WP1)*

WP4 objectives & tasks

WP 4 Concept and specifications of App(s) and/or tools
Lead: WIV-ISP; Partners: IRSN, ISGlobal, ISS, experts: V. Chumak, Ph. Pirard, O. Bondarenko)

Task 4.1 Development of guidelines/concept *for apps and tools*

Task 4.2 Development of specifications (including tutorials) *for the App(s) or tools, or if feasible,* ***development of*** *demonstration/****prototype App***

Task 4.3 Development of database management plan

Task 4.4 Economic evaluation *of the proposed approach*

WP5 objectives & tasks

WP5 Coordination and Dissemination.
Lead: ISGlobal, Partners: ISS, WIV-ISP, FMU

Task 5.1 Coordination

Task 5.2 Dissemination

III. Ethical issues related to Citizen-science participation

1. ***Data collection and data sharing***

2. ***Other possible conflicts in use of data (official sources vs. private)***

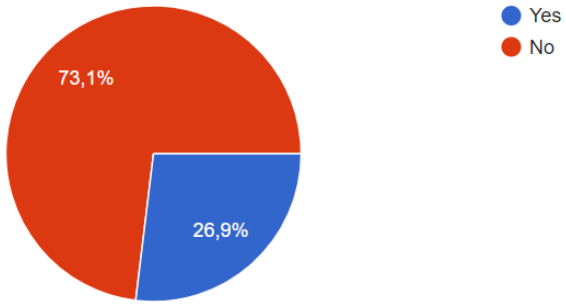
3. ***Type of information gathered and linkage needed for further data use and applications (***medical surveillance, epidemiology, environmental monitoring, etc.)

4. OTHER issues ???

III. Ethical issues related to Citizen-science participation

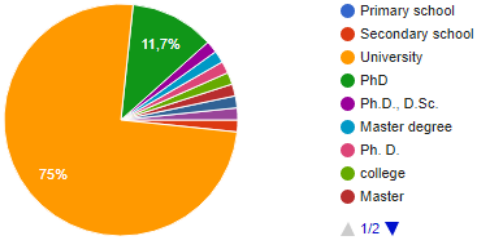
14. Are you aware of existing mobile apps or personal devices that allow you to perform your own radiation dose measurements?

78 respuestas



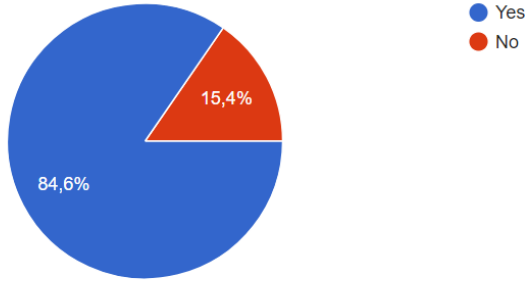
6. Level of education:

60 respuestas



8. Do you know what ionizing radiation is?

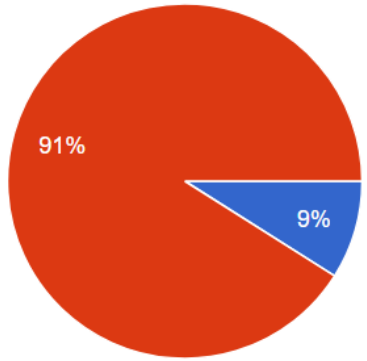
78 respuestas



III. Ethical issues related to Citizen-science participation

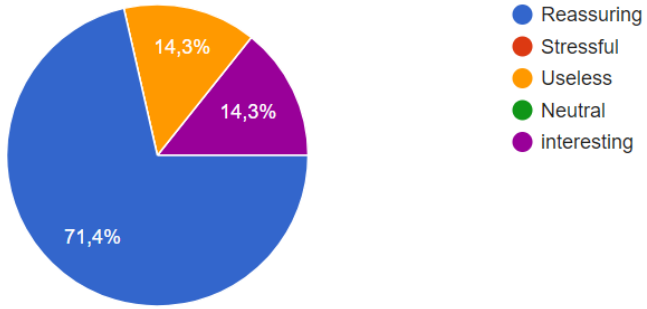
15. Have you ever used any of these mobile apps or devices (radiation measurements)?

78 respuestas



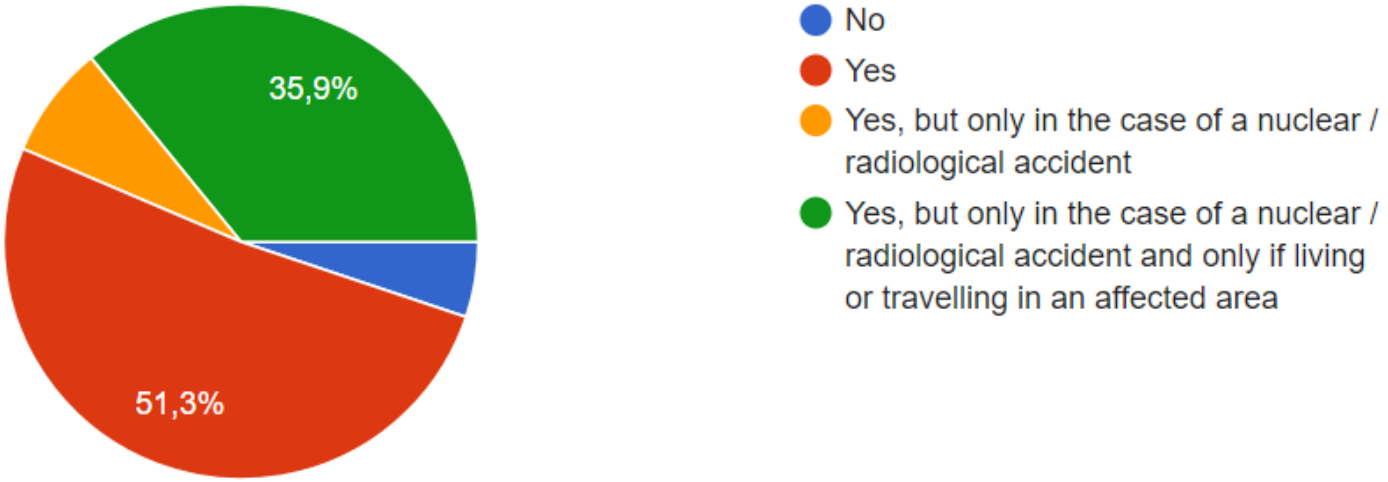
16. Would you say that using these apps/devices was or could be

7 respuestas



17. Would you be interested in using a mobile app that allows you to measure radiation?

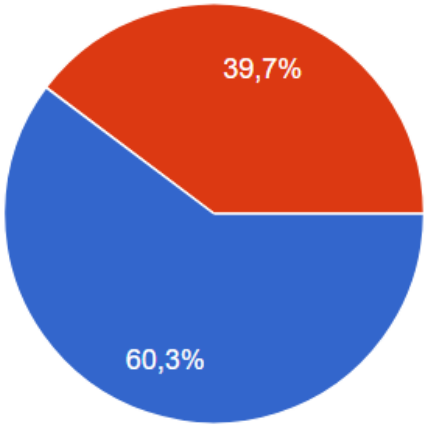
78 respuestas



III. Ethical issues related to Citizen-science participation

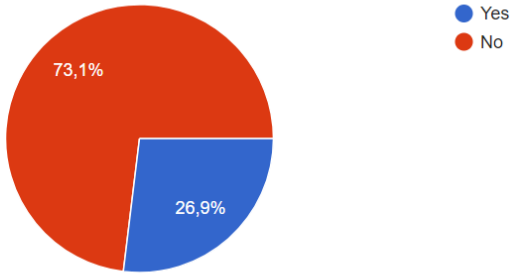
20. Are you aware of existing mobile apps or personal devices that allow you to monitor your health status?

78 respuestas



14. Are you aware of existing mobile apps or personal devices that allow you to perform your own radiation dose measurements?

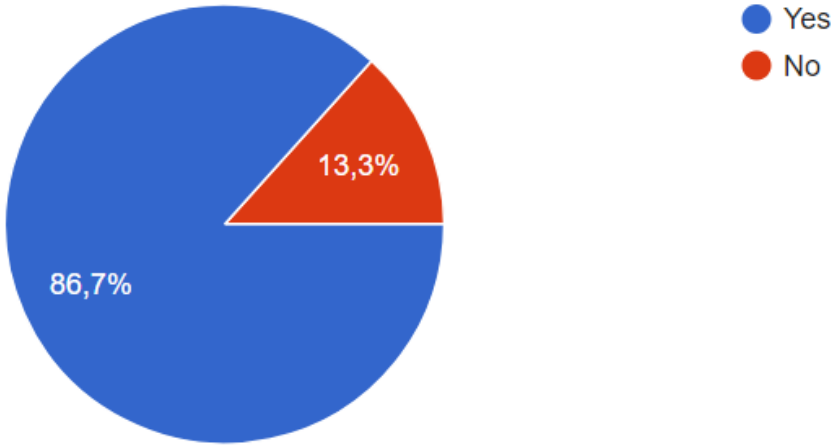
78 respuestas



III. Ethical issues related to Citizen-science participation

27. Would you be willing to share your own data on the app (for example with medical workers, scientists, for environmental monitoring, etc...)?

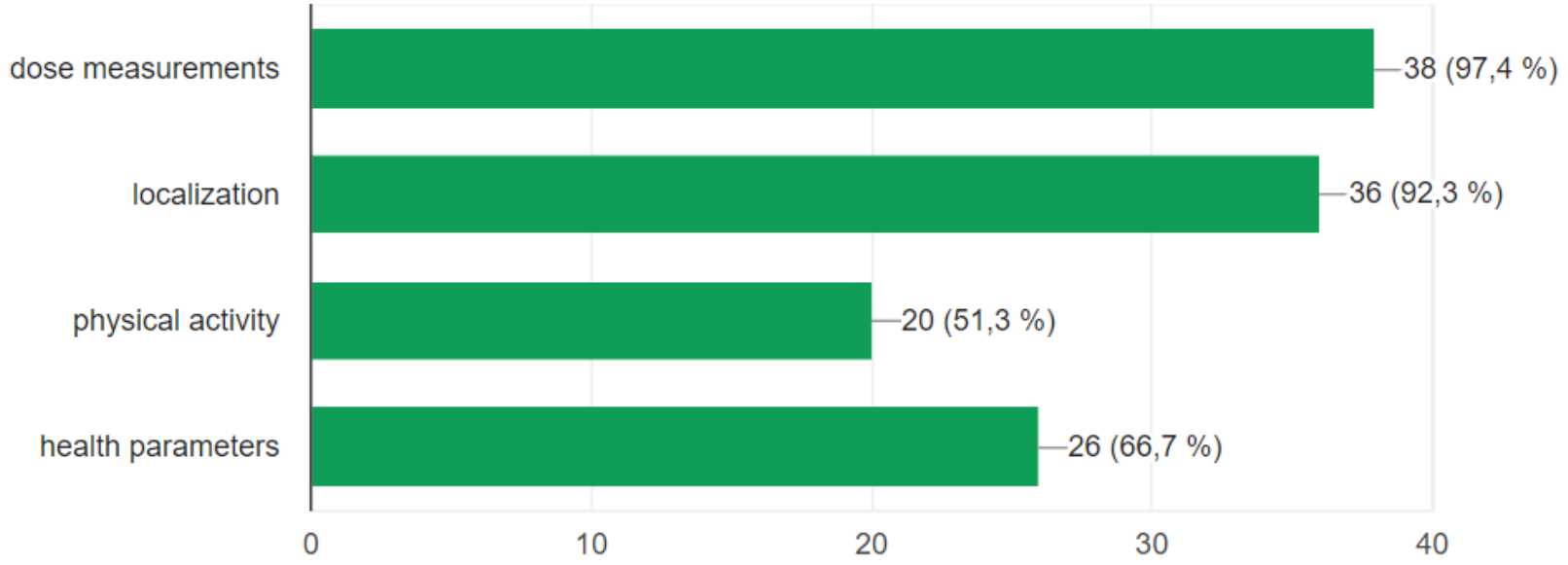
45 respuestas



III. Ethical issues related to Citizen-science participation

27b) Which data would you like to share:

39 respuestas



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Adelaida
Sarukhan
Scientific writer

Your Voice is Important! Developing an App to Engage Citizen Participation in Case of a Radiation Accident

1 June 2018

*[This article has been written by the ISGlobal members: **Adelaida Sarukhan**, scientific writer, **Liudmila Liutsko**, postdoctoral fellow, and **Elisabeth Cardis**, Head of the Radiation Programme]*

Filter by...
Dates

All

2013

2014

2015

How would you rate your knowledge of **ionising radiation**? Are you concerned about **potential health risks of living near a nuclear power plant**? Would you be interested in using a mobile app that allows you

> *"Would you be interested in using a mobile app that allows you to measure radiation?"*

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bit.do/shamisensings_sp

Gracias por ayudarnos respondiendo al cuestionario, te tomará unos 5-10 minutos de tu tiempo

YOUR VOICE IS IMPORTANT!

How would you rate your knowledge of **ionising radiation**? Are you concerned about potential health risks of living near a **nuclear power plant**? Would you be interested in using a mobile app that allows you to **measure** radiation?

These are some of the questions of the **survey** designed by the European-funded **SHAMISEN-SINGS project**, which aims to enhance citizen participation in case of a radiation accident.

We want to develop **mobile devices or applications** that allow the general population to do their own radiation measurements, monitor their health, monitor radiation levels in real time, and make **informed decisions.**

Shamsisen-Sings Project

bit.do/shamisensings_en

Thanks for helping us answering the questionnaire, only takes 5-10 minutes of your time.

SHAMISEN SINGS
Stakeholder Involvement in Generating Science After Nuclear Emergencies

EUROPEAN JOINT PROGRAMME FOR THE INTEGRATION OF RADIATION PROTECTION RESEARCH
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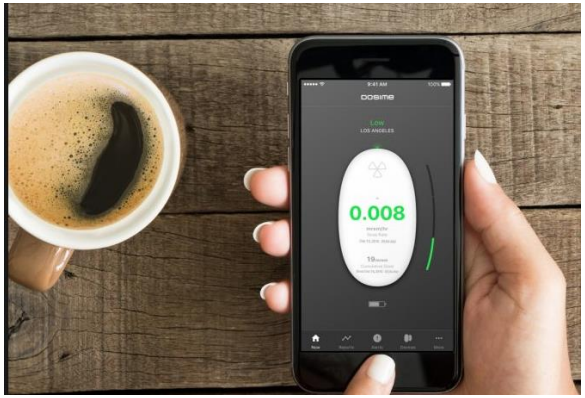
IV. BENEFITS and CHALLENGES of Citizen-science participation

Benefits:

-for projects & society (data gathering, awareness)

- for citizen-science participants (formation, information, awareness & control -> reduction of anxiety & related stress)



BENEFITS and CHALLENGES of Citizen-science participation

Challenges:

- correct use of methods -> providing correct data (superficial contamination of tools, etc…)

- big data storage

Acknowledgements

Thanks to contributors:

Liudmila Liutsko[1-3], Adelaida Sarukhan[1-3] and Elisabeth Cardis[1-3]
& **SHAMISEN SINGS consortium**

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SHAMISEN SINGS participants (partners and experts)

Thank you!

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