EVALUATION OF THE CONTRIBUTION OF CITIZEN SCIENCE PROJECTS TO RADON RESEARCH

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**RadoNorm citizen science model**

- **Review, map and assess existing citizen science initiatives**
- Develop a **citizen science model** for radon measurement and mitigation
- **Test** the model in France, Ireland, Hungary and Norway
  - May 2022 – Q1 2023
- **Final model** proposed
- **Network** of citizen science projects through open calls
  - September 2022
- **Recommendations for empowering Citizen Science (CS) initiatives**
  - October 2022 – launch open calls
  - November 2024

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● “the active engagement of the general public in scientific research tasks.” (Vohland et al., 2021)
● “the many modes of citizen science” (Kasperowski & Kullenberg, 2019)


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Mapping and evaluation of citizen science contributions to radon research (2021)

<table>
<thead>
<tr>
<th>Citizen science initiative</th>
<th>Country</th>
<th>Promoter</th>
<th>Level of participation (Haklay, 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evict Radon, 2010-2018</td>
<td>Canada</td>
<td>Evict Radon, University of Calgary</td>
<td>Crowdsourcing</td>
</tr>
<tr>
<td>(ongoing)</td>
<td></td>
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<tr>
<td>Citizen science with</td>
<td>Ireland</td>
<td>EPA Ireland</td>
<td>Distributed intelligence</td>
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<tr>
<td>Wexford libraries</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(ongoing)</td>
<td></td>
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<tr>
<td>Radon Project, 2018-2019</td>
<td>Israel</td>
<td>Technion &amp; TCSSC</td>
<td>Crowdsourcing</td>
</tr>
<tr>
<td>(ongoing)</td>
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<tr>
<td>Radioactivity Laboratory,</td>
<td>Italy</td>
<td>INFN</td>
<td>Distributed intelligence</td>
</tr>
<tr>
<td>2017 (ongoing)</td>
<td></td>
<td></td>
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<tr>
<td>Worcester, Massachusetts,</td>
<td>USA</td>
<td>Clark University</td>
<td>Participatory science</td>
</tr>
<tr>
<td>2006-2007</td>
<td></td>
<td></td>
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<tr>
<td>Tennessee Radon program,</td>
<td></td>
<td>Dpt. Environment and Conservation</td>
<td>Crowdsourcing</td>
</tr>
<tr>
<td>ongoing</td>
<td>USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radon on the RADAR, 2020</td>
<td></td>
<td>Univ. of Kentucky</td>
<td>Crowdsourcing</td>
</tr>
<tr>
<td>- 2024</td>
<td></td>
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<tr>
<td>Navajo National Radon</td>
<td></td>
<td>Community Uranium Exposure Journey to Healing</td>
<td>Crowdsourcing</td>
</tr>
<tr>
<td>Program, 2014-2015</td>
<td></td>
<td>Program</td>
<td></td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>ECSA principle</th>
<th>Indicator / questions</th>
</tr>
</thead>
</table>
| 4. Citizen scientists may, if they wish, participate in multiple stages of the scientific process. | *Do citizen scientists participate in the problem definition?*  
*Do citizen scientists participate in developing the research question?*  
*Do citizen scientists participate in the design of the research method?*  
*Do citizen scientists gather data?*  
*Do citizen scientists analyse or interpret data?*  
*Do citizen scientists communicate or disseminate results?* |
| 5. Citizens receive feedback from the project | *Are citizen scientists informed of how their data are being used?*  
*Are citizen scientists informed of the research outcomes?*  
*Are citizen scientists informed of the policy or societal outcomes?* |
Conclusions from the analysis of 10 ECSA principles (1/2)

1. All the citizen science initiatives involve citizens in scientific endeavour (as radon sensors or measuring points to collect radon)

2. Genuine scientific outcome (new knowledge or understanding regarding radon) is generated. In Canada, a legislative action was prompted

3. Both professional scientists and citizen scientists recognise benefits from taking part

4. Citizen scientists participate in data gathering but barely in other stages of the research project

5. Citizen scientists receive feedback from the project (at the start and at the end)
Conclusions from the analysis of 10 ECSA principles (2/2)

6. **Limitations and biases** are considered and controlled for by the scientists
7. **Data** is publicly available (open access) in most cases
8. Citizen scientists are **acknowledged** in project results and publications
9. **Evaluation** of scientific output, data quality, participant experience and policy or societal impact is undertaken to some degree
10. **Legal and ethical** considerations are mostly taken into account

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Key lessons learned

- No one model of CS is better than the other, they are all valid and dependent on the specific context;
- There is no radon related CS project registered in any **CS database**;
- There is confusion between CS and education/awareness campaigns;
- Difficult to distinguish between **CS and citizens measuring** radon in their dwellings;
- All projects initiated by authorities and/or research organisations following a **top-down** approach;
- Most projects follow **level 1 of Haklay’s participation typology** (**crowdsourcing**);
Radon citizen science projects are missing the final & most important steps needed to reduce exposure:

• 17 steps identified from first hearing about radon to confirming that I have reduced my exposure [Hevey, 2016]
• Most radon citizen science initiatives stop at steps 11-13:
  11. I test my home
  12. I understand my results
  13. I know I am at risk
• RadoNorm citizen science projects aim to focus on supporting homeowners to take the final steps:
  14. I want to reduce the risk
  15. I know how to reduce the risk
  16. I reduce the risk: remediate/ mitigate
  17. I confirm the risk has been reduced: re-test.

Key lessons

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Next steps for Radon Citizen Science Projects

- Test the toolkit (France, Ireland, Norway, Hungary) - Caroline Schieber presentation

- **Fund and support CS initiatives** related to radon testing or radon mitigation in radon prone areas.

- RadoNorm is seeking to partner with:
  - New citizen science projects on radon looking for support, financial and otherwise, to grow and become sustainable;
  - Communities interested in co-designing research into radon;
  - Organisations in the public and private sectors exploring the use of citizen science in their work related to radon measurements and/or radon remediation.

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Open call for proposals (125,000€ in total) in **autumn 2022**: grants from 1,000 to 25,000€ per project for a 6 months funding dedicated activities, resources and tools to set up and run the project. Includes FAQs.
Guide for applicants

- To support applicants through the application process for the RadoNorm call – main source of information
- Contents:
  - What is RadoNorm?
  - What is Citizen Science?
  - What is the RadoNorm toolkit?
  - Open call: competition: what is the funding for and conditions; how much funding is available and how it can be spent? How many projects will be funded? How do I apply? Who is eligible? Can I get funding from other sources?
  - Selected proposals: how they are selected? IPR? Ethics? GDPR issues? Is subcontracting allowed? Is the beneficiary allowed to change team members? Do I have to keep track of expenses?
  - Annexes: eligible costs; review criteria; declaration of honour, negotiation documents, FAQs
Guide for applicants

Who is eligible?

- Every entity legally registered and operating in an EU member state is allowed to participate in one application, either on its own or as part of a consortium.
- Individuals cannot apply.
- Non-profit organisations, educational institutions, consortia, research institutes and universities can apply.

*RadoNorm will fund citizen science projects proposed in radon prone areas*
Proposal title

Idea:
- Strength and novelty of the idea
- Relevance
- Open approach

Impact
- Value proposition
- Sustainability

Implementation
- Planned activities
- Team

Resources (personnel, equipment, travel, other, subcontracting)
www.radonorm.eu/activities/radonorm-citizen-science/
Evaluation of citizen science contributions to radon research

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Citizen engagement
Participatory research
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Abstract

In order to reduce lung cancer due to radon exposure situations, not only authorities and organisations but also citizens may meaningfully contribute to radon mitigation actions. Citizen science (CS) initiatives are recognised for their scientific, societal and policy value related to environmental issues. The purpose of this paper is to identify which CS initiatives in the field of radon exist and evaluate to what extent these CS initiatives contribute to radon research and/or radiation protection from radon. We conducted a systematic review of internet pages and scientific literature (September–December 2020) as well as expert consultation to help us identify and assess CS initiatives on radon (September 2020–February 2021). The ten principles of the European Citizen Science Association have been used as a starting point to develop indicators for the analysis of CS contributions to radon research. The results show that there are at least eight CS initiatives in the world contributing to radon related research which comply, to some degree, with each of the ten principles. In all these initiatives citizens contributed or are contributing meaningfully to radon testing and measurements. However, most of them apply the simplest form of participation (crowdsourcing) and only one focuses on radon mitigation. Moreover, unlike CS initiatives in other environmental areas, those focusing on radon are always led by the authorities and/or universities in a top-down manner. Yet, results confirm that both the present in radon related fields and the
THANK YOU FOR YOUR ATTENTION

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