



Detector CzechRad



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on behalf of the research team*

Citizen radiation measurements in the Czech Republic

- 2011 - Fukushima Daiichi nuclear disaster in Japan, Safecast established
- 2013 - Safecast introduces the bGeigie Nano detector
- 2015 - SÚRO buys first bGeigie Nano and starts providing data
- 2015-2019 - project RAMESIS - citizen radiation measurements for schools etc., borrowing bGeigies for free, receiving data
 - number of bGeigie Nanos in SÚRO increases to ~60 pieces
- 2020 - production of bGeigie Nano stopped, SÚRO needs a replacement

Citizen radiation measurements in the Czech Republic

- 2021-2024 - development of [CzechRad](#),
produced 1000 units within the [IMPAKT](#) project
- 2024/2025 - 300 CzechRads produced within the [CITISTRA](#) project,
started distribution, developed new tools etc.

Note: all measured data are now part of the [Safecast](#) dataset licensed as [CC0 Public domain](#) - e.g. everyone can use the data without restrictions

CITISTRA project

*CITizen measurements as complementary radiation monitoring
STRAtegy in threats due to armed conflict or natural disasters*

The project deals with these questions:

Can citizen measurements help us in emergencies / armed conflicts?

Which are the trusted groups? How to train these people?

Can we expect usable data from them?

Participating institutions:



National Radiation
Protection Institute



SLOVAK
MEDICAL
UNIVERSITY



THE HENRYK NIEWODNICZAŃSKI
INSTITUTE OF NUCLEAR PHYSICS
POLISH ACADEMY OF SCIENCES



CITISTRA

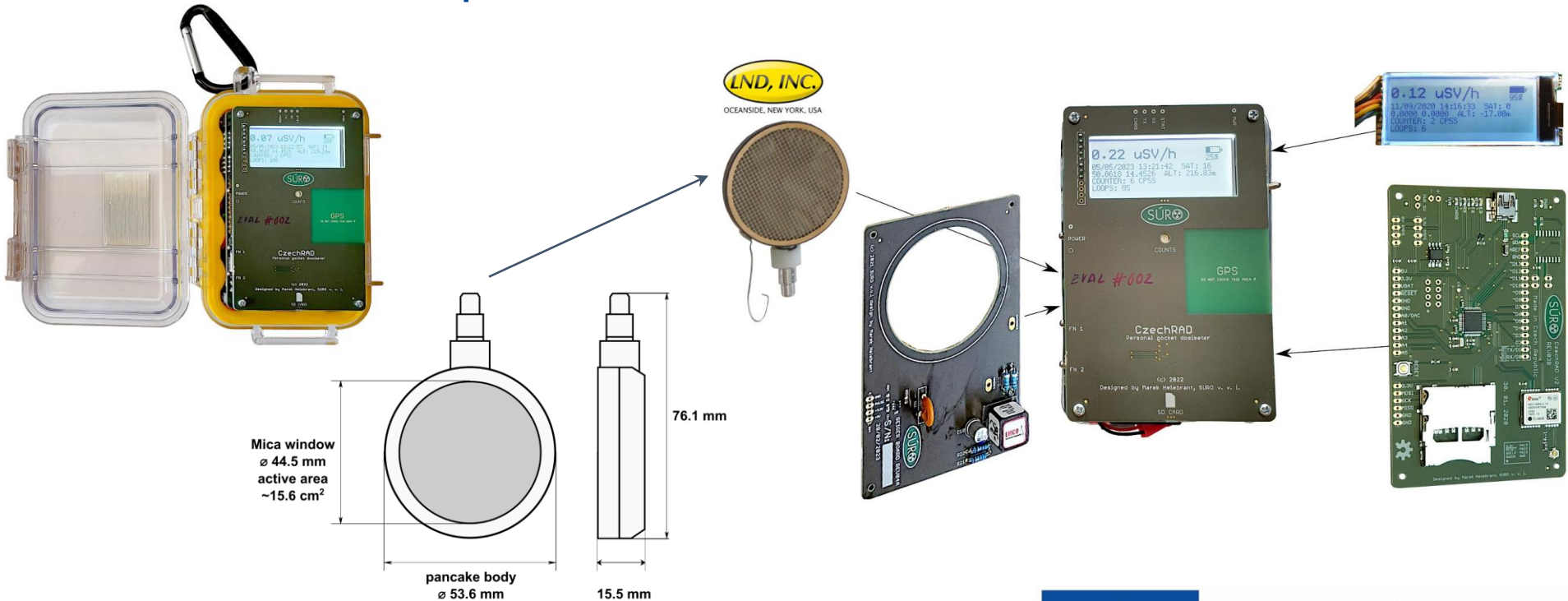
Brussels, 4th June 2025



Co-funded by
the European Union

CITISTRA - CzechRad detector

- CzechRad is portable detector inspired by SAFECAST bGeigie Nano
- rechargeable battery, GPS and automatic data saving to SD card
- pancake GM tube, rugged weatherproof case



Brussels, 4th June 2025



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the European Union

CITISTRA - CzechRad detector

- no wireless (Wifi, Bluetooth), data download via usb cable or card reader

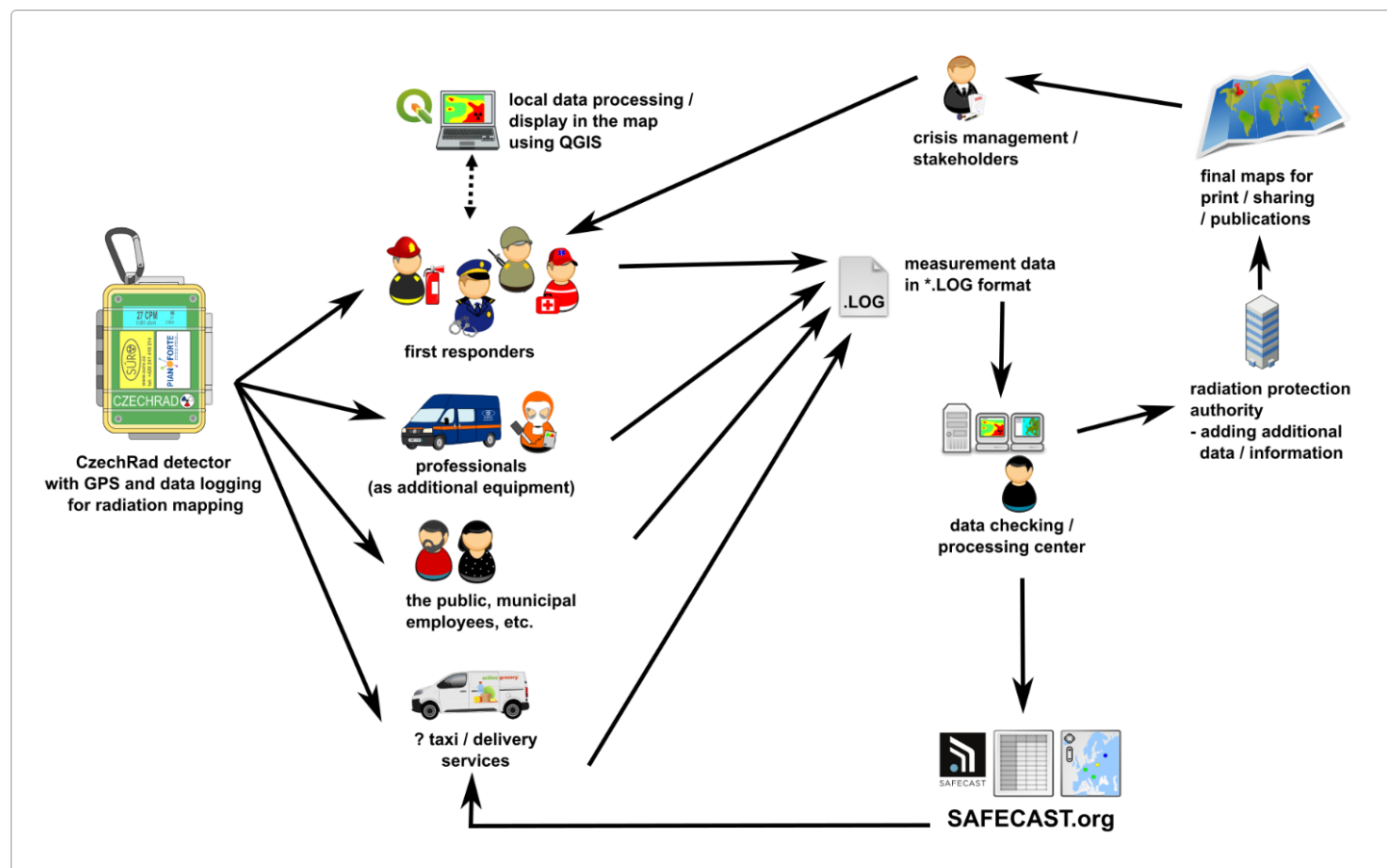
Advantages

- 1) safe to use in areas where wireless devices are prohibited, or can cause trouble to the user (e.g. detected by the enemy)
- 2) privacy / user safety - user decides when to send the data and what not to send (for example, upload of Safecast data measured in Ukraine were intentionally delayed - to prevent the device user from getting into trouble)
- 3) cannot be remotely hacked

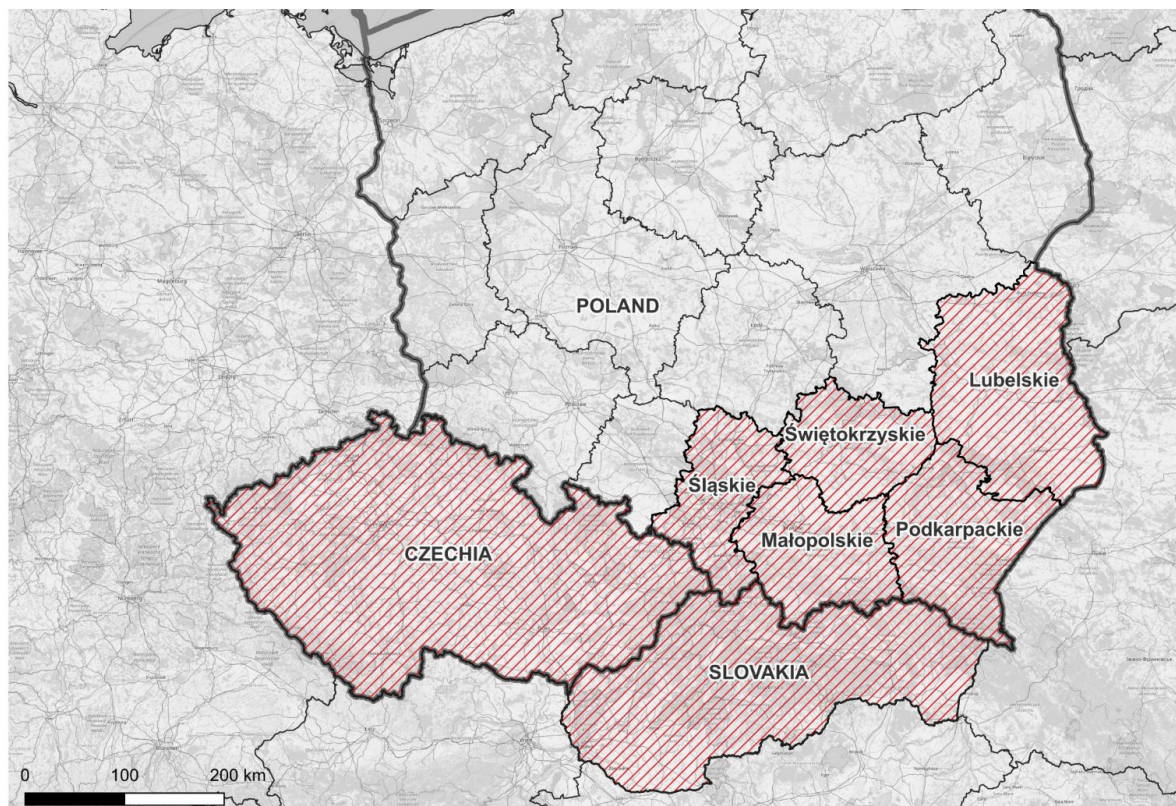


CITISTRA - CzechRad detector

- implementation of the CzechRad detector with GPS
- 200 detectors → Poland
- 100 detectors → Slovakia
- use of existing and proven applications - QGIS and Radiation Toolbox plugin, SAFECAST.org online apps (Safecast Map and API)



CITISTRA - detector coverage



created in QGIS, background map: © OpenStreetMap contributors, administrative data: CZ: ČÚZK, [2024], CC BY 4.0; PL: GUGIK, CC BY 3.0; World: Administrative boundaries by geoBoundaries.org (CC BY 4.0)

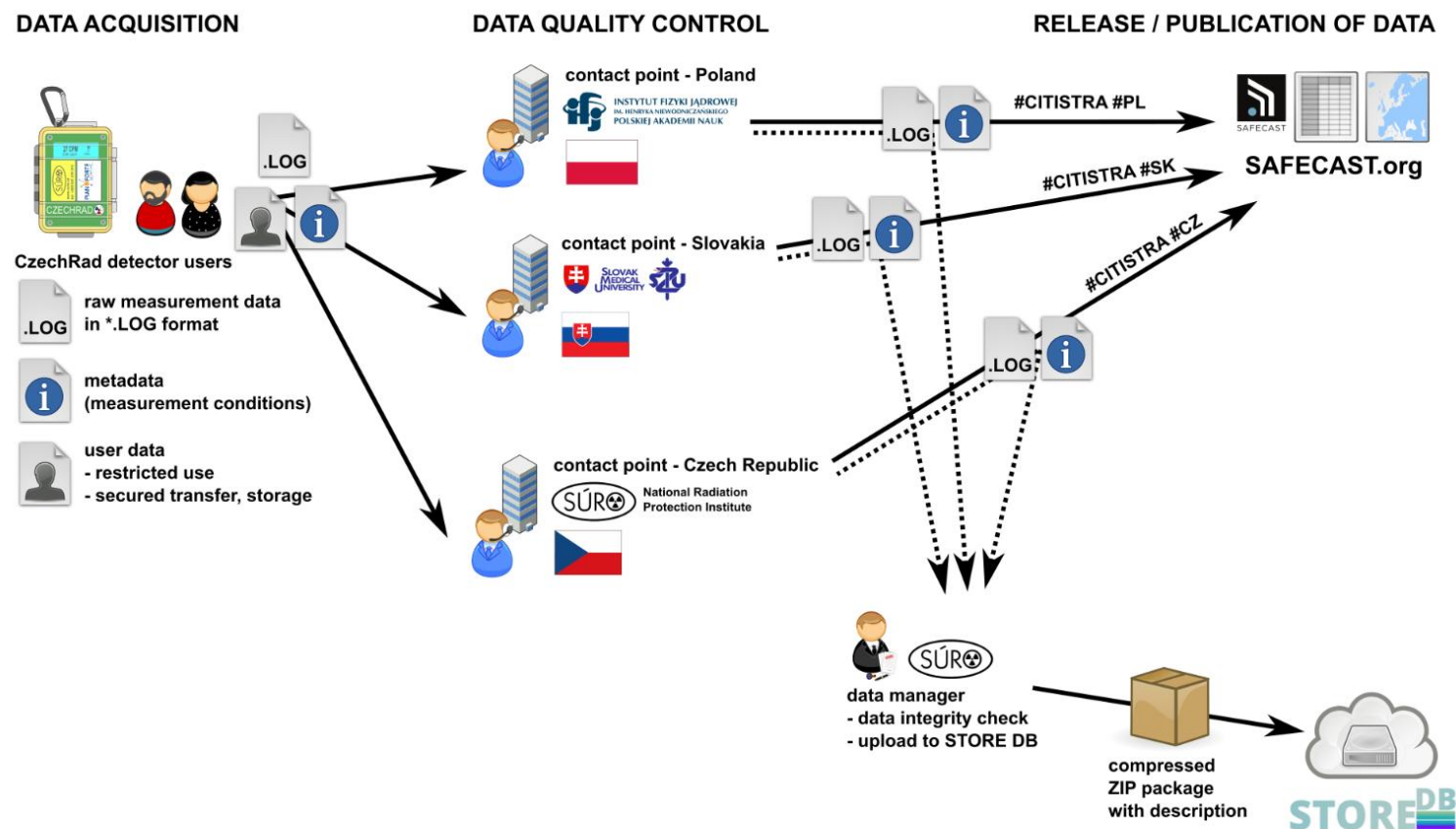
- distribution of the detectors is in progress
- Czech Republic
- Slovakia
- Poland - selected voivodeships

Resources: Background map: © OpenStreetMap contributors

Administrative boundaries: Runfola, D. et al. (2020)
geoBoundaries: A global database of political administrative boundaries. PLoS ONE 15(4): e0231866.
<https://doi.org/10.1371/journal.pone.0231866>

CITISTRA - data management

- measurements - local level
(detector user)
(local /offline viewing available)
- national contact points
- data quality control
- support, checking “hotspots”
- **release** of the data
to Safecast / public



CITISTRA - detector production

- 300 devices successfully produced, now being distributed
 - each device tested with Cs-137 source
 - detailed laboratory tests of several pieces in SÚRO
- X-ray and gamma ray laboratory



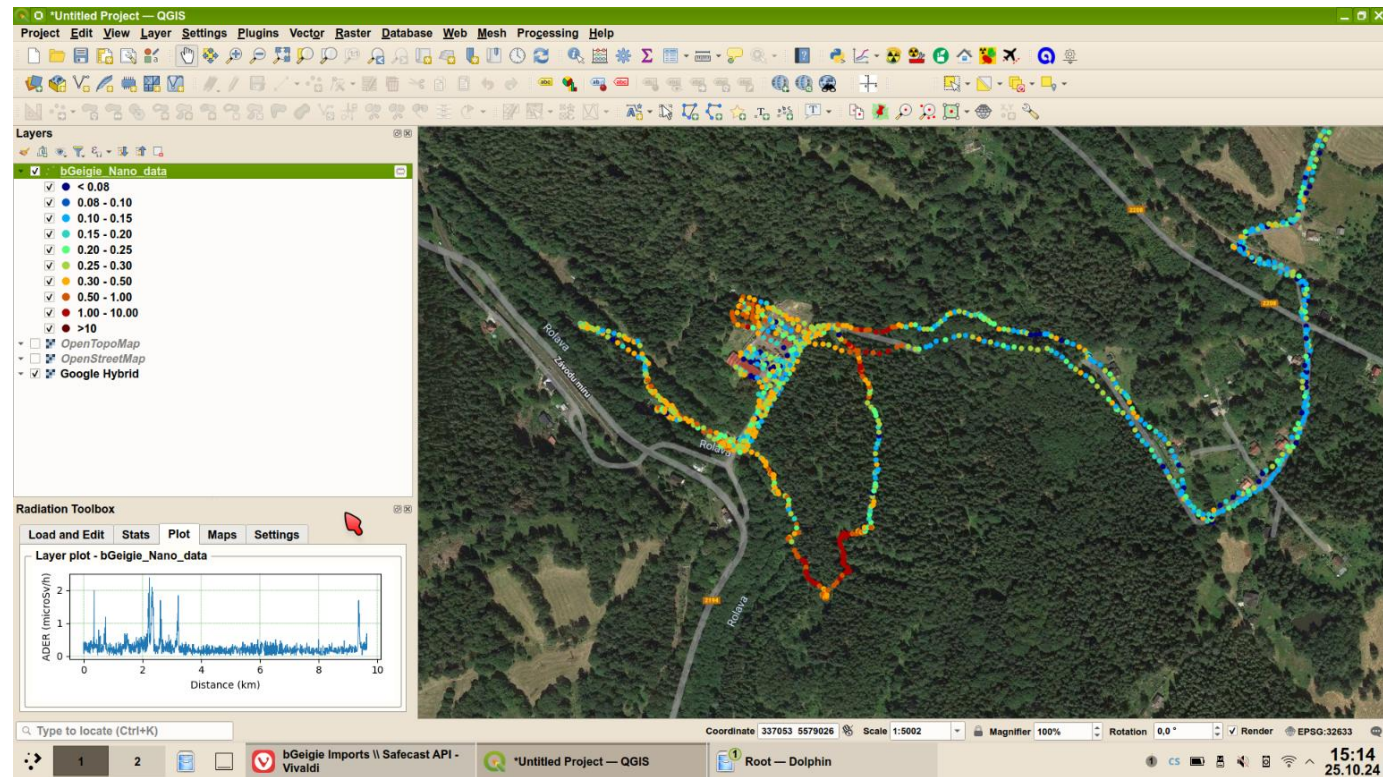
CITISTRA - detector distribution



Photo: IFJ PAN

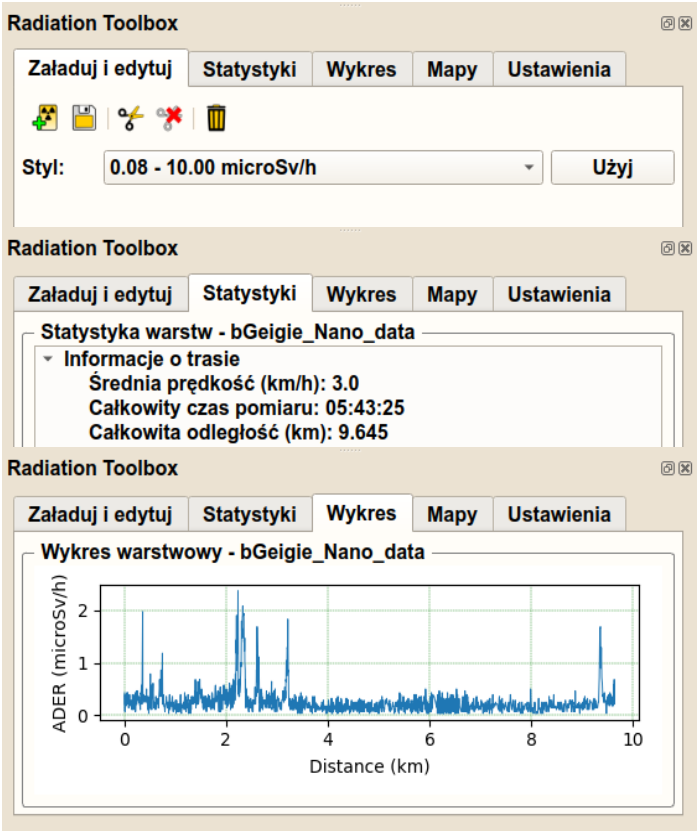
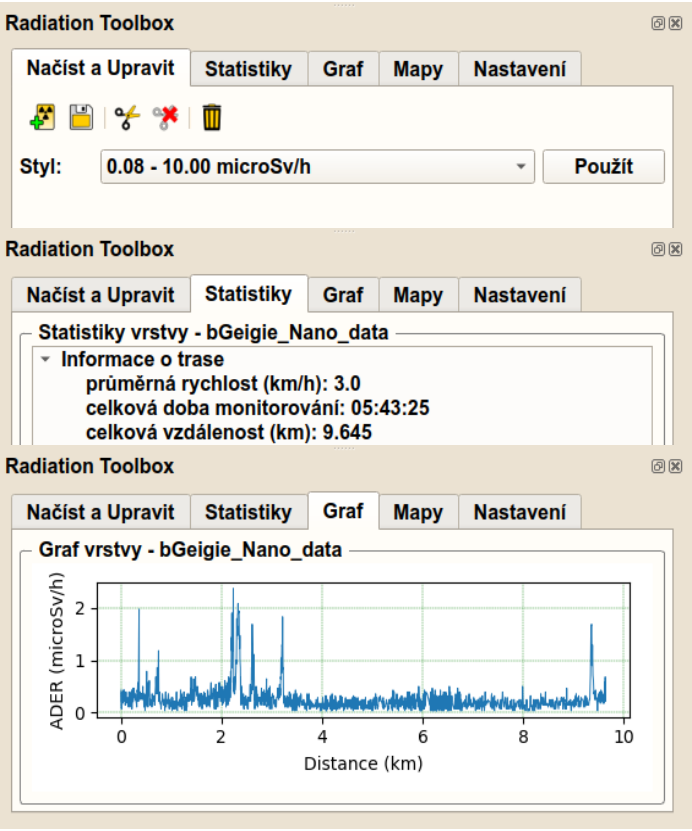
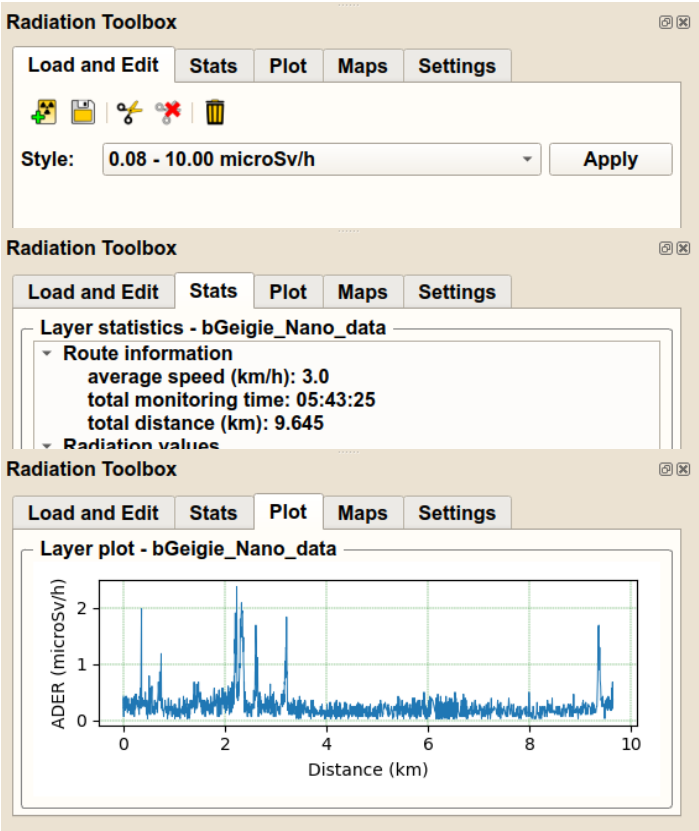
CITISTRA - QGIS

- QGIS plugin “[Radiation Toolbox](#)” has undergone a complete code redesign, new features to be added
- implemented support for CzechRad detectors (for proper ADER calculation etc.)



CITISTRA - QGIS

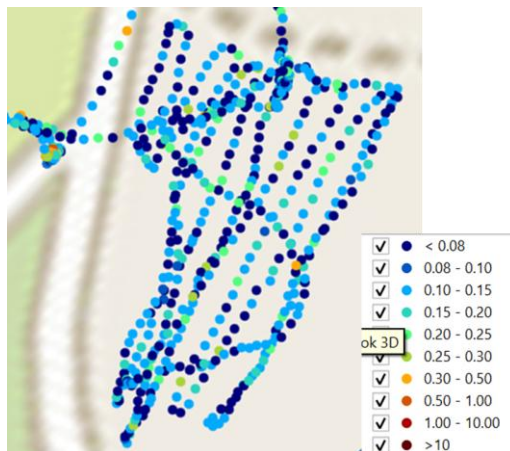
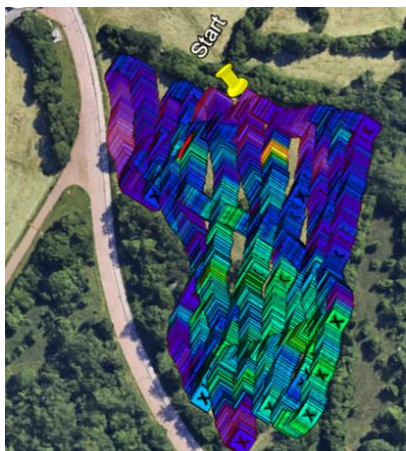
- plugin
also in
Polish
now



CITISTRA - training, workshops

- project was presented during several workshops including the [Joint ICTP-IAEA Workshop](#) (Trieste, 2024)
- creating training/education materials, graphics, web etc. (<https://www.suro.cz/aplikace/czechrad-wiki>)

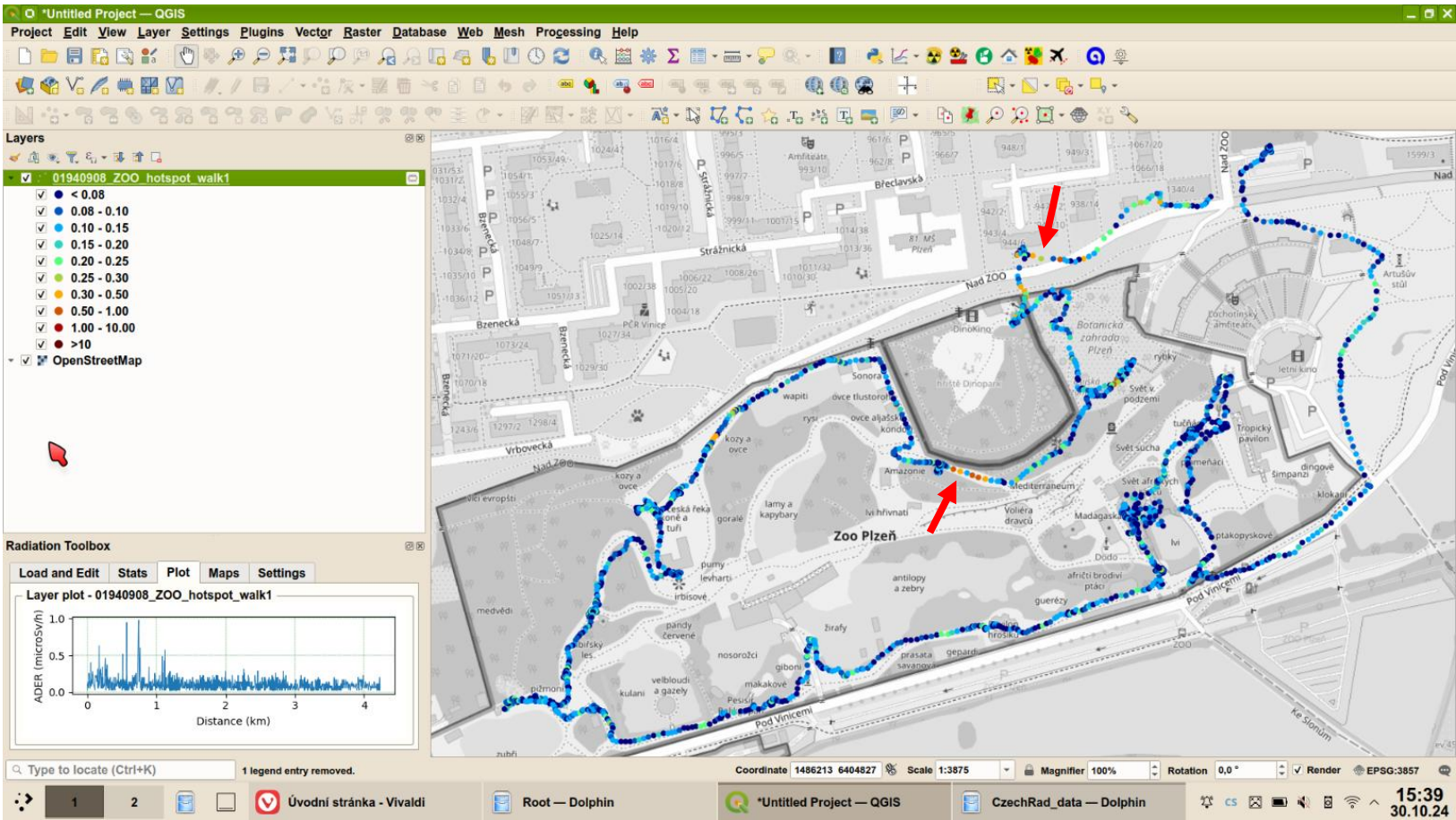
PGIS (Scintillation detector) vs CzechRad (G-M)



CITISTRA - cooperation with the community

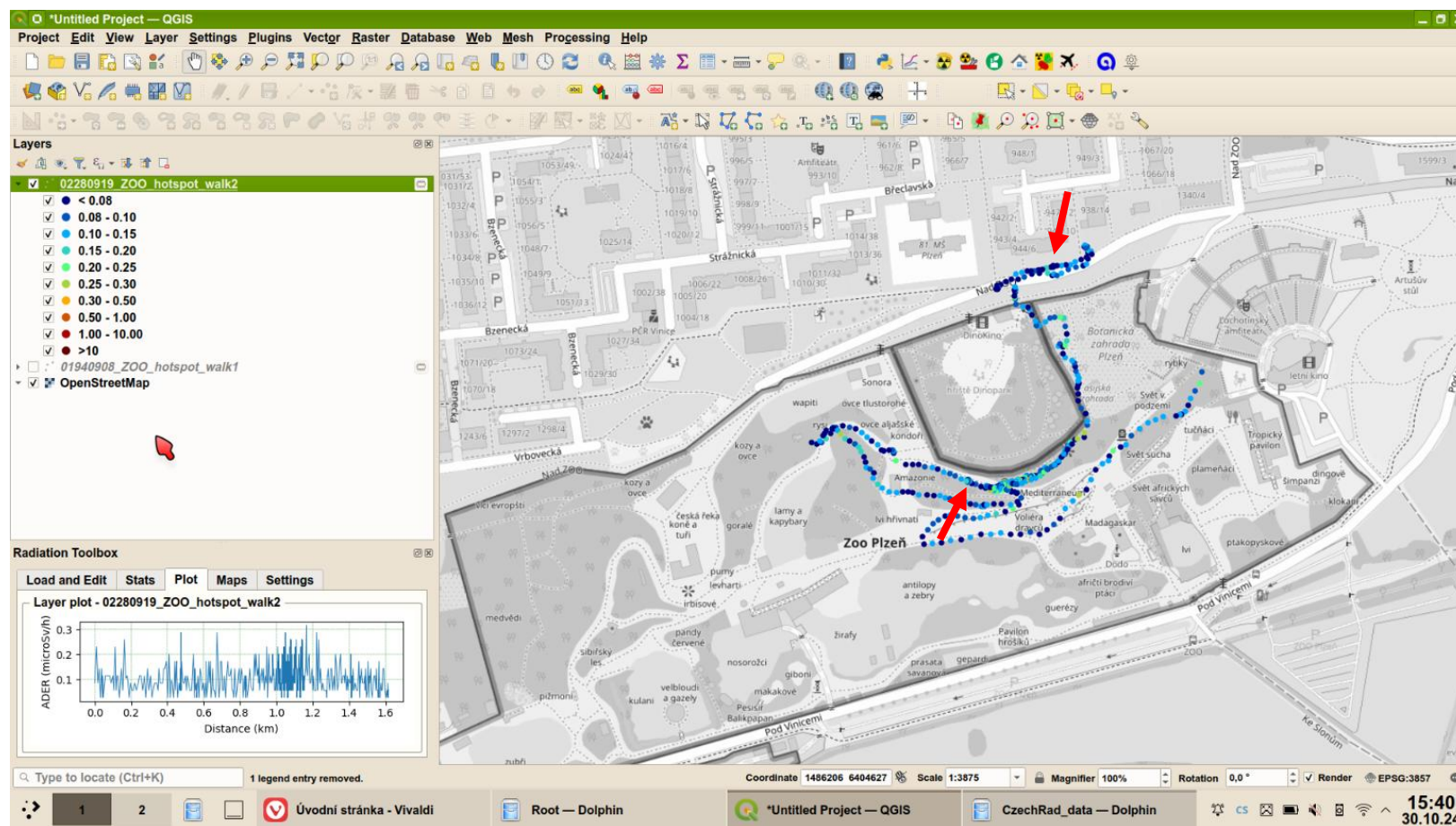
Potential “hotspot” in Pilsen ZOO (Czechia)

- measured dose rates up to 1 microSv/h
- looked real, could be NORM material used for road underfill etc.
- further investigation needed



CITISTRA - cooperation with the community

- few days later another user performed new measurement, no elevated values detected
- the cause was apparently a visitor - a patient after radiotherapy (radio-pharmaceutical treatment)



CITISTRA - measured data

- already > 2200 CzechRad data files (not just from Czechia) available from the Safecast API
- CC0 Public Domain licensed → no limitations regarding further use (comparisons, scientific analyses, students works etc.)



Photo: Marek Helebrant (CC BY-SA)



Photo: Rostislav Novák (CC BY-SA)

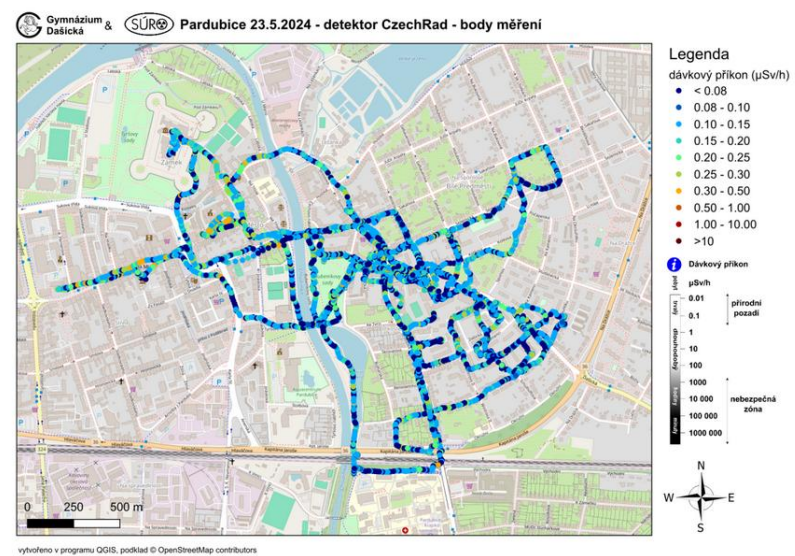
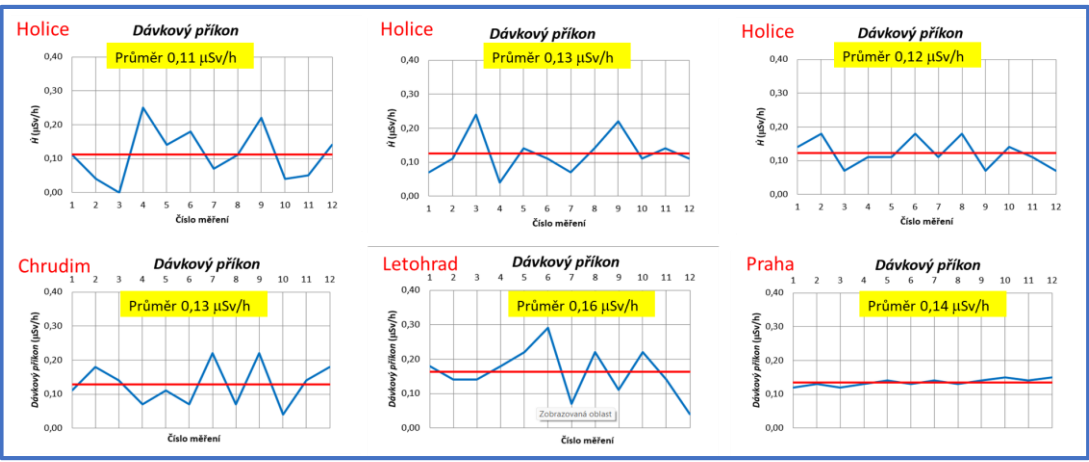
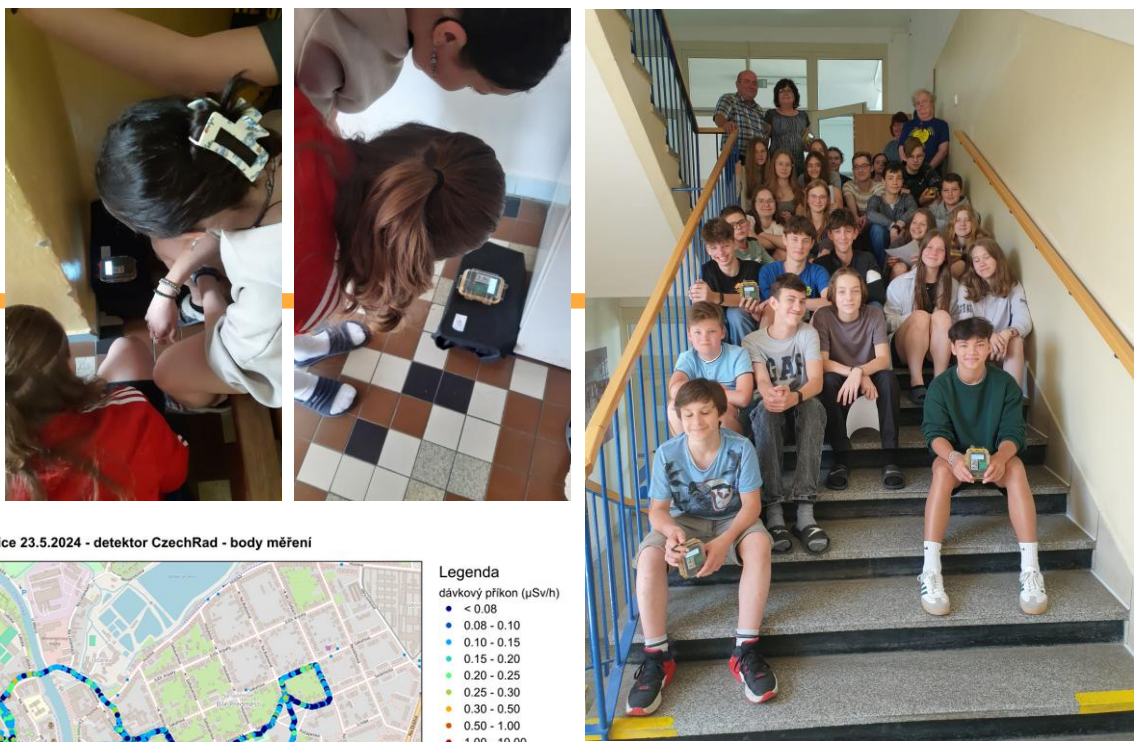
CITISTRA - sociological survey



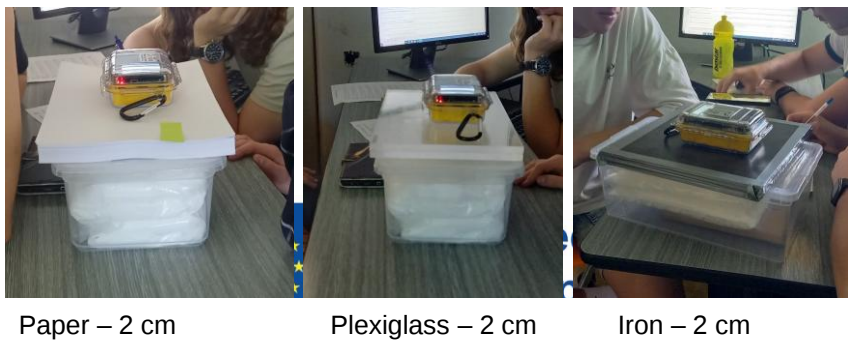
- selection of potentially suitable users / groups of users:
What is the most trusted group in each country? Etc.
- conducted by MEDIAN, s.r.o. company (*known for official pre-election polls etc.*)
- questions prepared by CITISTRA team, incl. country specific parts
- questionnaires in national language of each country
- 1000 respondents in each country (Czech Republic, Slovakia, Poland)
- results now being processed for the final report

CzechRad – sustainability

- Project day „Measure radioactivity“ for secondary school students (learn through game)
- Presentations to physics teachers

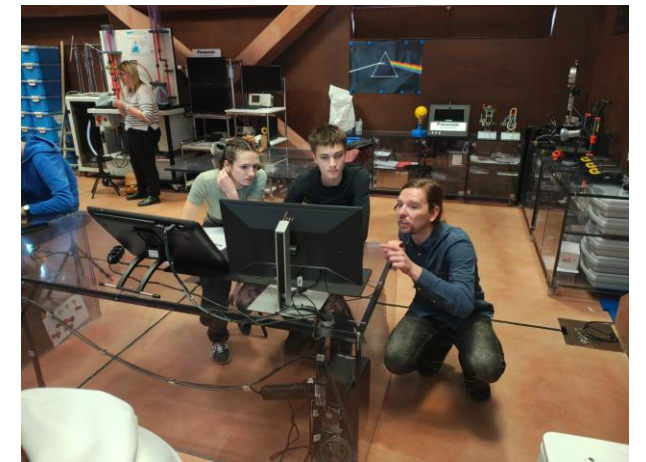


Brussels, 4th June 2025



CzechRad – sustainability

- Project for centers of science:
Sphere Pardubice
Techmania Plzeň
Pevnost poznání Opava
- Volunteer firefighters



**Thank you for
your attention**

