



# SURO - STÁTNÍ ÚSTAV RADIČNÍ OCHRANY v.v.i NATIONAL RADIATION PROTECTION INSTITUTE

*public research institute*

*established by State Office for Nuclear Safety (SONS)*

***Mission : support SONS in research, measurements, expertise, data acquisition and processing , intercomparison measurements, preparation of methodology, guidance, recommendation, education, public information ..***



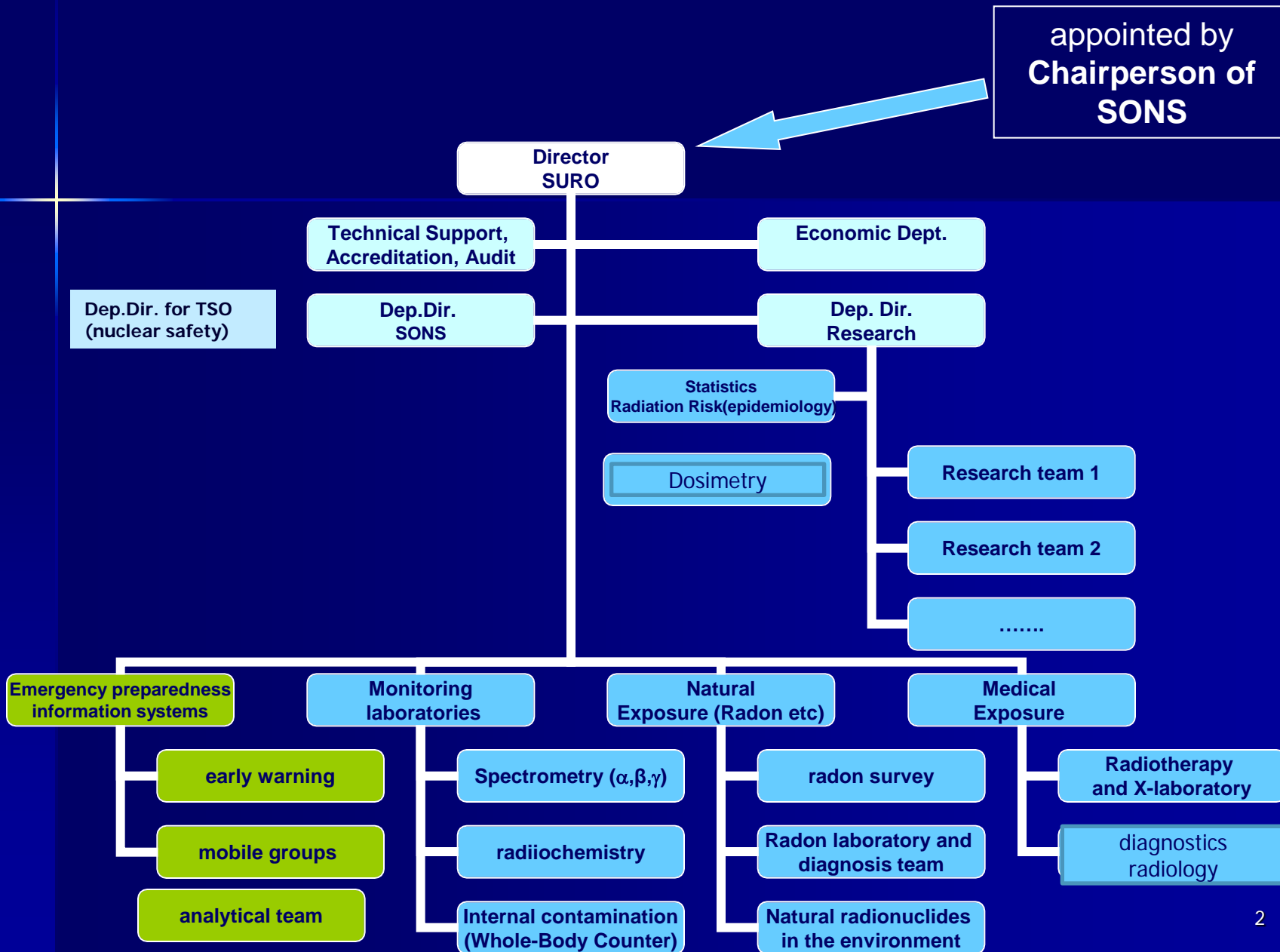
**Bartoškova 28, 140 00 Praha 4**

**[www.suro.cz](http://www.suro.cz)**

**(contact – Jiri Hulka , [jiri.hulka@suro.cz](mailto:jiri.hulka@suro.cz))**

# SURO - Organization Chart

appointed by  
Chairperson of  
SONS

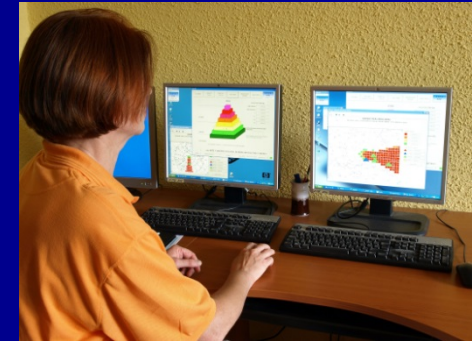
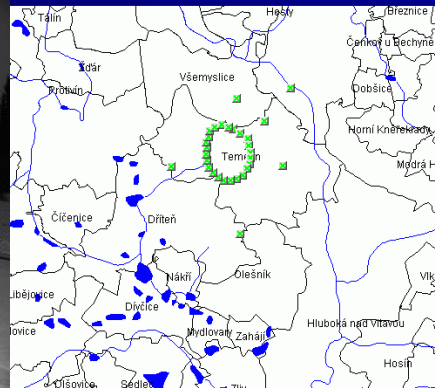
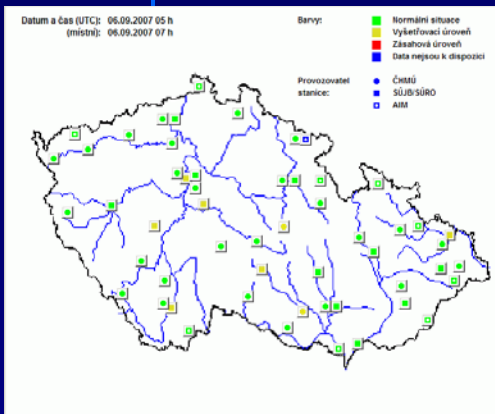


# Emergency preparedness

## Early Warning Network

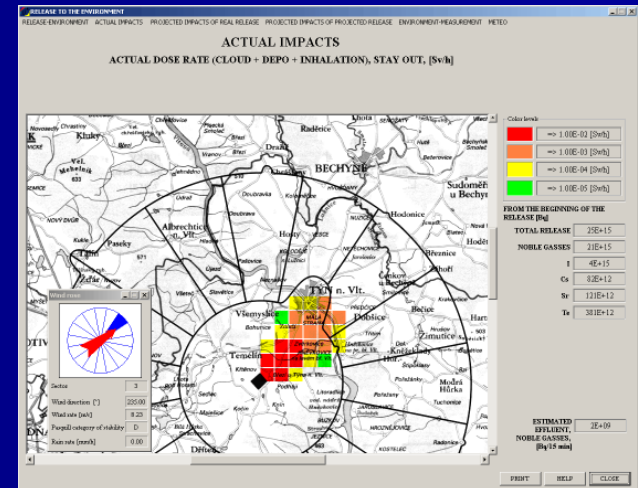


1) Early Warning Network  
data → to central dbase (10 min interval), web presentation



## 2) Emergency Response Center II - Computer Codes („este“, Havar, EU Rodos, .. )

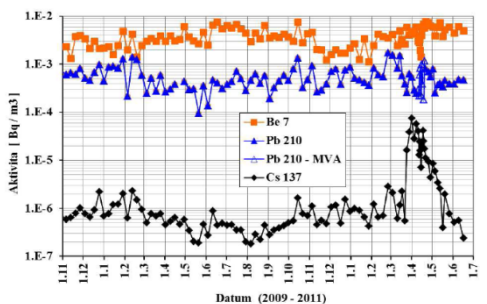
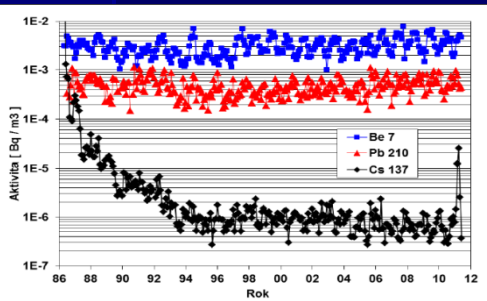
as support instrument for off-site emergency response (in pre-release phase and release phase of accident)



# Radioactive aerosol monitoring

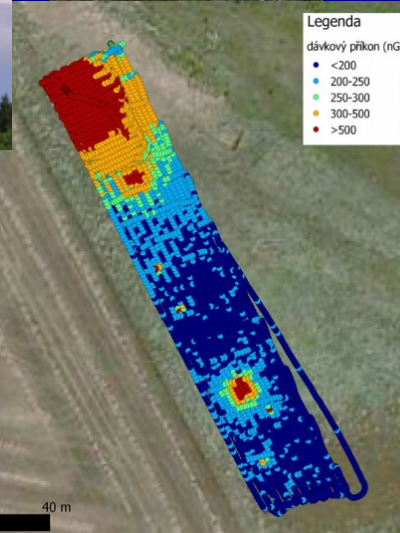


1 - 10 Territorial subnetwork  
 11,12 Local subnetworks  
 around the NPP's



# Mobile Groups

(car-borne and air-borne,  
emergency monitoring and analysis of extraordinary events  
2 experts in CTBTO)



## Equipment:

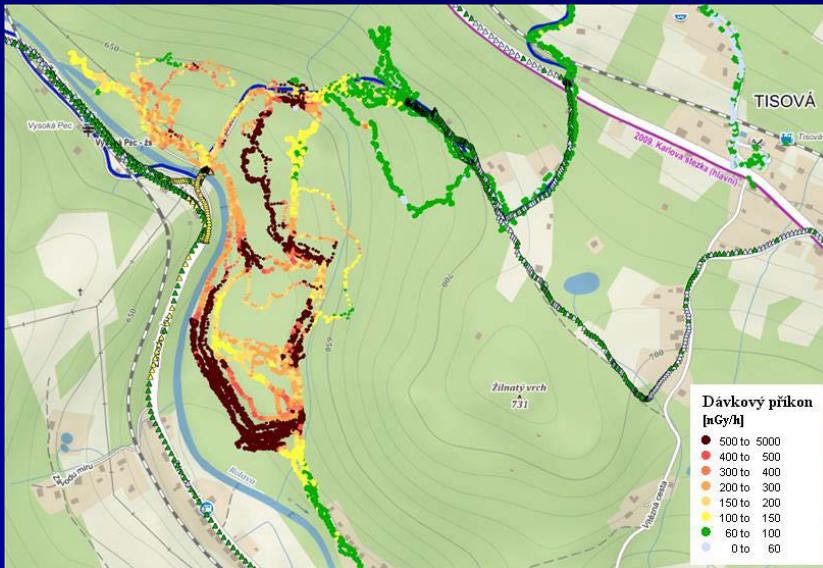
portable spectroscopy (HpGe, scint), air samplers, dose rate meters (GPS), alfa measurement,.. Dron, robot

# Some research project

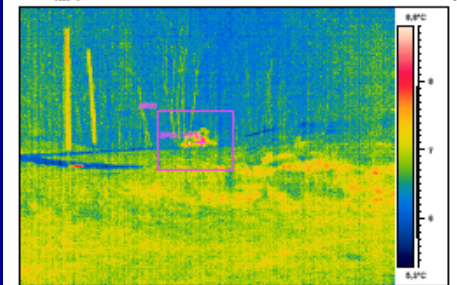
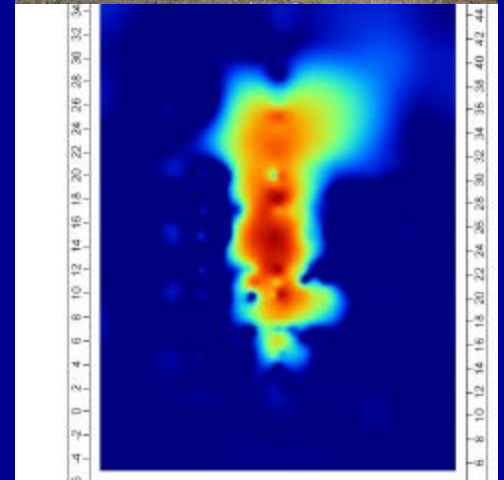
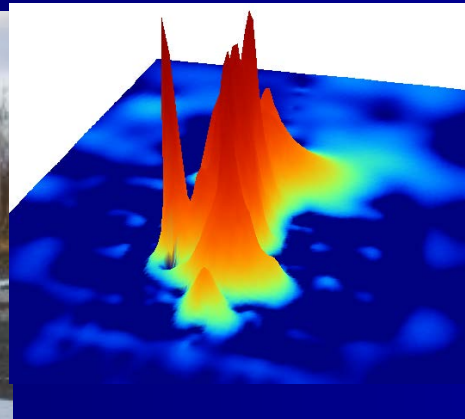
## Inovative carborne monitoring



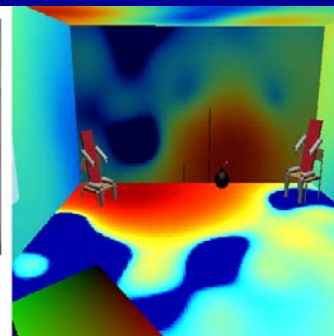
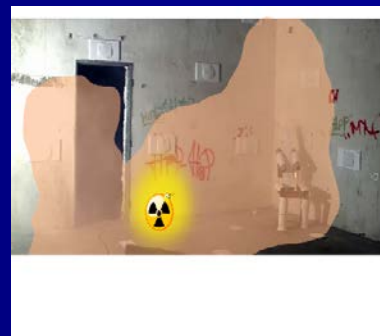
on-line and stand-alone monitoring dose rate and radioactive aerosol (blackout)



# Possible attacks with radioactive substances:



# Booby-trap explosive system in the house





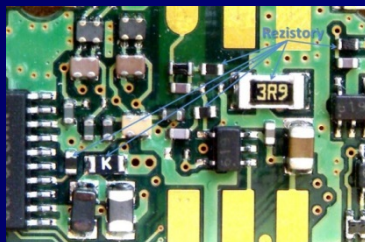
# Booby-trap explosive system in the bus



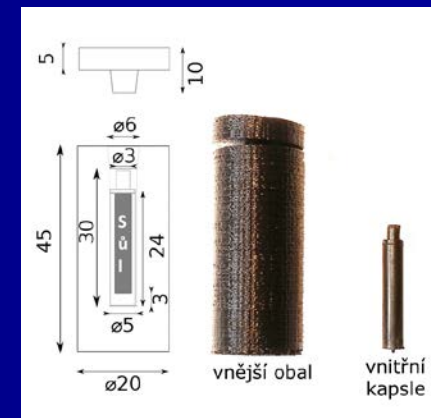
# Retrospective dosimetry (for person without dosimeters)



## Mobile phones as dosimeter



## Passive cheap dosimeter (NaCl)



# Sophisticated system for monitoring I-131 in thyroid gland in case of large amount of potentially contaminated children



Fukushima :  
lesson learned



6 measuring points, el.chip for children, central PC (integrated electronic)

100 children/hour

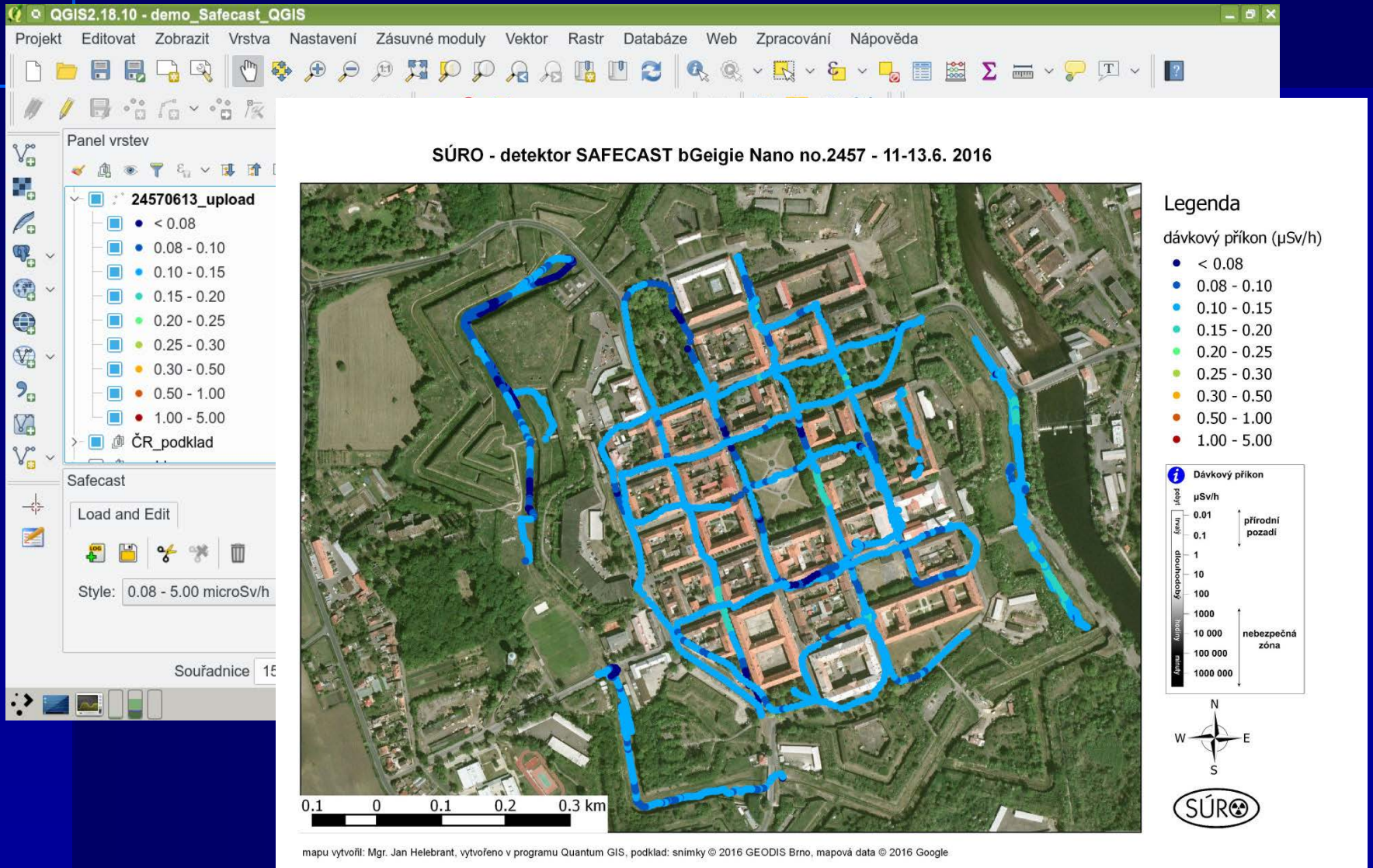


# Citizens measurement: their role in radiation protection

## SAFECAST



# SURO prepared independent mapping software (free) for citizens measurement



# Central laboratory (spectrometry gamma, alpha, beta (SURO))



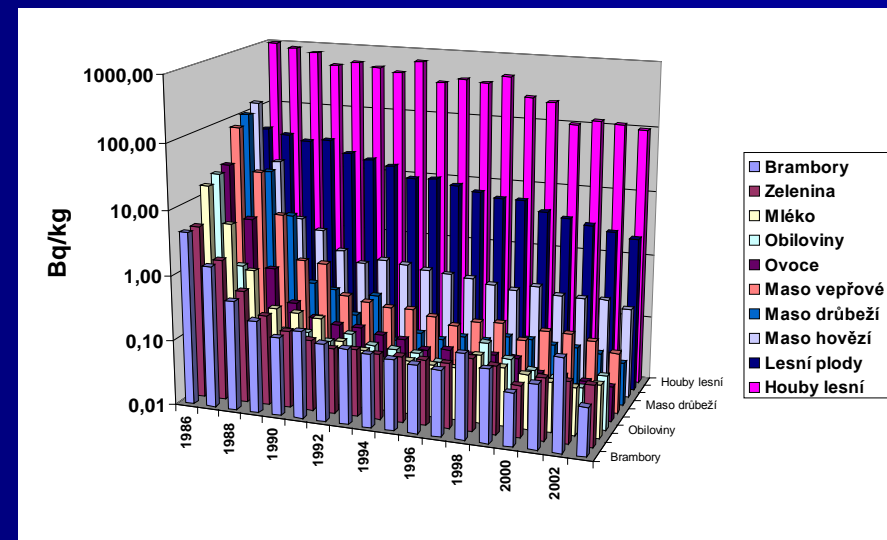
**AIM: identify long-term trends and detecting any deviations**

## **MONRAS**

Information system  
RADIATION MONITORING NETWORK  
of the Czech Republic  
(RMN)

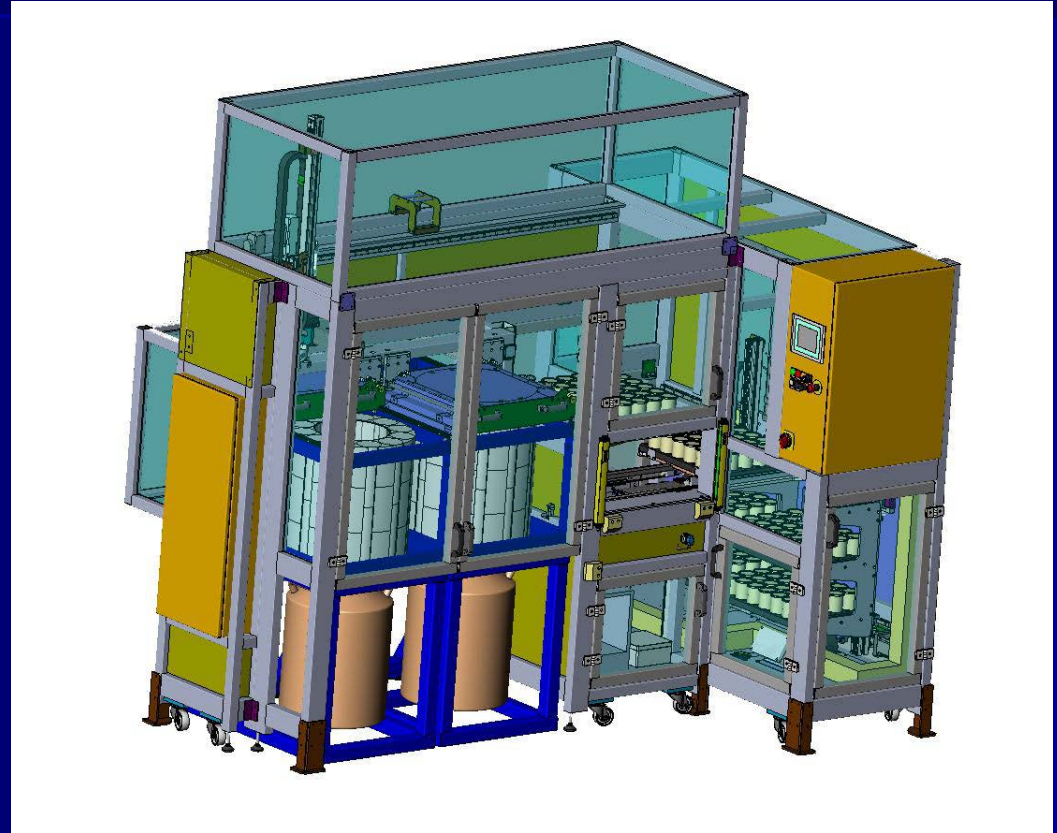
**- Central database -**

<https://www.sujb.cz/aplikace/monras>

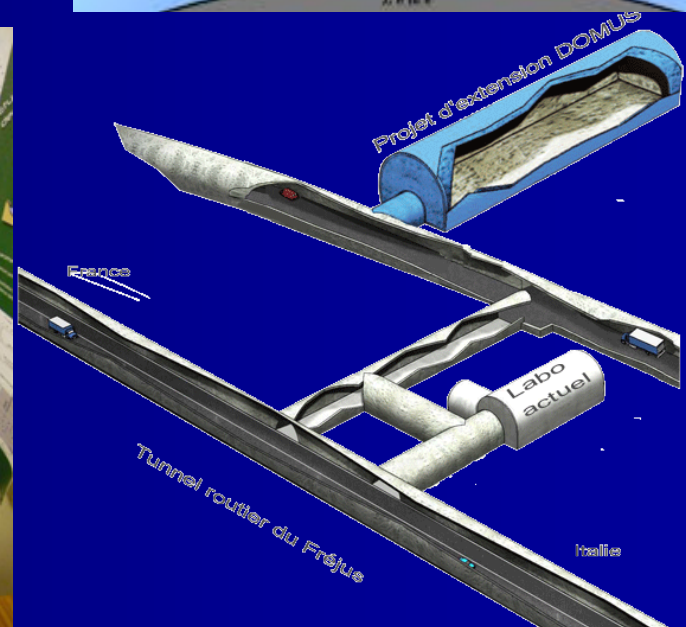
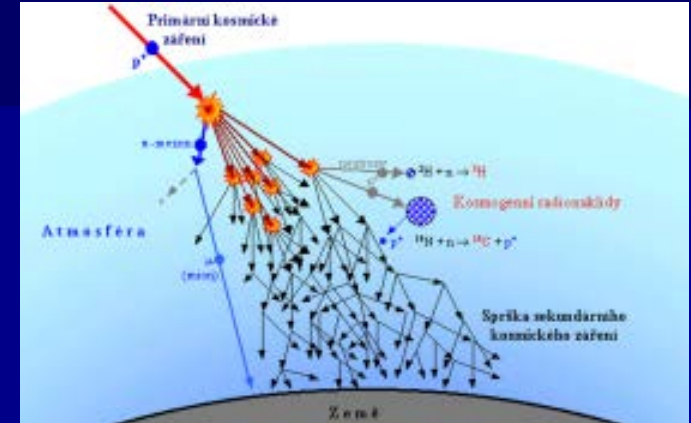
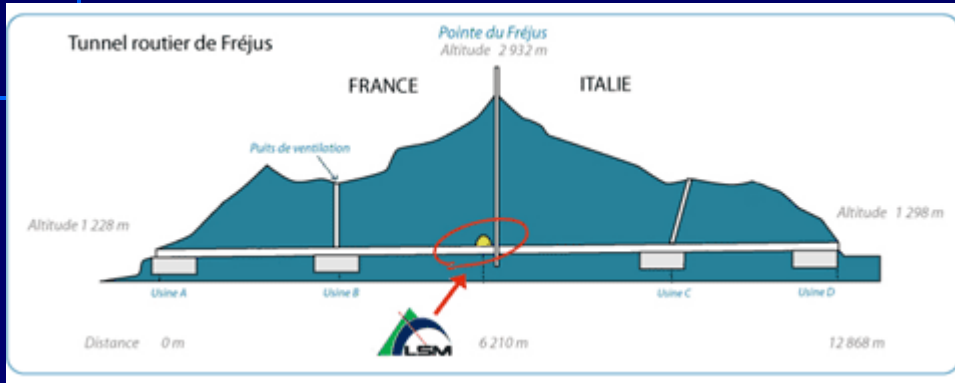


- gamaspectroscopy system capacity emergency ~ **1000 samples /day**
- Data annually sent to Joint Research Centre ISPRA ... REM (Radioactivity Environmental Monitoring)

# Gamma spectrometry – automat (NUVIA)



# Ultra low level gamma counting and spectrometry HpGe at LSM (Laboratoire Souterrain de Modane)





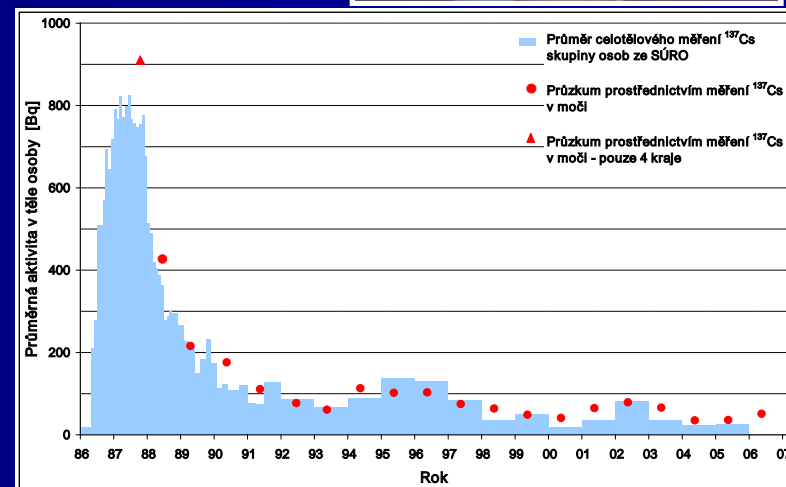
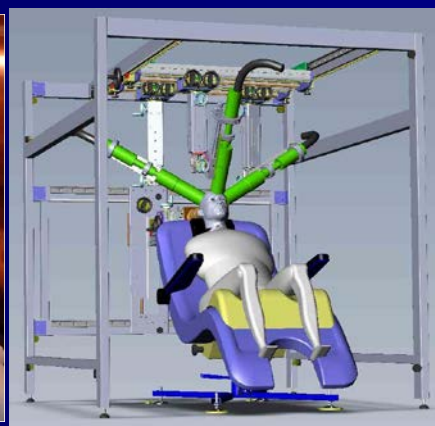
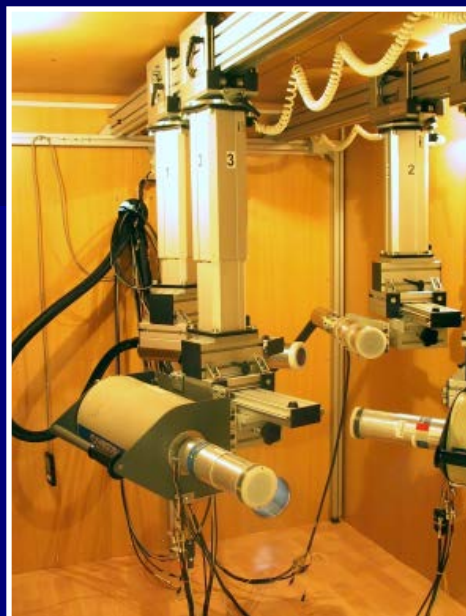
# Remediation , countermeasures in case of NPP accident

“Late phase (impact on agriculture, land cover)

**Biogas plant for agricultural waste remediation**



# Internal contamination (whole body counter)



# New type of detectors for radiation protection:

TimePix pixel detector (with Institute IAEPR Prague and CERN)

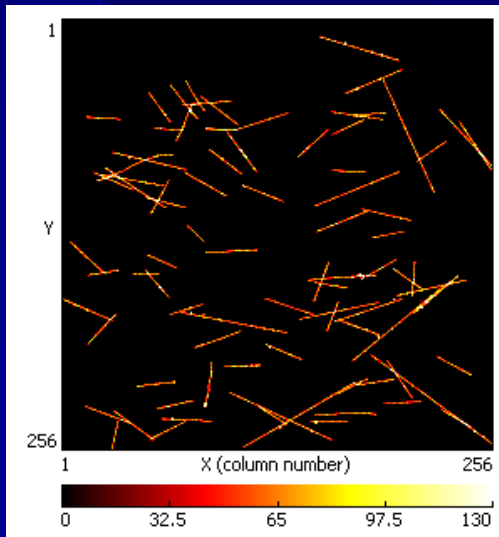
- ◆ TimePix device + USB readout interface
- ◆ 256x256 pixels, 55 $\mu$ m pitch, area 1.4 $\times$ 1.4 cm<sup>2</sup>, thickness typ. 300 $\mu$ m (Si) or 1mm (CdTe)
- ◆ Detected radiation forms clusters
- ◆ Possibility to distinguish various types of radiation using cluster analysis

USB Lite

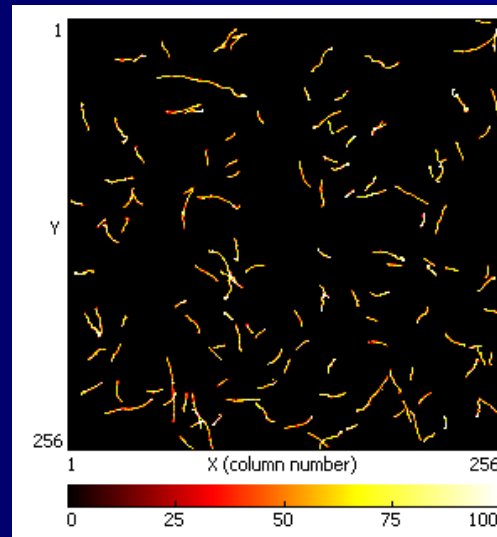


Typical signature for various radiation:

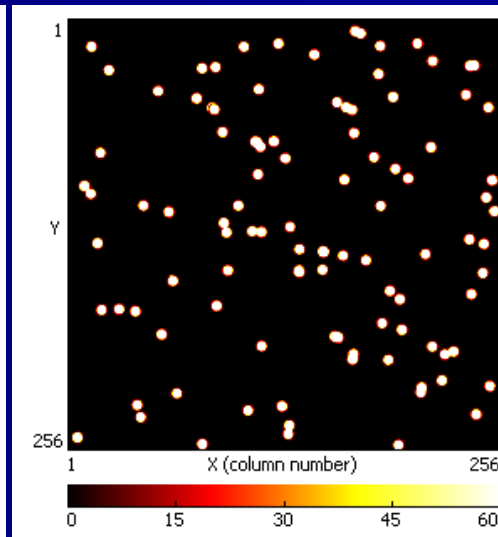
3D fitted data



Muons



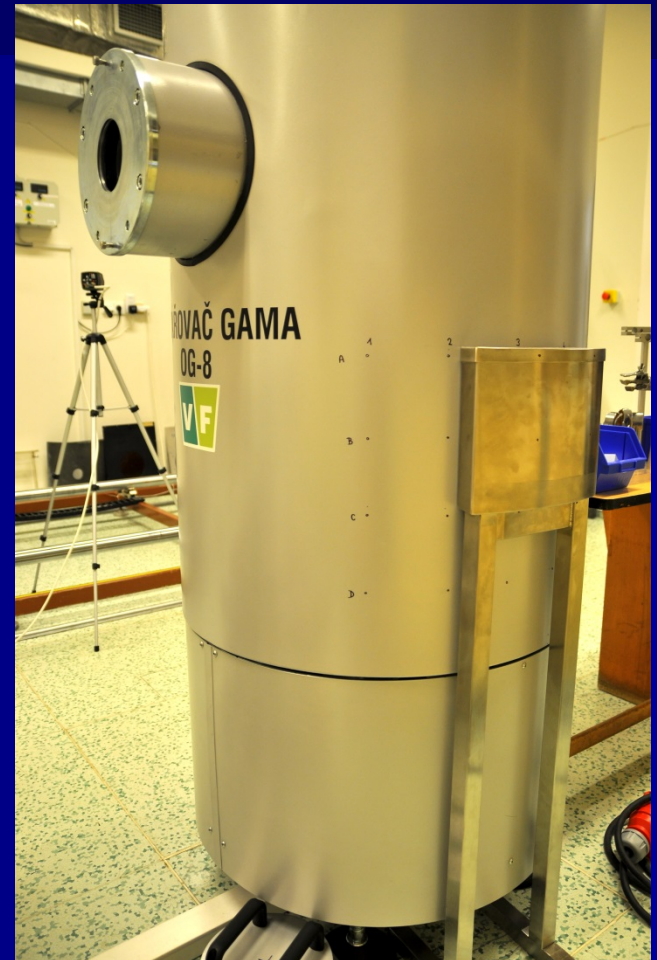
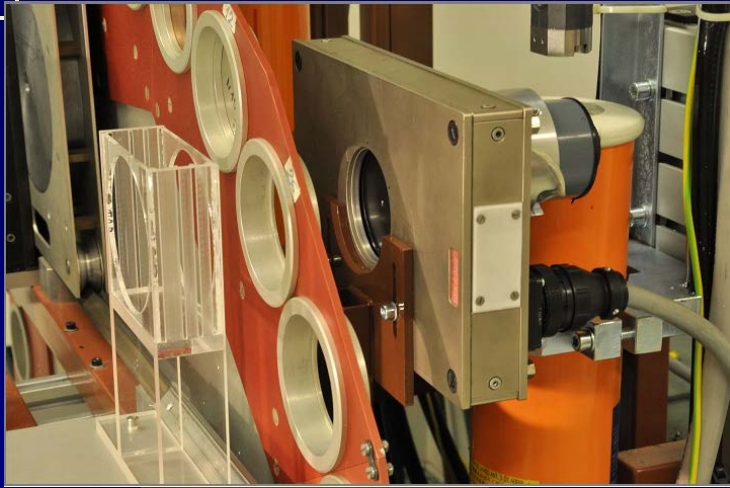
Electrons



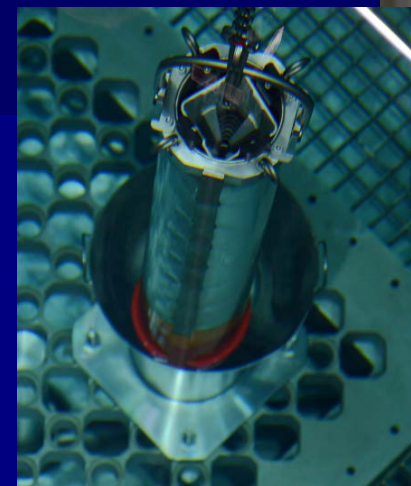
Alpha particles

# Irradiation and calibration laboratories :

## SURO : X / gamma



# MONTE - Irradiation facility **real fission spectra** (school reactor CTU , developed by SURO and CTU)

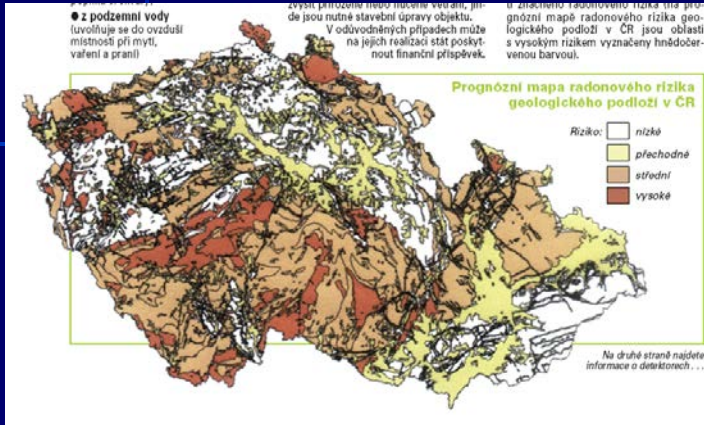


# SURO - Rn chamber (0-100 kBq/m<sup>3</sup>) (for R&D, irradiation, calibration, intercomparison)

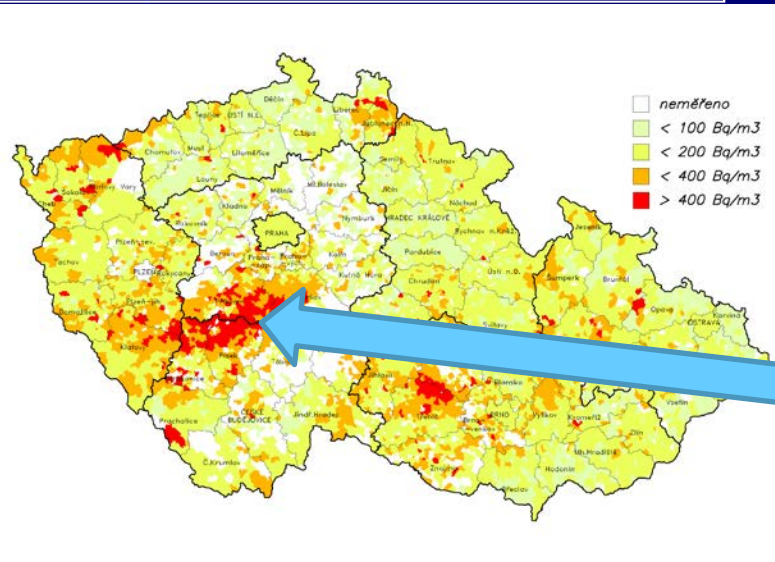
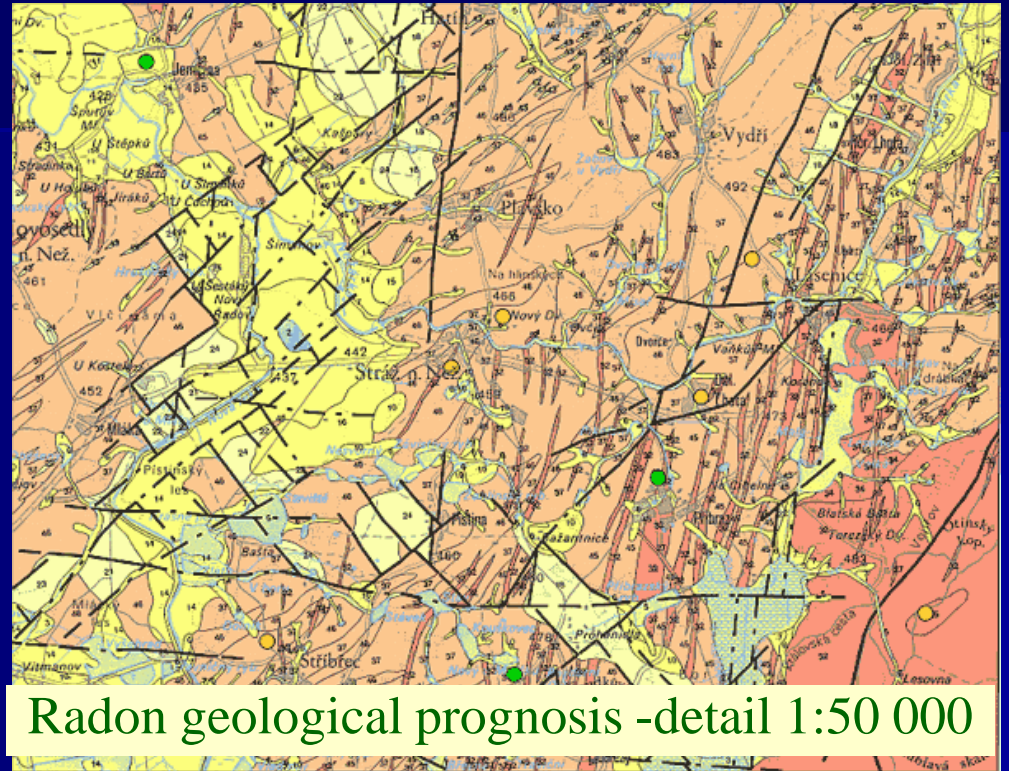


# National Radon Programme

more than 200 000 family houses measured and all school and kindergartens

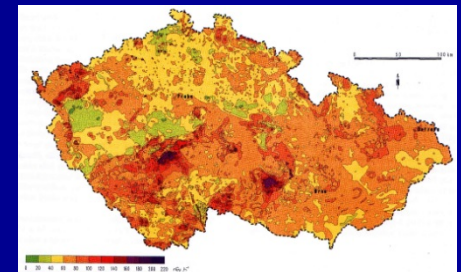


Radon geological prognosis maps



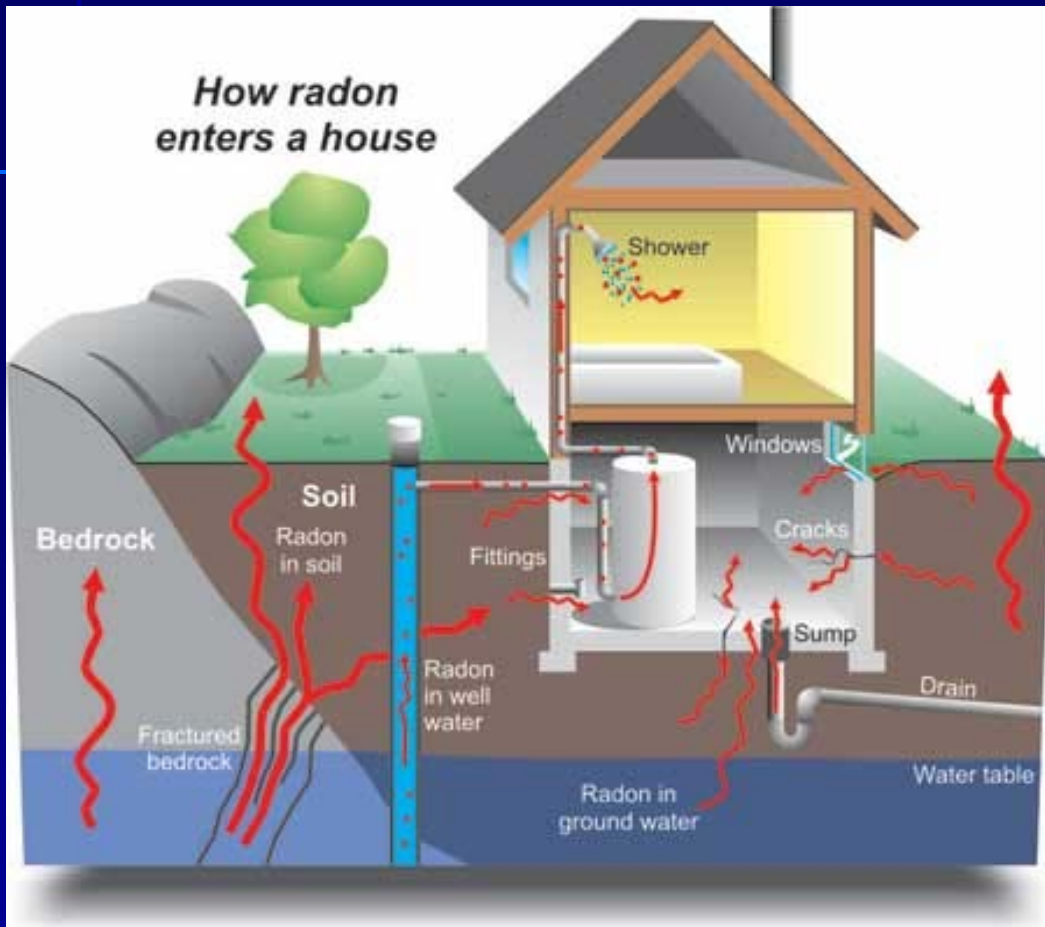
Epidemiologic study  
lung cancer

Radon indoor (200 000 family houses)

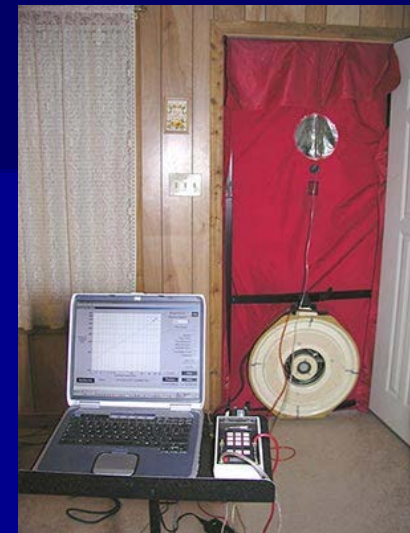


Gamma dose rate maps – airborne measurements

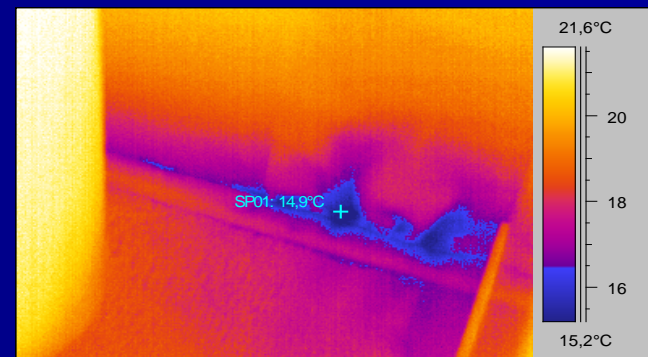
# Radon diagnosis of the building



**Simultaneous continuous Rn measurement**



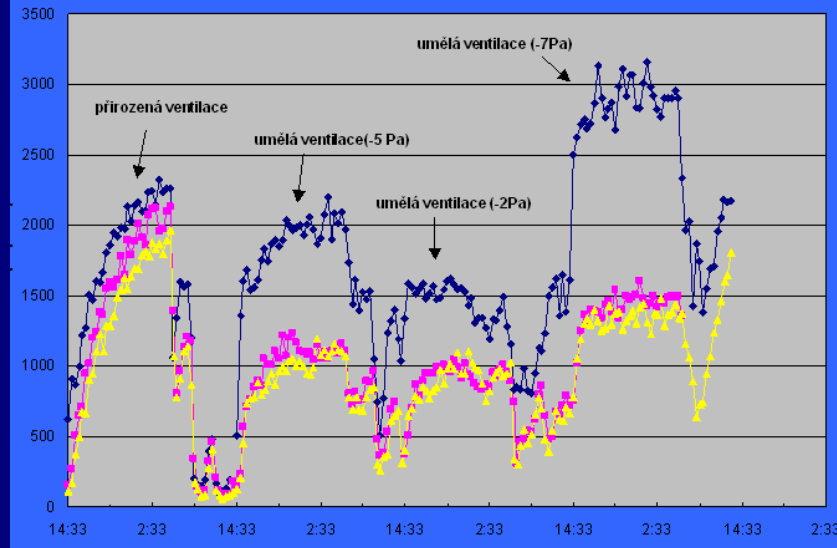
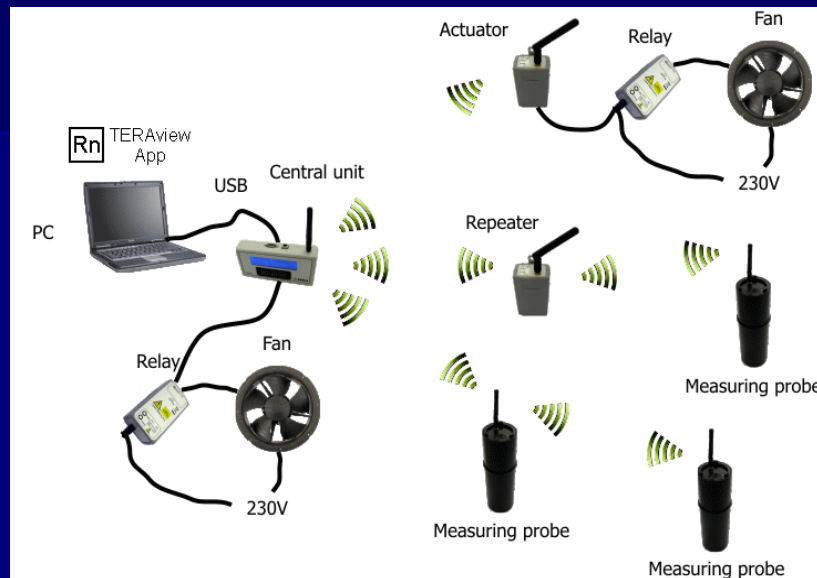
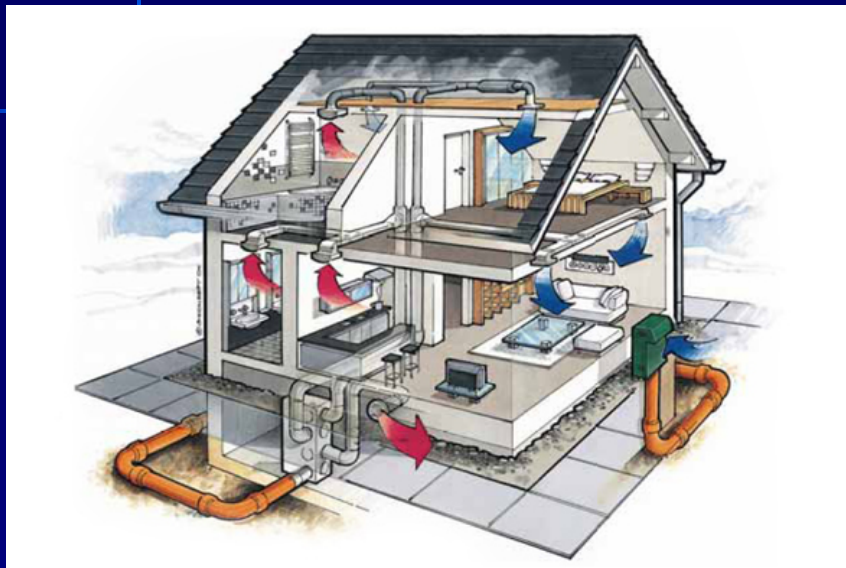
**Blower door technique**



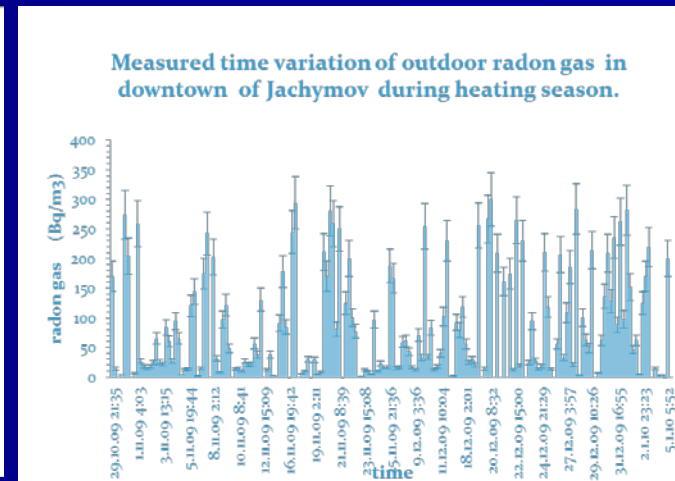
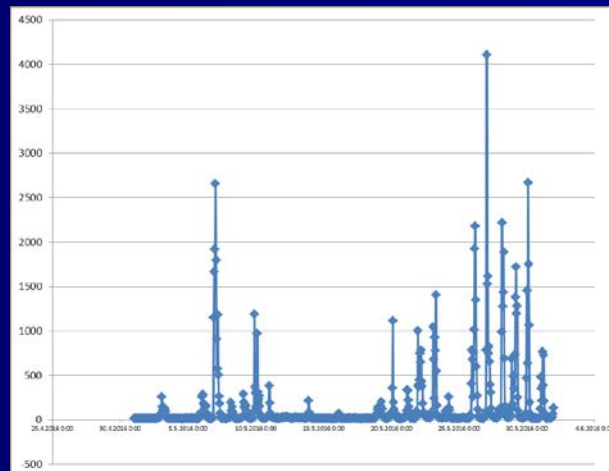
**Infra-camera – radon ingress detail**



# Radon and workplaces or „smart buildings“ TESLA TERA system



# Radon and Rn progeny continuous monitoring in the environment (uranium tailings, radon prone areas... seismicity)



# Division of Medical Exposure

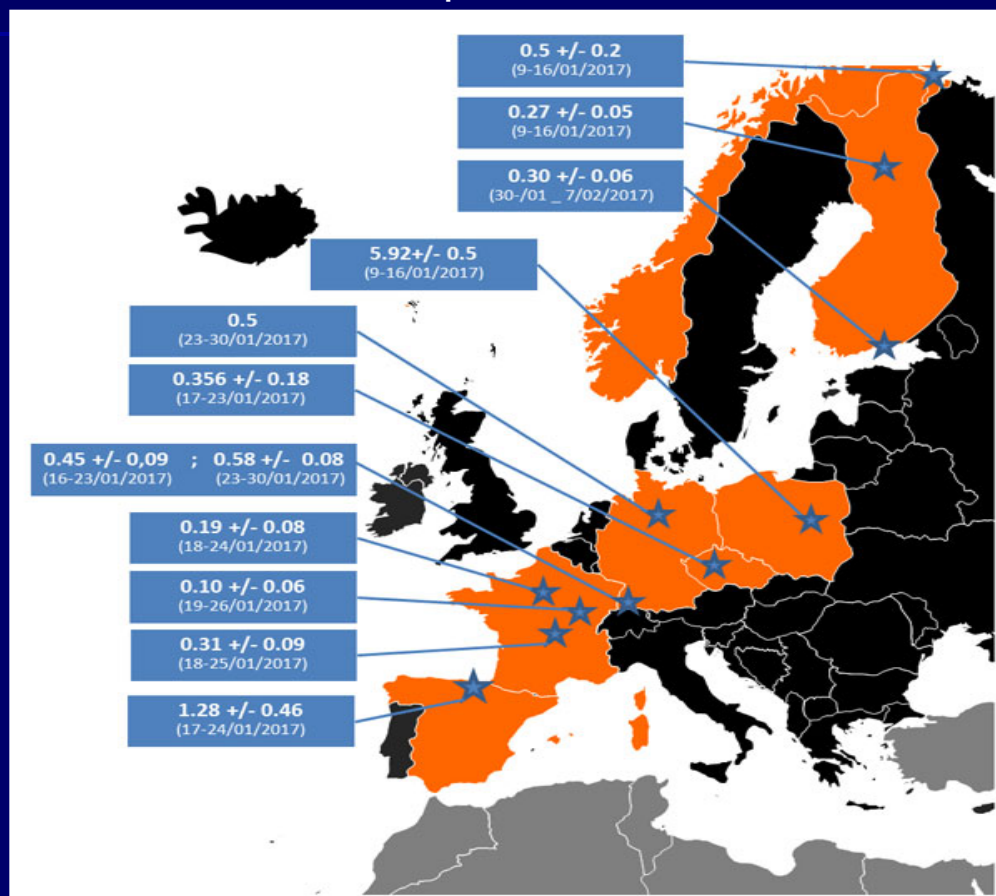
1. radiotherapy
2. diagnostics radiology
3. Nuclear medicine
4. Gamma and X ray laboratory



Research : estimation of radiation exposures from diagnostic medical examinations of the population of the Czech Republic.

# New : desinformation issue

The webpage spreading wrong information/interpretation (HOAX)  
on risk from I-131 levels in air  
and  
Research of public behavior



Very low I-131 concentrations ( $\sim$  microBq/m<sup>3</sup>) in air (February 2017)  
measured by EU laboratories network  
*published (forwarded to journalists) by IRNS*

# ...a couple of „messages“ from AENews



- A radioactive cloud rolls over Europe, apparently from a strange explosion in a French nuclear power plant Flamanville
- Governments are silent, Governments and organizations for nuclear surveillance can not be trusted
- France is trying to downplay the whole incident. No one cares about it. The French government is only interested in preventing Marine Le Pen from winning the presidential election - this would end the Berlin project to build a New Europe according to the so-called „Das neue Europa concept“.
- Any radiation leakage ? Governments in the EU will deny everything like the Soviets! Brussels behaves just like the Supreme Soviet in the USSR. The EU regime does not need you to be healthy, the regime only seeks to stay calm.
- **We recommend :**
  - Do not go out with children, do not ventilate, do not to collect mushrooms, blueberries and fruits, root vegetables
  - We recommend to immediately buy iodine tablets and buy dosimeters!
- If someone claims it is harmless, do not trust.

## Goals (?):

- cause panic?
- undermine confidence in national government and EU?
- test effectiveness of disinformation („hybrid war“) ?

# Questions

Have you recorded information on radioactive iodine in the air in the Czech Republic?

When - for the first time?

From which sources?

From which source for the first time?

Do you think the radioactive iodine in the air was really identified/measured?

Do you think the level of radioactive iodine can be dangerous for health?

Does it raise your concerns about the health of you and your family ?

Does the fear continue?

Did you pass the information to others ?

Were you looking for additional information (media, competent institutions..)?

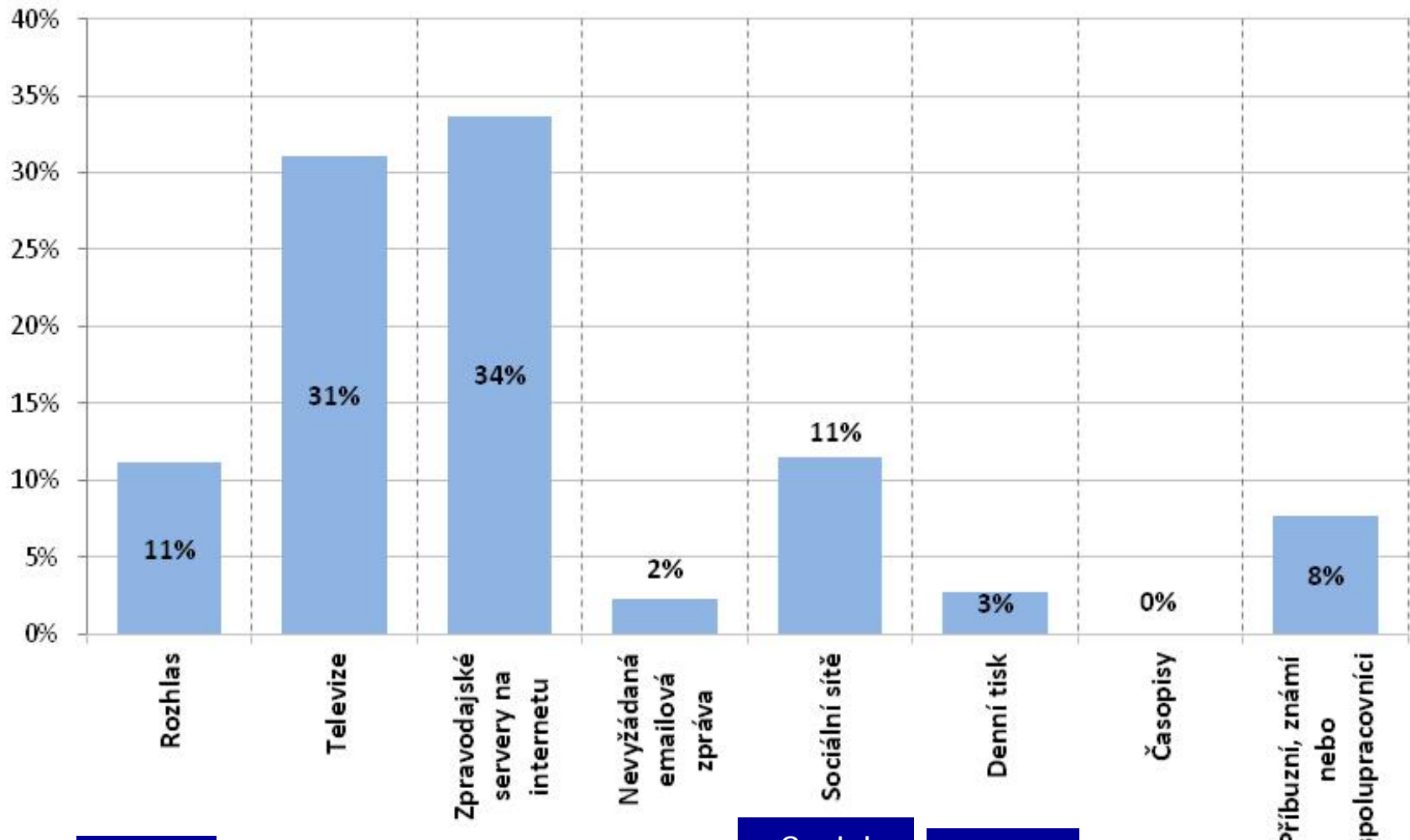
Did you notice an official position of Radiation Protection Authority?

Was this opinion understandable to you?

Do you trust the official statement?

Did you consider any health protection measures? (which?)

# From which media did you learn it .....for the first time?



radio

TV

web

spam

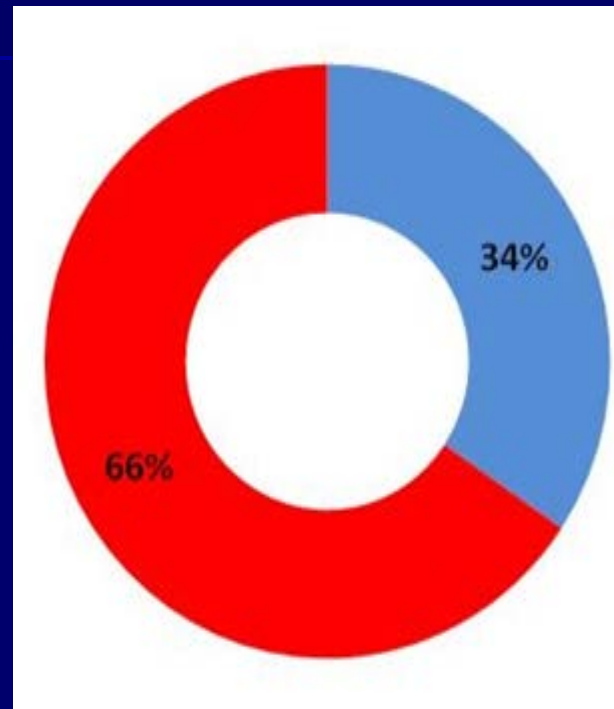
Social network

Daily press

journals

friends

## ...Fear (from radioactive iodine in the air)



No

Yes

! Those, who got information first on social networks are more afraid !

! There are no differences between men and women !



Thank you