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Federal Department of Home Affairs FDHA  
**Federal Office of Public Health FOPH**  
Consumer Protection Directorate

# **Actions undertaken in the framework of the implementation of the Radon National Plan**

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Fabio Barazza, Switzerland



# National Radon Action Plan 2012-2020



## 7 measures:

1. Revision of the legal regulations
2. Extending our knowledge of radon exposure in dwellings
3. Promotion of protective measures against radon in buildings
4. Planning an efficient strategy for remediation
5. Including radon in the training of construction experts
6. Improving public awareness to health problems caused by radon
7. Developing the tools and methods

Passed by the federal council  
may 25, 2011



# 1. Revision of the legal regulations

## Key points of the new ordinance

- one legal value: reference value 300 Bq/m<sup>3</sup>
    - **except:** radon exposed work places: threshold 1000 Bq/m<sup>3</sup>
  - building owner is responsible for remediation measures
    - **except:** schools/kindergartens have to be remediated
  - no obligation to measure radon
    - **except:** schools/kindergartens and radon exposed work places
- local authorities can order a remediation or radon measurements
- official measurements only by approved measuring services
- Radon courses for approved radon experts



## New legal values

	StSV of 1994	StSV of 2018		
<b>Dwellings</b>	Limit 1000 Bq/m <sup>3</sup> (aa)  Guide value 400 Bq/m <sup>3</sup> (aa)	Reference value <b>300 Bq/m<sup>3</sup></b> (aa)		
<b>Working places</b>	Limit 3000 Bq/m <sup>3</sup> (averaged over monthly working time)	Reference value <b>300 Bq/m<sup>3</sup></b> (aa)	Threshold <b>1000 Bq/m<sup>3</sup></b> (aa)	Annual doses <b>&gt; 10 mSv/year</b> → <b>Planned exposure</b>
<b>radon exposed Working places</b>		No reference value	Threshold <b>1000 Bq/m<sup>3</sup></b> (aa)	Annual doses <b>&gt; 10 mSv/year</b> → <b>Planned exposure</b>

aa = annual average



## Recommended delays for remediation

Radon concentration [Bq/m <sup>3</sup> ]	Maximal delay for remediation		
	Rooms with long presence of people	Rooms with short presence of people	No presence of people
>300 to 600 Bq/m <sup>3</sup>	10 years	30 years	No measures required
>600 to 1000 Bq/m <sup>3</sup>	3 years	10 years	
>1000 Bq/m <sup>3</sup>	3 years	3 years	

Communicated together with the results of the measurements



## 2. Extending our knowledge of radon exposure in dwellings

Future measuring campaigns should not mainly be targeted to high risk areas.

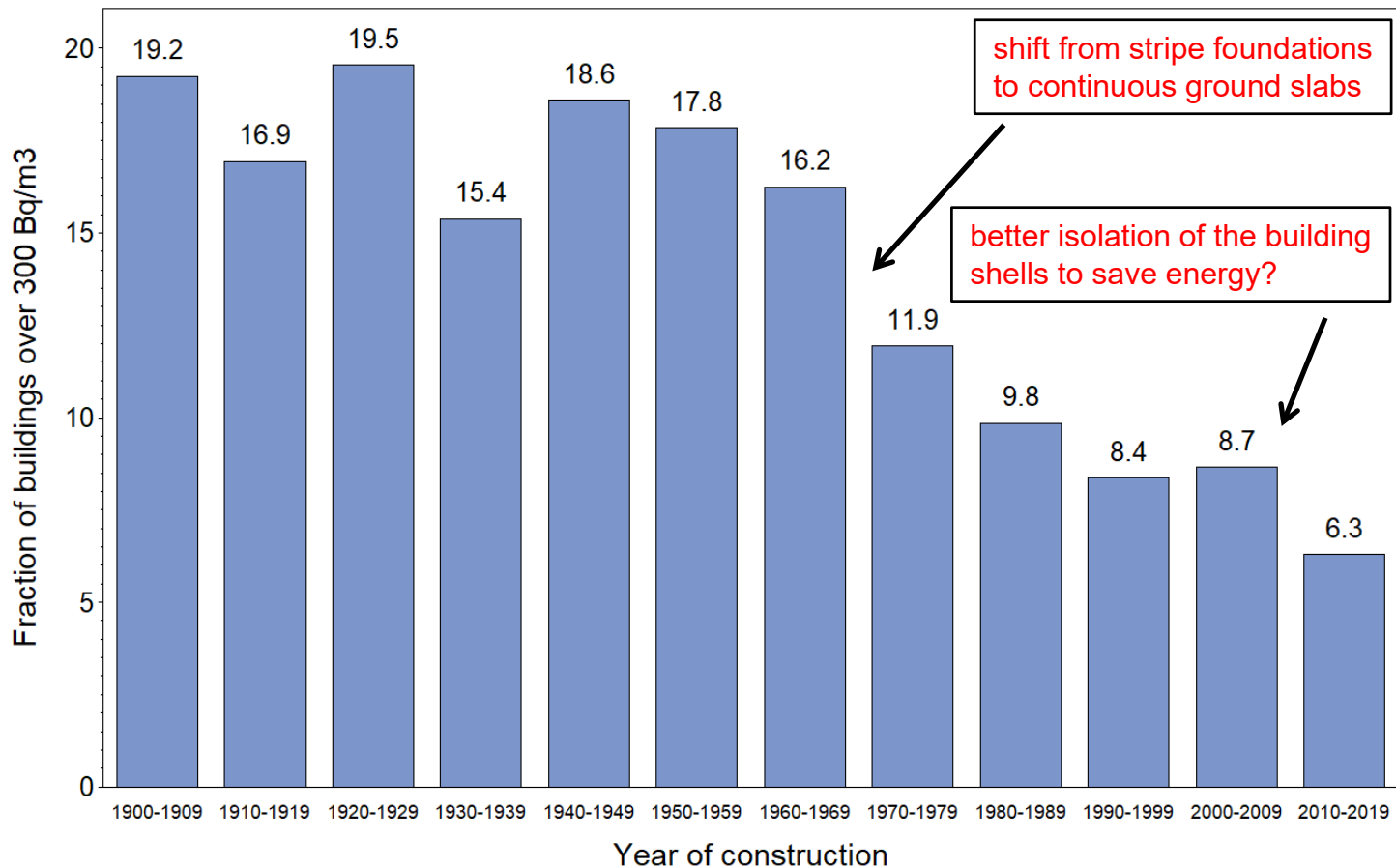
In view of the new recommendations, the denser populated regions in Switzerland turn into areas of medium to high radon risk.

### 2012-2016:

- larger cities: 0.3% → 5%
- schools/kindergartens: 3.5% → 13%
- new buildings: 3.5% → 20%



### 3. The promotion of protective measures against radon in buildings



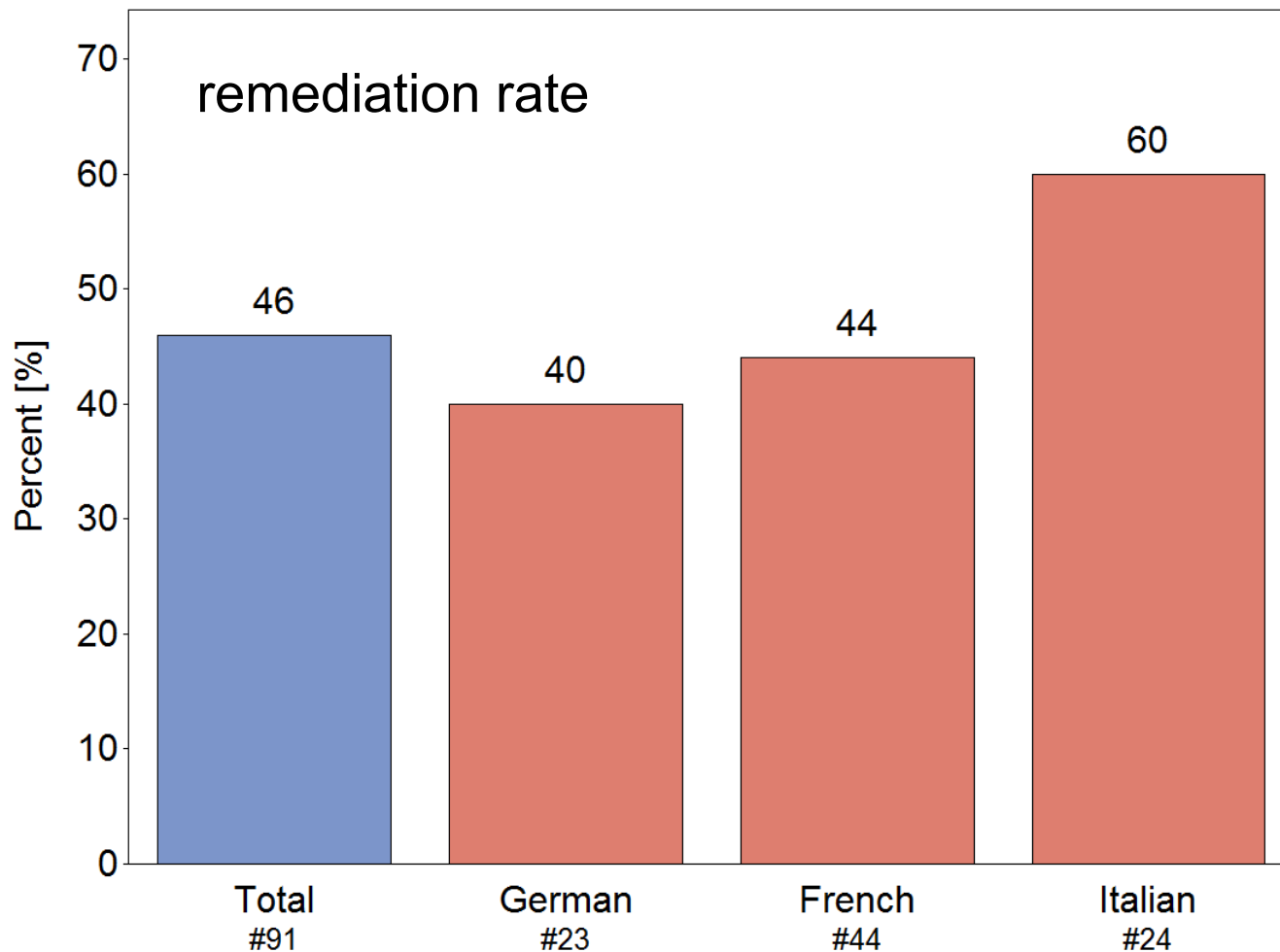
Concert ENGAGE WP3, Workshop, Athens

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February 13, 2019



## 4. Planning an efficient strategy for remediations



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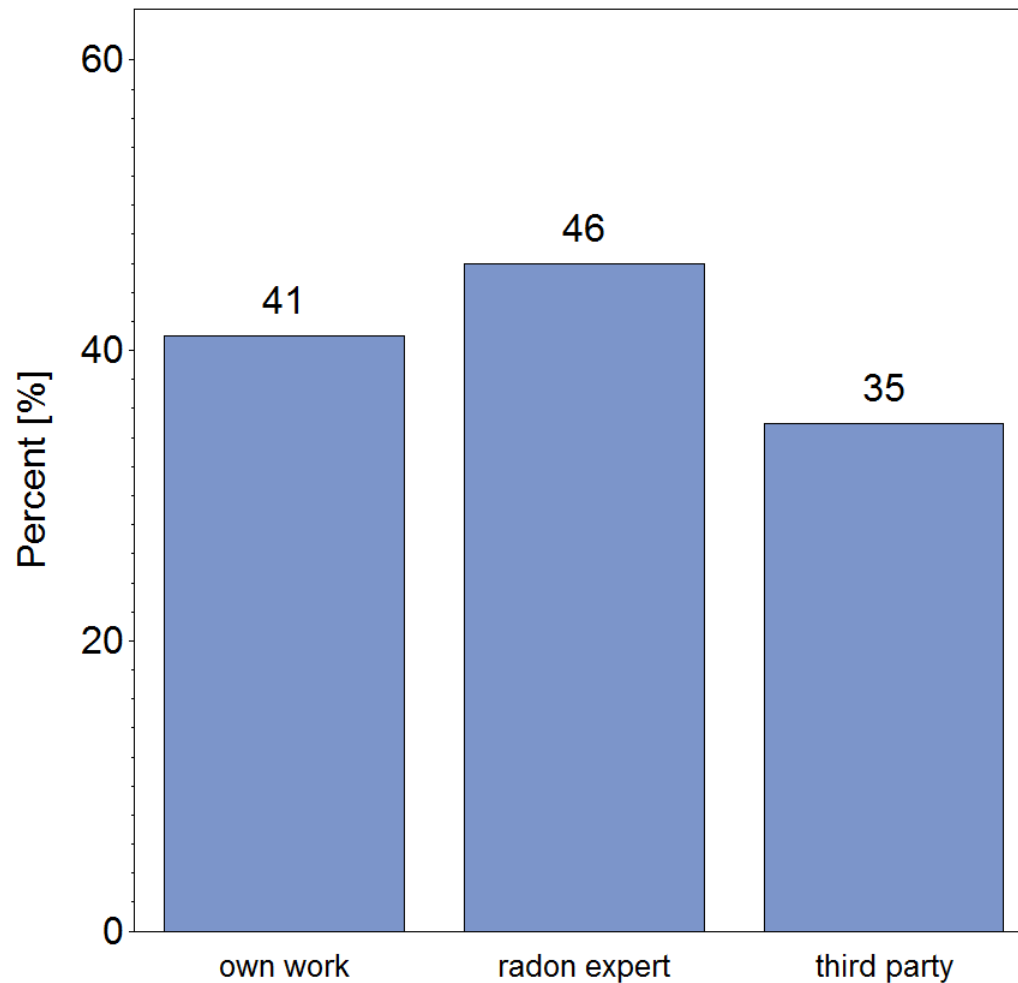
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## Who has done the work?



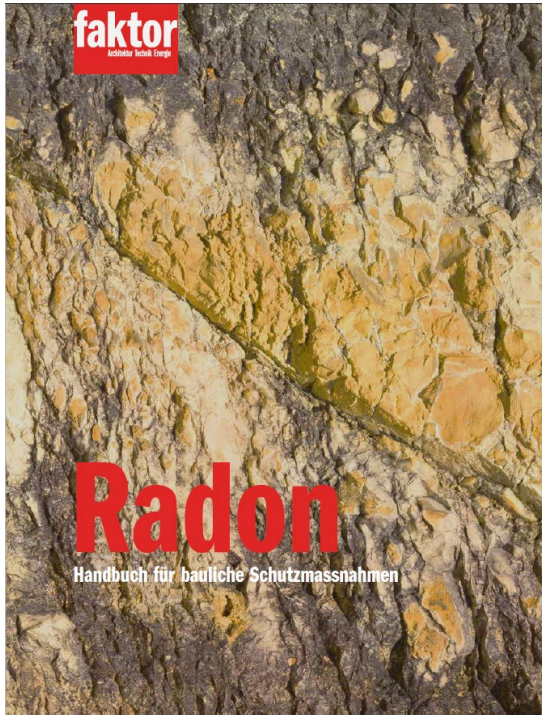
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# Radon practical handbook (G, F, I)



Radonschutz durch Lenkung von Luftströmungen ■ 45

## 5.4 Luftwechsel erzwingen

Ein Luftwechsel in Räumen ergibt sich aufgrund von offenen Fenstern, einer Abluftanlage oder einer mechanischen Lüftungsanlage (Tabelle 5.4).

und in der Regel Wärmerückgewinnung fachgerecht geplant und installiert wird, bildet dieses System eine zuverlässige Lösung zur Lufterneuerung und dadurch zur Minderung der Normbelastung in den belüfteten Räumen (Norm SIA 180).

Fensterlüftung	Fensterlüftung mit Stellmotoren	Abluftanlage	Mechanische Lüftungsanlage
Von Hand betätigte Fenster, allenfalls zwei gegenüberliegende Fenster.	Kleinmotoren öffnen und schliessen Fenster, teilweise automatisch gesteuert.	Belastete Raumluft wird in den Nozzellen und in der Küche abgesogen (Abluft).	Zu- und Abluft über eine Lüftungsanlage, in der Regel mit Wärmerückgewinnung.
– <b>Nachteil:</b> führt zu relativ grossen Energieverlusten (Lüftungswärmeverluste). Häufig ist auch der Komfort ungenügend.	– <b>Nachteil:</b> erzeugt Unterdruck und hat häufig Nachströmeffekte in der Konstruktion zur Folge.	– <b>Nachteil:</b> hohe Kosten, in Altbauten schwierig zu installieren (Platzprobleme). Erzeugt Unterdruck, da durch Eintrag von radonhaltiger Luft möglich.	– <b>Nachteil:</b> Falls Luftbilanz nicht stimmt, besteht das Risiko für Unterdruck.
+ <b>Vorteil:</b> kostengünstig	+ <b>Vorteil:</b> relativ kostengünstig	+ <b>Vorteil:</b> häufig schon bestehend	+ <b>Vorteil:</b> hoher Komfort, Energieeinsparung
<b>Fazit:</b> Aufgrund mangelnder Systematik in der Lufterneuerung für den Radonschutz kaum geeignet.	<b>Fazit:</b> Für Radonschutz bedingt geeignet (Systematik in der Lufterneuerung lässt sich programmieren).	<b>Fazit:</b> Für Radonschutz nicht geeignet (nur mit Nachströmöffnungen).	<b>Fazit:</b> Ideale Lösung für Radonschutz, fachgerechte Lösung vorausgesetzt.

Tabelle 5.4: Lufterneuerung

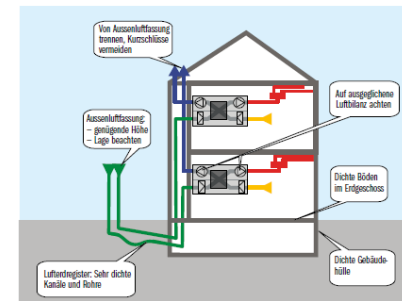


Abbildung 5.9: Wichtige Markpunkte bei der Planung einer Wohnlüftungsanlage, siehe auch Merkblatt SA 2023.



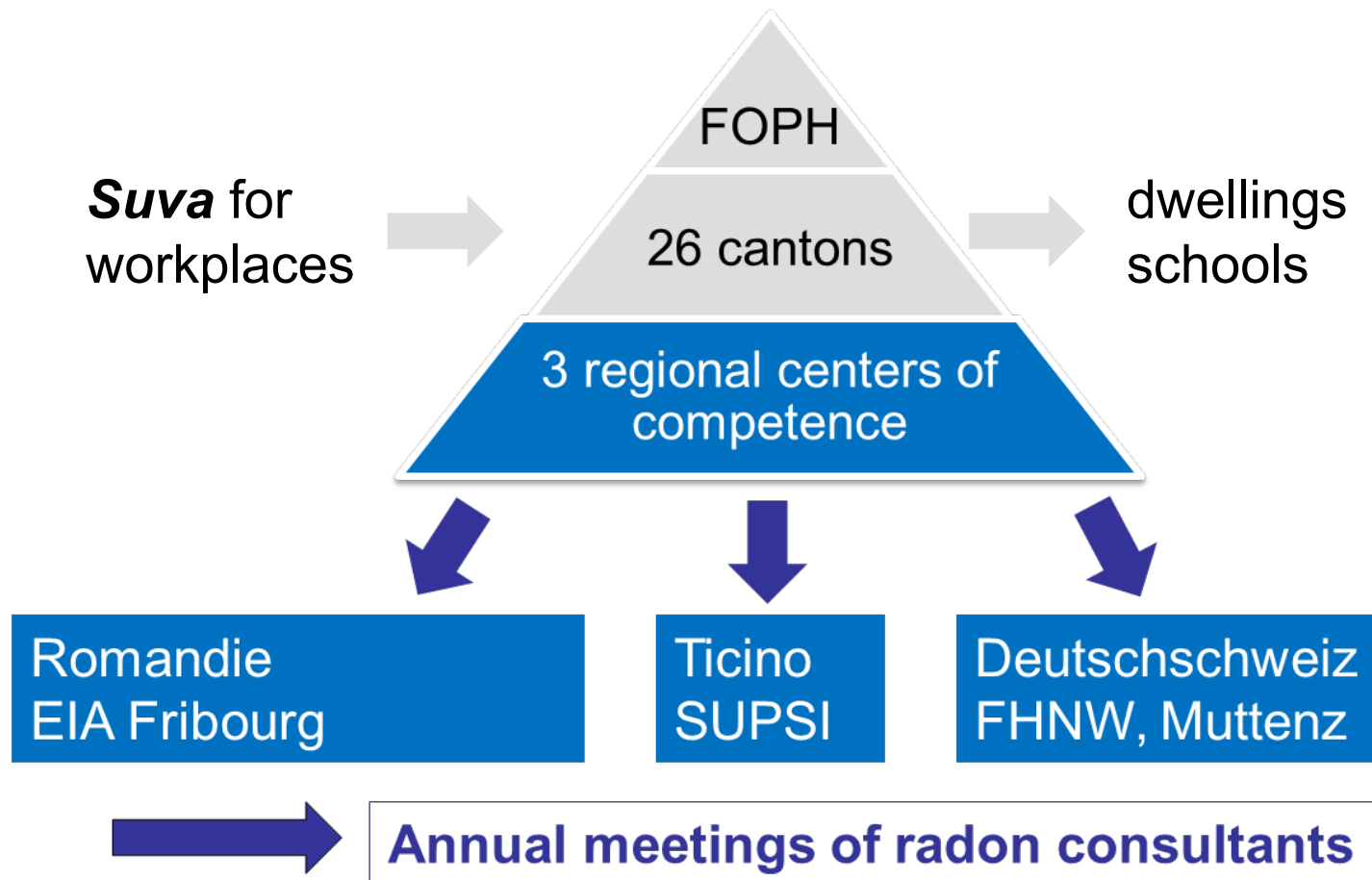
## **5. Including radon in the training of construction experts**

Many architects and construction experts are not aware of the radon problem.

The FOPH has appointed three radon delegates based at three universities of applied sciences, who work on including the radon issue in the basic education of building experts.

Improve the knowledge of radon at the level of apprenticeship and professional training, cooperation with professional unions.

## Radon prevention: involved parties





## Radon in the SIA 180 standard

- Considered pollutants are humidity, **radon**, CO<sub>2</sub> and odours
- The concentration **must not exceed** the legal limits
- Recommended to be **as low as possible** and <300 Bq/m<sup>3</sup>
- Buried parts of the building shell must be impermeable so as to avoid radon ingress into the building
- *Idem* for partition walls that separate the below-ground premises from the rest of the building.
- Preventative measures in new buildings
- Reduction obtained by reducing infiltrations and by controlling pressures

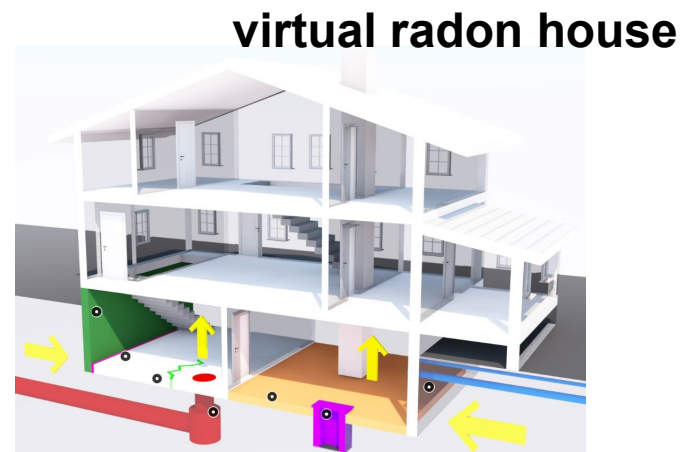
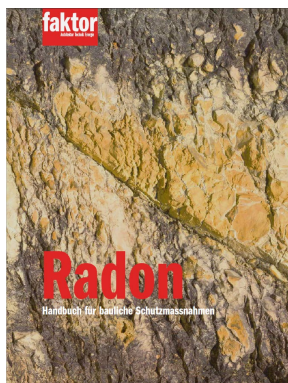


## 6. Improving public awareness to health problems caused by radon

Most people in Switzerland do not know about radon: 60% have never heard about the radon problem (30% in high risk areas, Gruson et al. 2010)



publications



radon hotline &  
[www.ch-radon.ch](http://www.ch-radon.ch)



## 7. Developing the tools and methods

- Develop a protocol for short term measurements (particularly for real estate transactions)
- A more detailed statistical evaluation of the available data (measurements, remediation)
- A better understanding of the equilibrium factor at work places exposed to radon
- An improved knowledge of geological factors and the influence of building characteristics



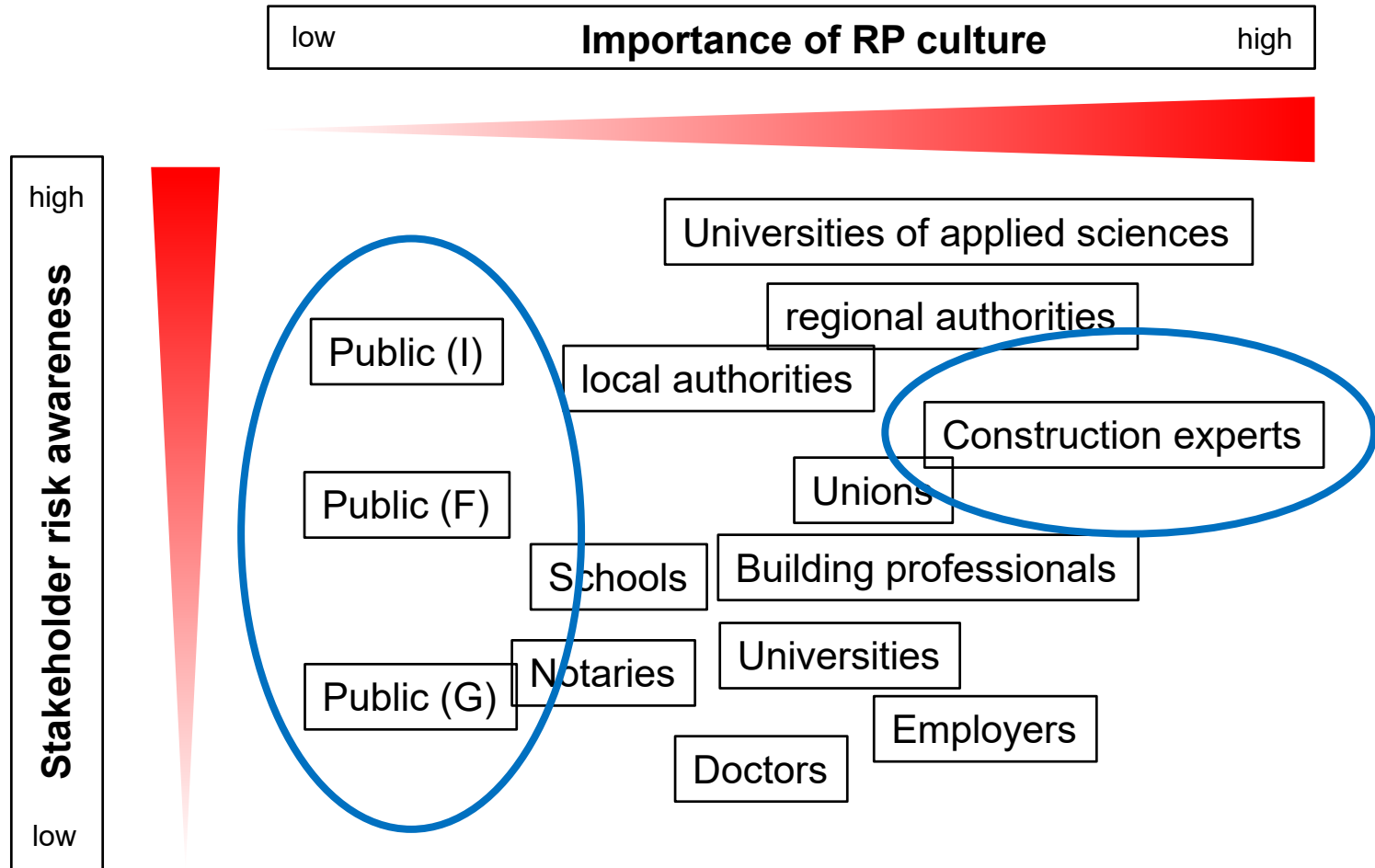
## Measuring process: overview

Measurement characteristics	Measurement protocols
<b>Measurement time</b>	≥ 90 days
<b>Measurement period</b>	Heating season (October-March)
<b>Number of dosimeters per unit</b>	generally <ul style="list-style-type: none"><li>• Two dosimeters per housing unit</li><li>• All class rooms basement/ground floor</li></ul>
<b>Which result if multiple measurements available</b>	Highest value in the building
<b>Verification of a limit violation</b>	1-year measurement for confirmation (only dwellings)
<b>Estimation of the annual average</b>	No seasonal correction
<b>Placement of the measurement devices</b>	Mail order possible only for dwellings





## Dissemination of RP Culture = raising risk awareness?





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# Thank you for your attention!