SCK•CEN
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE

SCK•CEN ACADEMY
FOR NUCLEAR SCIENCE AND TECHNOLOGY

ABR IRPA BVS

Applied radiological risk communication for the 21st century

Refresher course

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IRPA, 6th of June 2018, De Hague, Nederland

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Risk communication about ionizing radiation

Supports the stakeholders to make informed decisions and to establish two-way communication and joint problem solving.

- It involves communities
- It protects vulnerable groups
- It serves the public interest (health)

Citizen-centred communication

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Objectives of this course

- To realize that power structures are shifted
- To recognized that expertise is not limited to policy-makers and scientists any more
- To encourage members of

IRPA
INTERNATIONAL RADIATION PROTECTION ASSOCIATION

to **take an active role**
in communication about ionizing radiation
and radiation protection

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- To realize that power structures are shifted
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COMMUNICATION IS YOUR JOB

ke an active role

cation about ionizing radiation

and radiation protection

Do you communicate?

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Content

- Information processing
- Different approaches to risk communication and influence on peoples behavior
- Risk perception and new trends in risk communication

? CHALLENGE or OPPORTUNITY for

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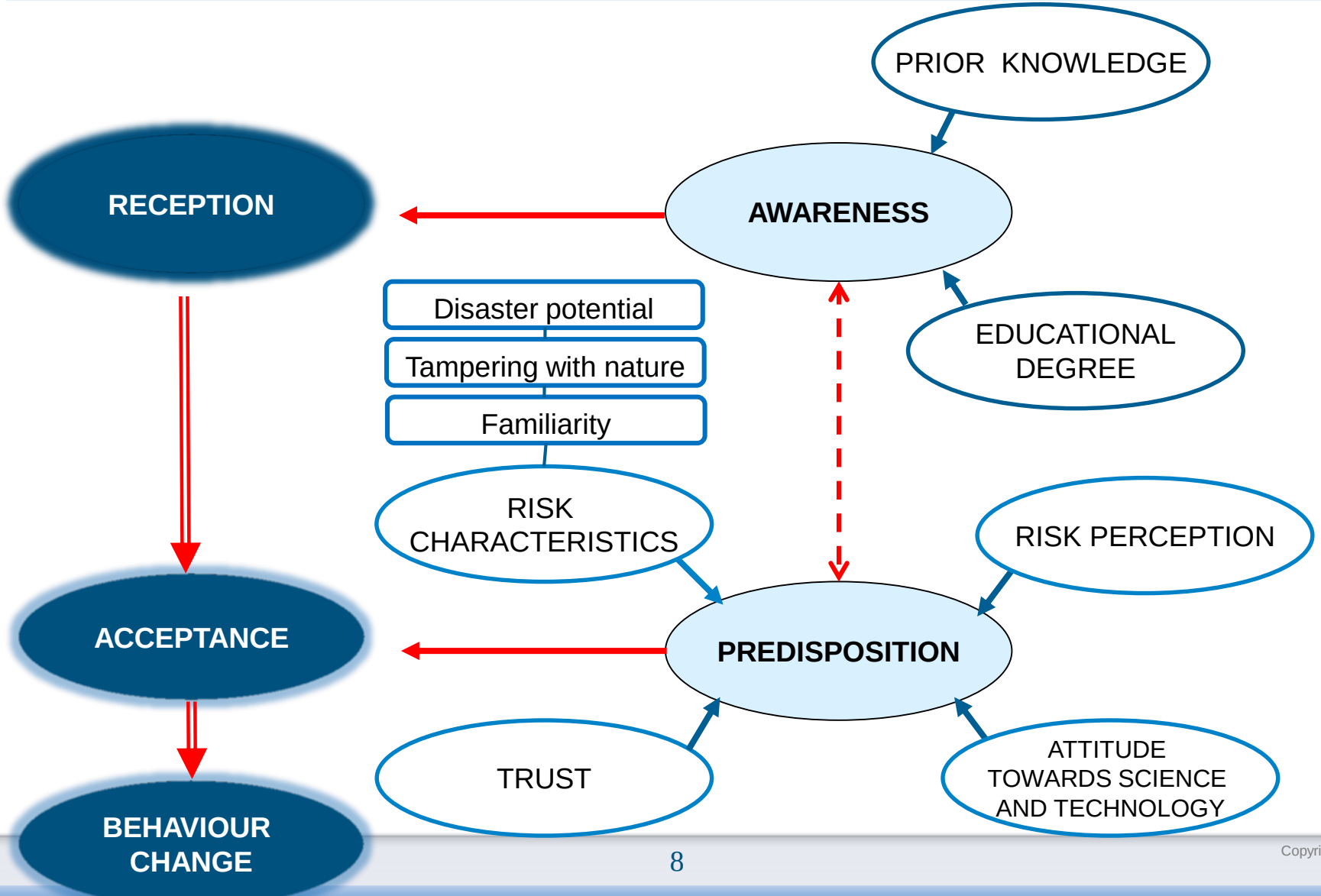
Perko T. et al,, Risk Analysis (2013) and Journal of Risk Research (2014)

Theoretical background
model for risk communication



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Research Objectives

Determine factors influencing:

- attentiveness to information,
- recall of information,
- opinion formation

related to nuclear emergency management.

Studies: 1, 2, 3

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Research
Questions

What kind of information is available?

How do people acquire information about radiological risks?

How do they process information important for radiation protection?

How do they convert it into behavioural change (or intention for behavioural change)?

In communication about ionizing radiation

By defining different target groups in the population we aim for a more effective and focused communication.

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Research
Interdisciplinary approach

- Context:
  - Radiation protection
- Main theoretical framework:
  - Information processing models
  - Media studies
- Other theoretical concepts:
  - Risk communication
  - Risk perception
  - Opinion formation

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Research
Three investigated case studies

- Study 1: Radiological accident in Fleurus, Belgium (2008)

Photos: Belga and SCK CEN

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Research
Three investigated case studies

- Study 1: Radiological accident in Fleurus, Belgium (2008)
- Study 2: Iodine distribution campaign, Belgium (1999, 2002, 2008, 2011)

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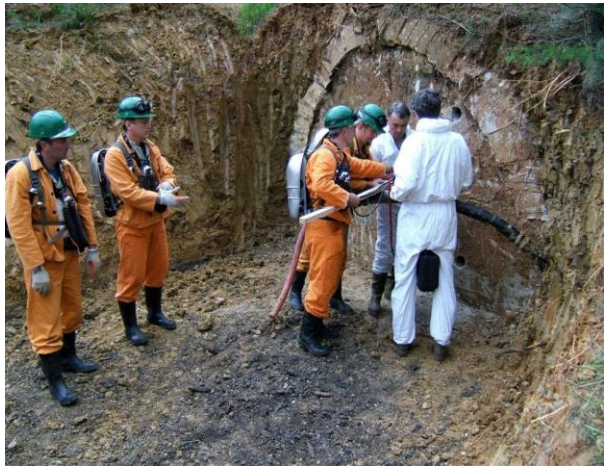
Research
Three investigated case studies

- Study 1: Radiological accident in Fleurus, Belgium (2008)
- Study 2: Iodine distribution campaign, Belgium (1999, 2002, 2008, 2011)
- Study 3: Study 2 + Radwaste disposal campaign, Slovenia, (1996 – 2011)



Photos: ARAO

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Research
Data

- Public opinion surveys:
  - General population:
    - SCK•CEN Barometers 2006, 2009, 2011 in Belgium (N>1000)
    - Survey conducted in Slovenia (N>1000)
  - Affected populations:
    - Fleurus 2008 (N=100)
    - Target population Iodine campaign in Belgium (N=207)
    - Target population LILW disposal in Slovenia (N=217)

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Results

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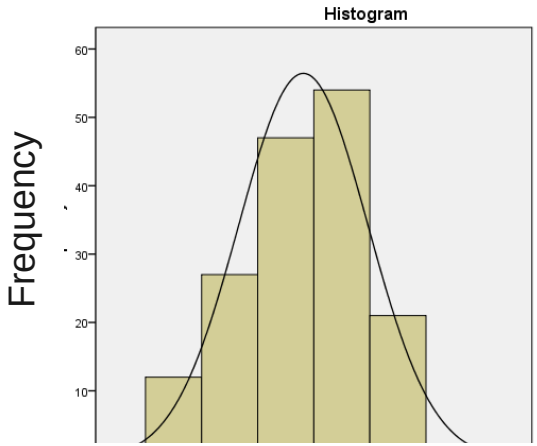
Results-study 1

Dependent variables: Crisis communication-reception

Reflects the respondent's ability to correctly recall the information:

- 1st reception = binary variable
  - Recall correctly the place, year and month of the radiological accident
    - General population (Belgium) 15%
    - Affected population (Local community) 91%
- 2nd reception = index
  - Number of correct answers on five specific messages from communication

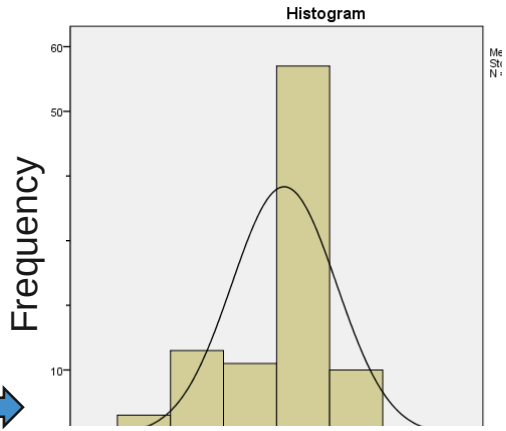


Number of correct answers

Q:"Which was the main radioactive pollutant?"
A:"Radio-iodine"

General population

Affected population



Number of correct answers

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Results-study 1
Crisis communication: reception of information

- Method: Binary logistic regression

Significant predictors	β General population	β Affected population
Disaster potential	**0.43***	not significant
Prior knowledge	**0.11*****	**0.31***
Education	**-2.18** (prim.), **-0.75** (sec.) (ref.cat. Uni)*****	not significant
Age	**0.02****	not significant
	N = 763 Nagelkerke Pseudo R^2 = 0.21	N = 80 Nagelkerke Pseudo R^2 = 0.34

***p<0.001, **p<0.01, *p<0.05

- Not significant variables :
  - Risk perception, attitude towards S&T, trust, tampering with nature, familiarity

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Results-study 1

Crisis communication: reception of information

- Method: Linear regression

Significant predictors	β General population	β Affected population
Risk perception of an accident	**0.24***	not significant
Prior knowledge	**0.08***	**0.17*****
	N = 135 R^2(adj) = 0.10	N = 72 R^2(adj) = 0.41

***p<0.001, **p<0.01, *p<0.05

- Not significant variables:
  - Language, gender, education, age, attitude towards S&T, trust, disaster potential, tampering with nature, familiarity

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Results-study 1

Crisis communication: acceptance of information

Reflects the respondent's (dis)agreement with the communicated statements.

- Factor analysis, 5-point Likert scale, 6 statements
  - α=0.78 for the general population
  - α= 0.89 for the affected population

"Evacuation of people in the 3 km radius would have been better."

- A large majority of people think that the situation was worse than communicated by the authorities

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Results-study 1

Crisis communication: acceptance of information

- Method: linear regression analysis

Significant predictors	β General population	β Affected population
Disaster potential	**-1.66****	**0.46*****
Dis. potent. x prior knowledge	**0.13****	not significant
Attitude towards S&T	not significant	**-1.1****
Attitude towards S&T x Prior know.	not significant	**0.13****
Trust	not significant	**0.02***
Trust in authorities x Prior know.	not significant	**0.03****
Gender	(ref. cat. female)*	
	N = 95 R^2(adj) (full model) = 0.49	N = 50 R^2(adj) (full model) = 0.54

***p<0.001, **p<0.01, *p<0.05

- Not significant variables: prior knowledge, education

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Conclusions-study 1
Crisis communication

Reception of nuclear emergency information is driven by:

- Prior knowledge
- Systematic predictors (affected population)
- Risk perception (general population)
- Is not dependent on other heuristic predictors e.g. trust or attitudes

Acceptance of nuclear emergency information is driven by :

- Heuristic predictors e.g. disaster potential, attitudes
- Interaction of prior knowledge with heuristic predictors
- Is not directly driven by prior knowledge
- High disaster potential = low acceptance of information

Perko et. al., Journal of Risk Research; (2013)

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Results-study 2

Model testing in iodine tablets context - Reception

- Prior knowledge plays a dominant role: **β = 0.35*****

Predictors

- Education
- Hazard experience
- Trust
- Risk perception
- Fear

although significant – do not play an important role

Context:
The iodine distribution campaign
Method: CAPI, N=1031 (519)

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Additional findings-study 2

Model testing in iodine tablets context - Acceptance

Higher acceptance of communicated information
= mostly driven by systematic information processing,
e.g. more view points, attentively followed the discussion,
considered the info…

STAKEHOLDER INVOLVEMENT

Perko et. al., Journal of Risk Analysis; (2013)

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Results-study 3

Model testing in long term communication

- What influences:
  - Perception of communicated risks
  - Acceptability of communicated messages

after intensive communication campaigns in two different countries

Context:

The iodine distribution campaign; Belgium
Method: CAPI, N=1031, target population N=253

Long-term radioactive waste disposal campaign; Slovenia
Method: CATI, N=983, target population N= 217

Perko et. al., Journal of Health Physics; (2012)

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Additional findings-study 3

PERCEPTION OF COMMUNICATED RADIOLOGICAL RISK
is strongly influenced by
PERCEPTION OF OTHER RADIATION RISKS
β (Belgium) = 0.70***
β (Slovenia) = 0.45***

SLO:"Evaluate the risk of a radioactive waste disposal"

BEL:"Evaluate the risks of an accident in a nuclear installation for you"

The main predictors of successful communication are similar in different countries

Perko et. al., Health Physics; vol. 102, 2012

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Conclusions for Studies 1, 2, 3

Influencing factors of information processing

- Minor differences between the crisis and not-crisis communication, as well between the affected and the general population identified.
- Prior knowledge dominates at the level of reception of risk messages.
- Heuristic predictors, such as risk perception, psychometric risk characteristics and attitudes are most influential at the level of acceptance of risk messages.
- Stakeholder involvement increases acceptability.

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1988	Social amplification of risk framework	Risk is amplified by increased public attention, or attuned, by less public attention.
1990	Recreancy paradigm	People have insufficient knowledge about risks from complex and potentially dangerous technologies; therefore they must rely on their judgments about whom to trust.
Mid nineties	Mental model approach	People's basic frames of reference, their previous knowledge on the subject, their set of values, the format and structure of the new information contribute to their interpretation of the information.
2000	Risk society	Society is recognized as "risk society"; Power of defining the risk.
2000	Extended psychometric paradigm	Focus on risk toleration with emphasis on beliefs
2000	Risk Governance	Risk perception is among different actors diverse, but none is wrong. Stakeholder process bridges the differences and helps in risk governance.

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Education

Marketing practice

Participatory practice

Risk message

Risk dialogue

Risk governance

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Revised Basic Safety Standards Directive 2013/59/Euratom
Amended Nuclear Safety Directive 2014/87/Euratom
The Aarhus Convention

Nuclear safety directive

Directive 2009/71/EURATO
nuclear installations and its

Worldwide, the nuclear safety of nuclea
supplemented by an EU Directive. The
adopted by the Council of the Europe
of the Directive takes into account e

The objective of the Directive is
national arrangements for a hig
nuclear installations.

The Directive comprises pr
to the organisation, duties
of all parties' staff, and
separation principle w
with the promotion o

Community framework for the nuclear safety of
2014/87/Euratom

nd the international conventions. Within the EU, this is being
amework for the nuclear safety of nuclear installations,
national nuclear safety principles. The content
advises the European Commission.

provide for appropriate
radiation from

Official Journal
of the European Union

ISSN 1977-0677
L 13

English edition

Legislation

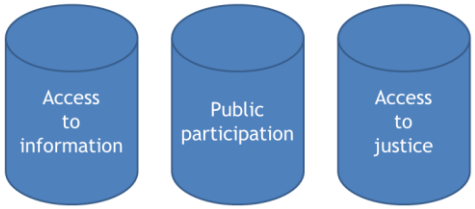
Contents

II Non-legislative acts

DIRECTIVES

★ Council Directive 2013/59/Euratom of 5 December 2013 laying down
protection against the dangers arising from exposure to ionising
Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom,
2003/122/Euratom

Participatory and Procedural
Rights in Environmental Matters



Three pillar System

INFORMATION PARTICIPATION JUSTICE

AARHUS CONVENTION
for our environment

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New trends have entered the radiation protection field

- Citizens journalism
- Social media
- Citizens science
- Open source information
- New regulations on public rights for information and stakeholder engagement

Address risk perception factors

Familiarity, controllability, trust, social trust, dread ….

an opportunity to **make informed decisions**

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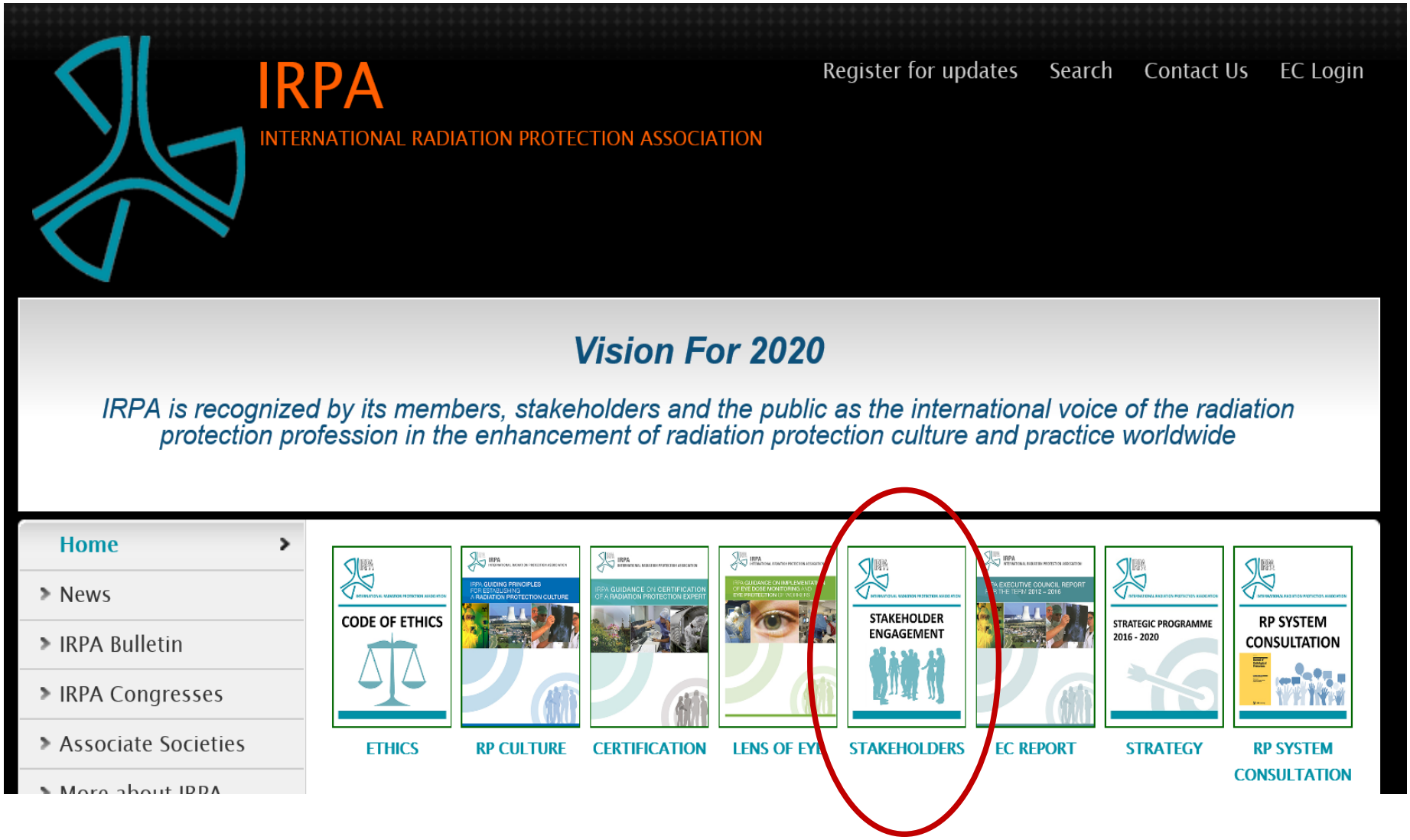

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IRPA Guiding Principles for [illegible]ion Protection Professionals on St[illegible] Engagement

IRPA, 2004

1. Identify opportunities for engagement [illegible]ment is proportionate to the nature of the ra[illegible]text.
2. Initiate the process as early as [illegible] implementation plan.
3. Enable an open, inclusi[illegible]s.
4. Seek out and inv[illegible]
5. Ensure that th[illegible]e rules for cooperation[illegible]
6. Colle[illegible]gement process, based on [illegible]
7. D[illegible]e and understanding, and favou[illegible]
8. Respe[illegible]rent perspectives.
9. Ensure a[illegible]n is in place to inform and improve current and future st[illegible]nt processes.
10. Apply the I[illegible]hics in their actions within these processes to the best of their knowledg[illegible]

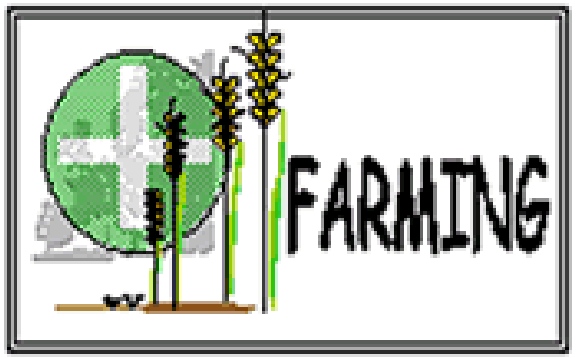
Stakeholder Engagement", should play an important and integral part in the decision-making processes related to radiological protection

IRPA, 2004

© SCK•CEN Academy

Examples from emergency management

- Involving population in exercises and evaluation, improvement of emergency response plans …
- Partnership approach in management of nuclear installations
- FARMING: Stakeholders' feedback on a compendium of countermeasures for the management of contaminated food production systems (2000-2004)
- FP6 Project EURANOS: Generic Food Handbook (2004 – 2006)
- Guidance on lifting of emergency countermeasures (2007)



Social media

- Popular
- Collaborative
- Participatory
- Decentralised
- Accessible

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Example: Citizens journalism

Studies have shown that in emergency situation the individual is an **information seeker** but also **information source** for others.

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Recommendations for Improving Communication with Journalists to Enhance Public Safety in the Event of a Nuclear or Radiological Emergency

At the conclusion of the workshop, a group of participating representatives of news media drafted the following recommendations to international, national, and local authorities regarding improved communication with the media in the event of a nuclear or radiological emergency:

Recognizing that in the event of a radiological emergency, where there is risk to public safety from ionizing radiation, governments and journalists share the goal of minimizing harm to the public;

Recognizing that the availability of factual, reliable, timely information is indispensable to an appropriate public response to prevent avoidable panic and chaos;

Recognizing that ongoing fragmentation of the contemporary media landscape, including the ascendance of social media networks and the advent of citizen journalism, requires a corresponding multifaceted response;

Recognizing that tools by which authorities have traditionally communicated with media are insufficient today (for example, press releases may be issued long after journalists have received eyewitness photos and accounts);

Recognizing that in an emergency, without the most expeditious release of information, citizen journalists untrained in standard codes of practice for news gathering and factual reporting may unwittingly circulate rumors and unverified information;

Also recognizing that radiological emergency first responders may not have the capacity to give priority to informing journalists as a means of assuring the public;

And further recognizing that despite the need for robust scientific data, its compilation should not hinder the earliest release of basic facts and safety protocols to journalists;

http://www.atomicreporters.com/

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Misrepresentations and mistakes in media

Radiological risks related to Fukushima in European media:

- References to non-existing norms (e. g. levels in the enviroment)
- Using norms for drinking water as benchmark for seawater
- Mixing up allowed levels for general population and emergency workers
- Mixing up dose and dose rate
- Presenting permitted levels as «safe»

Perko T. at al (2014); Journal of radiation protection

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Perko T. at al (201

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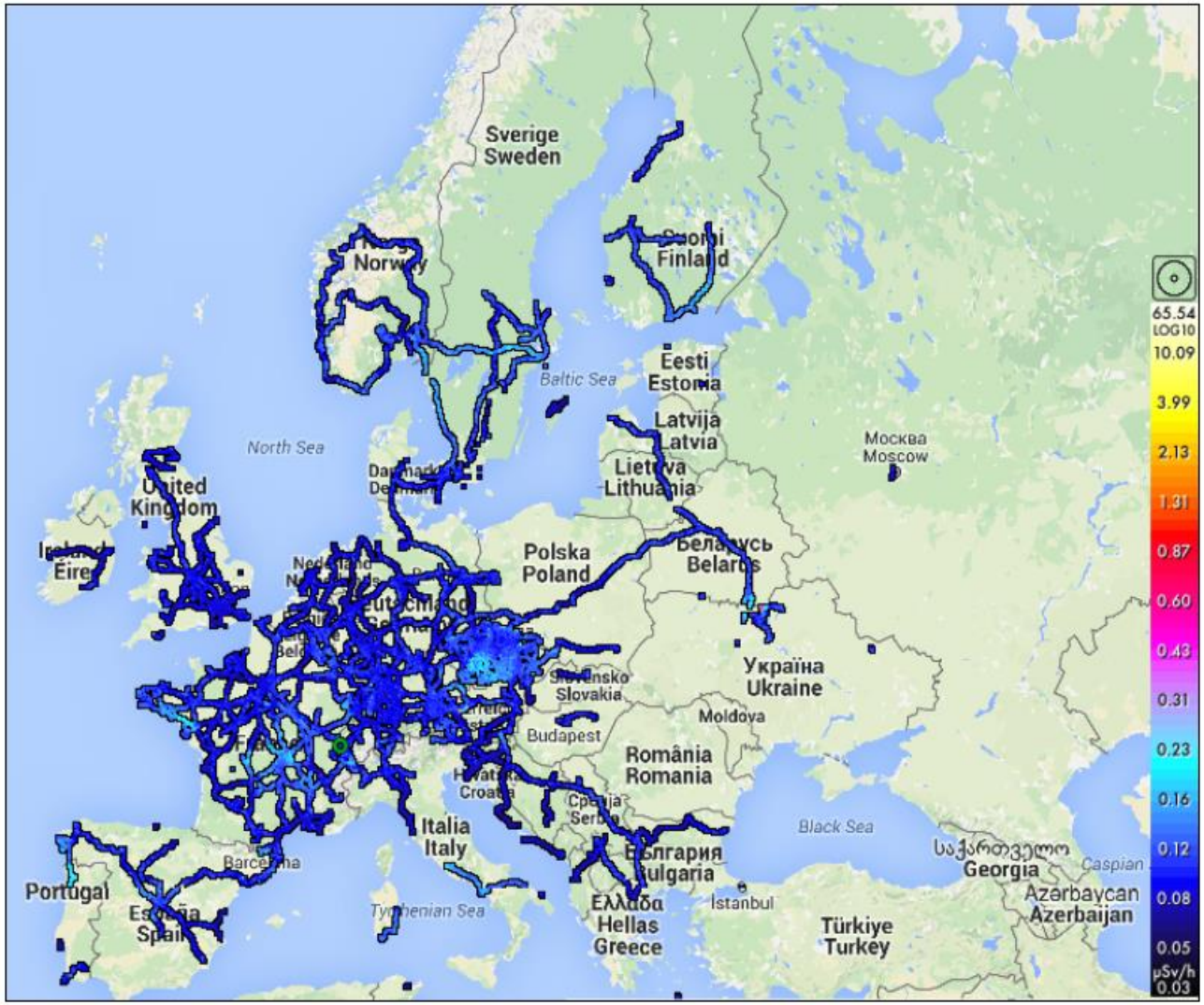
Example: Open- source, citizen-science-centered radiation mapping solutions through a process of collaborative open innovation, SAFECAST



Safecast web map showing data from Europe as of May 2016

Automobile

Bicycle

Hand-carry

Aerial drone
(under development)

Brown, 2016

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Conclusions

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- From educating towards dialogue
- From exclusive towards inclusive communication
- From challenges to opportunities
- From passive towards active
- From hierarchical towards open communication
- From communication about certainty towards communication about uncertainty

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