



United Nations Scientific Committee  
on the Effects of Atomic Radiation

unscear.org

# UNSCEAR: The scientific basis for ICRP's work

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# Content

- Background to UNSCEAR
- Role and interface with ICRP
- Issues affecting scientific work



# Mandate



- **Scientific** Committee of UN General Assembly
- Assess **levels, effects & risks of ionizing radiation**
  - identify emerging issues
  - evaluate levels and effects
  - improve knowledge
  - identify future research needs

for General Assembly, scientific community & public

# Examples of technical underpinning

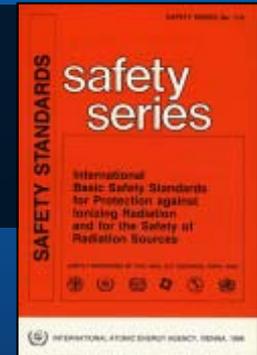
1963 partial test ban treaty



1972 UN Conference on Human Environment



1996 reductions in international radiation exposure limits for workers and public



Recovery from Chernobyl accident



Recent international action plans on worker, patient and environmental protection





**May 2011 session involved over 120 scientists in 21 delegations, observers from 6 countries and IAEA, UNEP, WHO, WMO, EC, ICRP**

# Member States on UNSCEAR

**Scientists from 21 UN Member States** designated by General Assembly  
UNEP provides secretariat

- Argentina
- Australia
- Belgium
- Brazil
- Canada
- China
- Egypt
- France
- Germany
- India
- Indonesia
- Japan
- Mexico
- Peru
- Poland
- Russia
- Slovakia
- Sudan
- Sweden
- UK
- USA



**Belarus  
Finland  
Pakistan  
Rep. of Korea  
Spain  
Ukraine**  
**expressed desire to join**

**Other States and international organizations provide relevant data on exposures**

**UNSCEAR assessments are conducted on behalf of all 193 Member States and represent consensus of United Nations system on these matters**

# Solid foundations crucial

## Safe and beneficial uses

**Sound and  
confident  
decisions**

**Protection  
standards**

**Protection  
programmes**

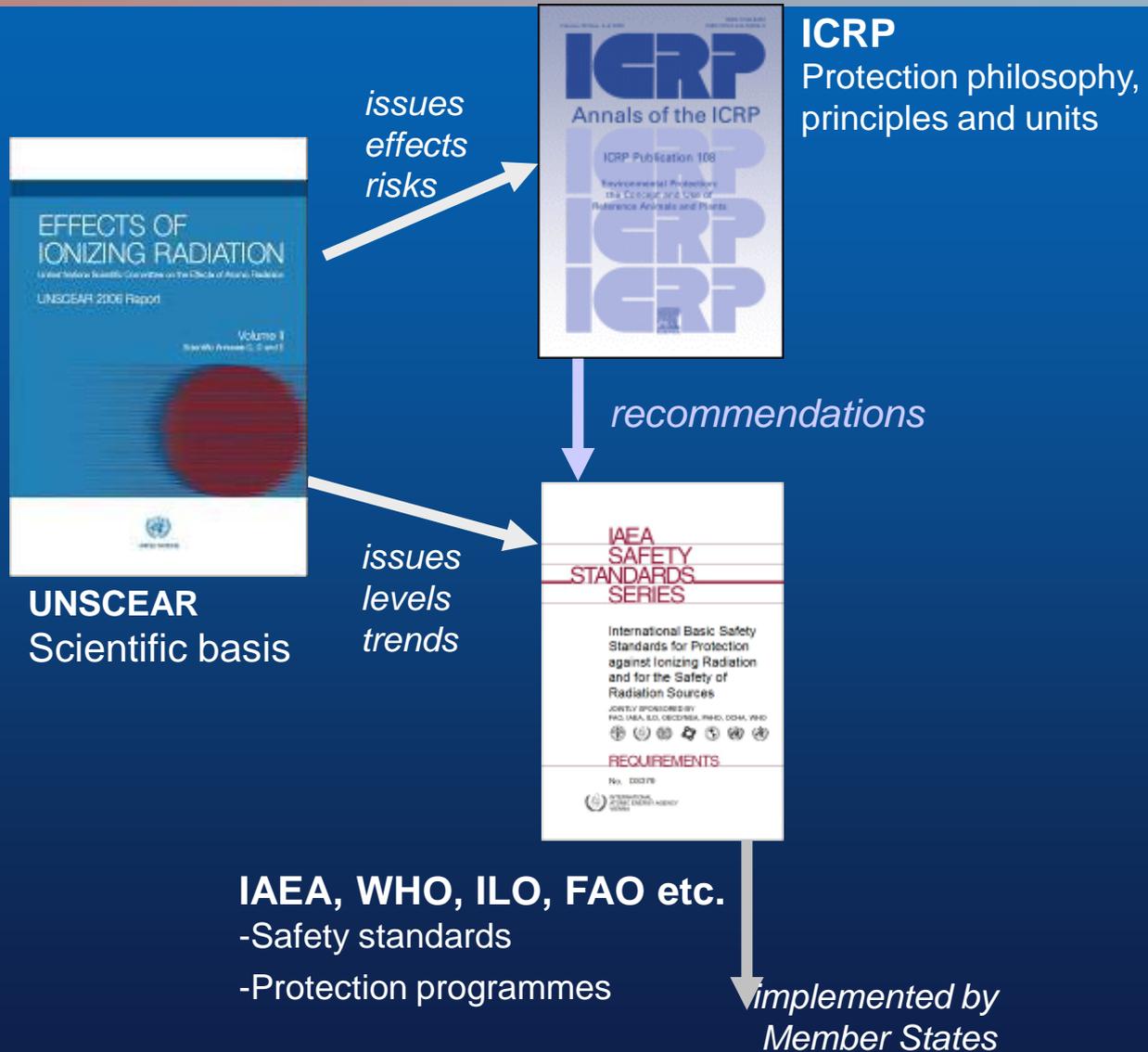
**Understanding  
of public and  
decision-makers**

**Protection  
paradigm**

**Emerging  
issues**

## Scientific platform

# International radiation safety regime





# UNSCEAR assessments of recent years

- 2006
  - Epidemiological studies of **radiation and cancer**
  - Epidemiological evaluation of **cardiovascular disease** and other **non-cancer** diseases following radiation exposure
  - **Non-targeted** and delayed effects of exposure to ionizing radiation
  - Effects of ionizing radiation on the **immune system**
  - Sources-to-effects assessment for **radon** in homes and workplaces
- 2008
  - **Medical radiation exposures**
  - **Exposures of the public and workers** from various sources of radiation
  - Radiation exposures in **accidents**
  - Health effects due to radiation from the **Chernobyl** accident
  - Effects of ionizing radiation on **non-human biota**
- 2010
  - Summary of **low-dose radiation effects** on health

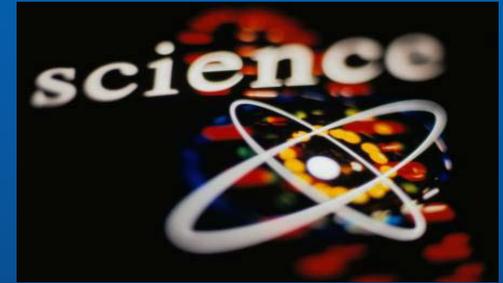


# Current programme of work

- Attribution of health effects to radiation
- Uncertainties in cancer risk estimates for radiation
- Biological effects of selected internal emitters
- Radiation risks and effects on children
- Epidemiology of low dose rate radiation risks
- Mechanisms of radiation actions at low doses
- Methodology for assessing discharges
- Radiation exposure from electricity generation
- Radiation levels/effects from Fukushima accident
- Public information material
- Improved mechanisms for data collection

*Next session 21-25 May 2012*

# Issues affecting scientific work





# Science – policy interface

- Assess **levels, effects & risks** of ionizing radiation
- UNSCEAR does **not conduct basic research**, nor justifies radiation uses **nor sets protection policy**
- Rather assesses and synthesizes available scientific information to best **convey a coherent picture of the state of knowledge** on levels, effects and risks
  - **Truthfully**
  - **Honestly**
- Decisions and policy (e.g. by ICRP) must additionally apply **ethical values and judgements** regarding protection and **practicality** under uncertainty
- **Sound science for better decisions**



# Truth and honesty

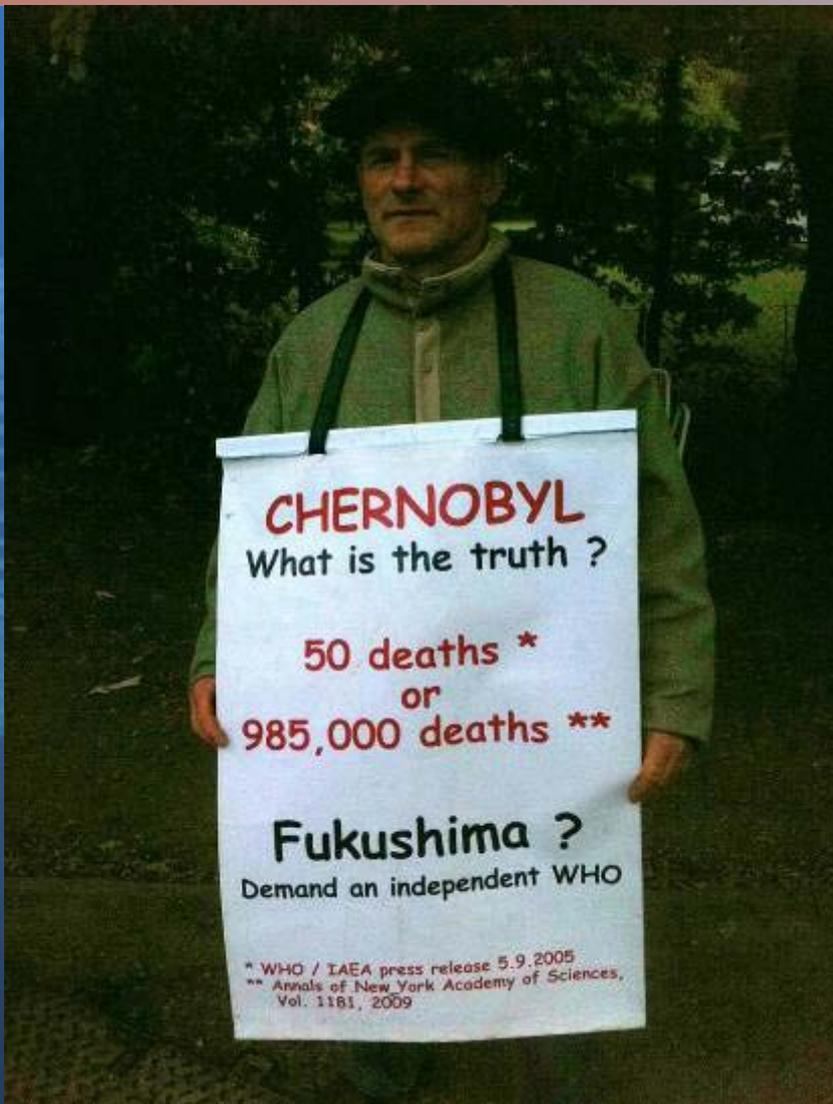
- *“The chance that ICRP policy caused the banking crisis is no more than 50%”*
  - *True*
  - *but honest?*

# Attributing effects and risks to radiation exposure



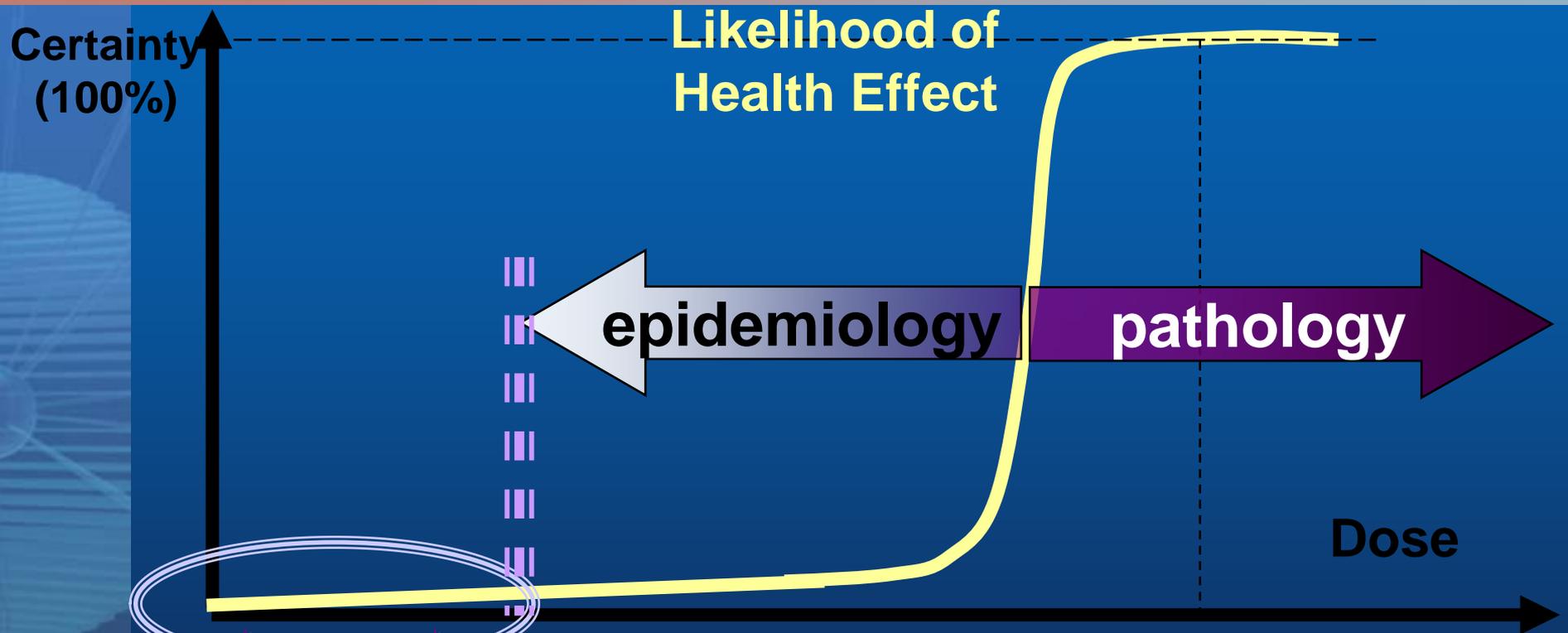


# Risk communication



- Truth and honesty
  - 50 deaths?
  - 4,000 deaths?
  - 30,000 deaths?
  - 985,000 deaths?
- “Any increase in cancer rates are likely so small as to be undetectable”

# Attribution of effects



# Science ► paradigm

**Increased incidence**

Scientific observations

Cancer type, sex, age, time,  
other factors

**Relative risk**

Risk assessment

Assumptions on  
applying observations  
to another situation

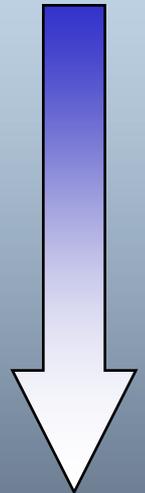
**Lifetime risks**

**Overall population risk**

Risk management tool

More generalization, more  
assumptions

**Detriment-adjusted risk coefficients**



## Interface with ethical values and judgements

- UNSCEAR's work is **not immune** to protection policy judgements and values
- Assess in quantities used by policy community
  - Risk of exposure-induced death (REID) per unit dose
- But judgements that other quantities were more appropriate for protection purposes would affect UNSCEAR's portrayal of results
  - Risk of exposure-induced incidence (REIC) per unit dose
  - Years of life lost per unit dose (YLL)
- But for emerging issues, use appropriate quantities
  - For children sensitivity, not population average

# Quantities and units

- Work of ICRP/ICRU on quantities and units **crucial** for early UNSCEAR assessments
- Strive to use **physical quantities** (e.g. absorbed dose in gray) for risk/effect assessments
- However, for exposure assessments
  - instruments calibrated for **ambient dose equivalent**,
  - doses usually reported as **effective dose**
  - assessments in **effective dose** (adding internal and external exposures, over many organs etc.)
- **Discontinuities** in trends when **definition of quantity** changes with time (**nominal** not scientific)
- Confusion over which quantity was reported, using which weighting factors
- If changes are small, is it really worth it?

# Other potential for confusion

- Apologies to the purists but...
- Confusion of equivalent dose and effective dose **because they are expressed in the same units** (sieverts)
- Despite the different adjectives, people often just use the noun “dose”. Perhaps the **noun** itself should be adjusted?
- For **tissue effects** at high doses, radiation weighting factors for effective dose are not appropriate – other radiation weighting factors, other quantity?
- For **medical exposures**, appropriate to adjust effective dose estimates for age, sex, risks, body size etc.? How to best describe the weighted quantity and unit?

# Concluding remarks

- **ICRP and UNSCEAR are pillars** of international radiation safety regime
- **Highly respected** by Governments, other international organizations and scientific community
- **Independence** and scientific objectivity
- More **clarity needed** over science--policy interface
- Improve **feedback** mechanisms
- Issues regarding **quantities and units** need addressing, but very carefully; changes **must do more good than harm – pilot test them first**



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