

# **EUROPEAN ACADEMY OF SCIENCES**

**The Future of Science in the 21st Century : Progress in Science, Progress in Society**

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# **SCIENCE AND SOCIAL COMMUNICATION**

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## INTRODUCTION

- Communication has a great influence in many sociological and psychological aspects, so that the way scientific developments are transmitted to society can significantly change their perception.
- Different issues will be able to attract social understanding for science if they are properly addressed in terms of general perspective, interest and values.
- Communicating is considered a strategic function by the majority of organizations which interact in our social system.

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- The influence of traditional mass media instruments such as newspapers, radio and TV, is being overtaken by the powerful influence of the Internet.
  - As matter of fact Internet is perceived by a large social sector worldwide as a reliable source of information.
  - These new and powerful communication channels used for dissemination of scientific information require greater awareness to avoid that science would be potentially misunderstood or even, in the worst case, misused.

However...

- In many cases, science broadcasting and assessment of scientific issues are not correctly done, thus causing misjudgements and social rejection.
- It is easy to make people accept negative effects when scientific thinking, spirit or content have deviations; vested interests or ignorance.
- Transmission of science through social mass media can have a positive impact on people to accept science benefits or, conversely, can lead to misapprehension or detrimental effects.
- One of the most significant cases is how nuclear energy is in many cases manipulatively transmitted to society, thus creating an emotional reaction far from scientific or empiric facts.

## ACCIDENT OF CHERNOBYL (1986)

- Information on the true scale of the Chernobyl accident has been systematically distorted by numerous mass media.
- In 2011 the United Nations published the report “Sources and Effects of Ionizing Radiation. United Nations Committee on the Effects of Atomic Radiation. UNSCEAR 2008. Report to the General Assembly with Scientific Annexes. Volume II. Scientific Annexes C,D and E. United Nations - New York 2011”.
- This report was the result of a multidisciplinary investigation to assess the consequences of this severe accident.

# ACCIDENT OF CHERNOBYL : CONCLUSIONS UNITED NATIONS REPORT 2011

## SOURCES AND EFFECTS OF IONIZING RADIATION

United Nations Scientific Committee on the  
Effects of Atomic Radiation

UNSCEAR 2008  
Report to the General Assembly  
with Scientific Annexes

VOLUME II  
Scientific Annexes C, D and E



UNITED NATIONS  
New York, 2011

“The vast majority of the population were exposed to low levels of radiation comparable, at most, to or a few times the annual natural background radiation levels and need to live in fear of serious health consequences. This is true for population of the three countries most affected by Chernobyl accident, Belarus, the Russian Federation and Ukraine, and even more so for the population of other European countries. Lives have been disrupted by the Chernobyl accident, but from the radiological point of view, generally positive prospects for the future health of most individuals should prevail”. P. 186.

Source: [http://www.unscear.org/docs/reports/2008/09-86753\\_Report\\_2008\\_Annex\\_B.pdf](http://www.unscear.org/docs/reports/2008/09-86753_Report_2008_Annex_B.pdf)

# What the media did not explain:

- Chernobyl reactor was dual-application for obtaining both electricity and plutonium for nuclear weapons.
- In 1944 it was demonstrated that this kind of reactors were intrinsically unsafe and dangerous because the reactivity coefficient of temperature and void were positive: the higher the temperature the higher the number of nuclear fissions and therefore the higher the energy produced that, in turn, led to further increase of temperature.
- Commercial nuclear reactors must have a negative reactivity coefficient of temperature and void. For this reason, Chernobyl type reactors were forbidden for civil applications in democratic countries.

# FUKUSHIMA DAIICHI ACCIDENT

- On 11 March 2011, Japan suffered the largest ever recorded earthquake with a 9 magnitude. Japanese nuclear power plants (NPPs) successfully shut down.
- However, 40 minutes after the earthquake a tsunami whose wave front reached height of up to 40 m destroyed the emergency cooling systems of Units 1-3 at Fukushima Daiichi NPP. Reactor cores meltdown and released iodine 131 and caesium 137 radionuclides to the environment.
- Distortion of information on the actual facts at Fukushima provoked further anxiety in Japanese citizens that in the middle of the devastation effects of both the earthquake and the tsunami received through Internet stressful and apocalyptic messages.
- In 2013, the World Health Organization published the “Health risk assessment from the nuclear accident after the 2011 Great East Japan Earthquake and Tsunami *based on a preliminary dose estimation*” carried out by international experts and observers.

# Report on Fukushima accident by the World Health Organization



“The HRA (Health Risk Assessment) Expert Group agreed that cancer data from Fukushima were likely to be comparable to those from other parts of Japan. This determination was made on the basis of the similarity of cancer incidence in two neighbouring prefectures for which cancer registries are available (Miyagi and Yamagata) and the other Japanese cancer registries. Also, similarities were found between cancer mortality data in those two neighbouring prefectures compared with cancer mortality data in Fukushima and data from the rest of Japan. From a global health perspective, the health risks directly related to radiation exposure are low in Japan and extremely low in neighbouring countries and the rest of the world”. P. 76.

Source:[http://www.who.int/ionizing\\_radiation/pub\\_meet/fukushima\\_risk\\_assessment\\_2013/en/](http://www.who.int/ionizing_radiation/pub_meet/fukushima_risk_assessment_2013/en/))

# COMMUNICATION ON HEALTH MATTERS DURING A RISK MANAGEMENT PROCESS

Risk communication is a key component linked closely to risk assessment and risk management.

- Proactive risk communication is critical to the success of any remedial activity.
- Fears and perceptions need to be addressed. It is of utmost importance to prevent reactions that themselves carry risk by promoting healthy mechanisms such understanding and social solidarity.
- An effective risk communication should include credibility, transparency, technical accuracy and ethics.



# **How to improve scientific communication?**

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- It is necessary to consider communication learning as an important component of science education.
  - For an effective communication, scientists should also take into consideration the public's needs and views.
  - According to International Council for Science (ICSU), scientific work should be communicated with integrity, respect, fairness, trustworthiness, and transparency, recognizing its benefits and possible harms.

# Where are the limits of openness in scientific communication?



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- Disseminating certain scientific information could pose a threat for safety and security.
  - **Scientific ethics:** Knowledge that could cause harm to people without producing any benefits.
  - **Scientific responsibility:** When knowledge could be used by other people to cause harm.



**The Internet:  
An impact in science communication**

## POSITIVE EFFECTS OF SCIENCE COMMUNICATION IN INTERNET

- Science communication webs are vastly expanded around the world.
- The content of science communication has been substantially enlarged.
- The forms of science communication are varied, multimedia, and communication effect can be strengthened.
- Promptitude of science communication is enhanced.

## NEGATIVE EFFECTS

- Anyone can publish any information, thus, the scientific and accuracy of science communication contents cannot be always guaranteed.
- A lot of useless or harmful messages appeared and cause misinformation.
- Excessive freedom of opinion makes people not to distinguish between true, reliable or false information.

## SURVEY ON SOCIAL PERCEPTION OF SCIENCE IN SPAIN (2014)

- Since 2002 the Spanish Foundation for Science and Technology (FECYT) of the Ministry of Economy carries out a survey on Social Perception of Science.
- The survey analyzes different issues on how science is perceived by Spanish citizens. Some of these issues are: spontaneous interest for science and technology; reasons for lack of interest for science; social image of science; social image of scientific profession; scientific education; scientific information sources, etc.
- The following summarizes some of the results.

Source: VII Encuesta de Percepción Social de la Ciencia. Dossier informativo. FECYT.  
[http://www.idi.mineco.gob.es/stfls/MICINN/Prensa/NOTAS\\_PRENSA/2015/Dossier\\_PSC\\_2015.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Prensa/NOTAS_PRENSA/2015/Dossier_PSC_2015.pdf)

### Reasons for lack of interest in science

- Not arouse my interest: **39,4%**
- I don't understand it: **35,9%**
- No specific reason: **9,9%**
- I have never thought about this issue: **8,4%**
- I don't have time: **7,7%**
- I don't need it: **7,1%**
- Others: **0,9%**
- No answer: **6,5%**

### Social image of science. Contributions of scientific knowledge to the global reality

- The benefits of science are greater than its damage: **59,5%**
- The benefits and harms of science are balanced: **26,1%**
- Damages of science and technology outweigh the benefits. **5,3%**
- I have no opinion on this topic: **6,9%**
- No answer: **2,1%**

Source: VII Encuesta de Percepción Social de la Ciencia. Dossier informativo. FECYT.  
[http://www.idi.mineco.gob.es/stfls/MICINN/Prensa/NOTAS\\_PRENSA/2015/Dossier\\_PSC\\_2015.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Prensa/NOTAS_PRENSA/2015/Dossier_PSC_2015.pdf))

### Scientific information sources

- Internet: **56,7**
- TV: **72,1%**
- Daily newspapers: **28,9%**
- Free newspapers: **15,5%**
- Radio: **31,0%**
- Books: **17,8%**
- Scientific journals: **13,2%**
- General information journals: **6,7%**
- Other: **1,2%**
- None: **0,4%**
- Don't know: **5,9%**

### Scientific information sources in Internet

- Wikipedia: **32,7%**
- General digital media: **31,5%**
- Social networks: **30,8%**
- Videos: **29,7%**
- Blogs: **25,4%**
- Science and technology digital media: **22,8%**
- Radio: **7,6%**



# **Scientific communication in the European Union**

# EUROPEAN UNION SCIENTIFIC COMMUNICATION POLICY

The European Union considers highly important that science communication among EU countries can be performed as efficiently as possible. Main issues are:

- To produce strategic communication: Objectives are clearly defined.
- To generate an effective flow of information among participants.

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- The EU Framework Programme for Research and Innovation Horizon 2020 intends to improve scientific community communication by providing specific guidelines for project coordinators and scientists. (<https://ec.europa.eu/programmes/horizon2020/>)
  - The European Open Science Cloud for Research provides support to deal with the huge amount of scientific data and to create a tool that will help to scientific computing, storage and connectivity. (<https://www.eudat.eu/the-european-open-science-cloud-for-research-rome-workshop-report>)

# Some last words...

- It is necessary to build an open infrastructure between science and society to avoid that scientific issues could fade the relationship between science, society and politics.
- It is our responsibility to transmit science in an interesting, attractive way and showing that scientific research is a fundamental pillar in human development.
- It is also our duty to convey that ethics and scientific responsibility must always be accompanied by a sense of social responsibility.

*THANK YOU*

A scenic landscape at sunset. The sun is low on the horizon, creating a bright glow and lens flare. The sky transitions from a deep blue at the top to a warm orange near the sun. In the foreground, there are dark silhouettes of trees and a rocky cliffside. The text "THANK YOU" is overlaid in a light blue, italicized serif font.