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## EJP-CONCERT

European Joint Programme for the Integration of Radiation Protection Research

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# D 5.3 - First public/specialist website material

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### **Abstract**

This deliverable describes the structure and content of pages on the CONCERT website (<http://www.concert-h2020.eu/>) that provide some information on ionizing radiation exposures and risk for a public stakeholder audience. The work was carried out by DH-PHE and SCK.CEN as part of Work package 5, task 5.4. The work required close cooperation with Task 1.8, responsible for website development and maintenance, Task 5.4 focused on the content of the website.

<End of abstract>

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## Background

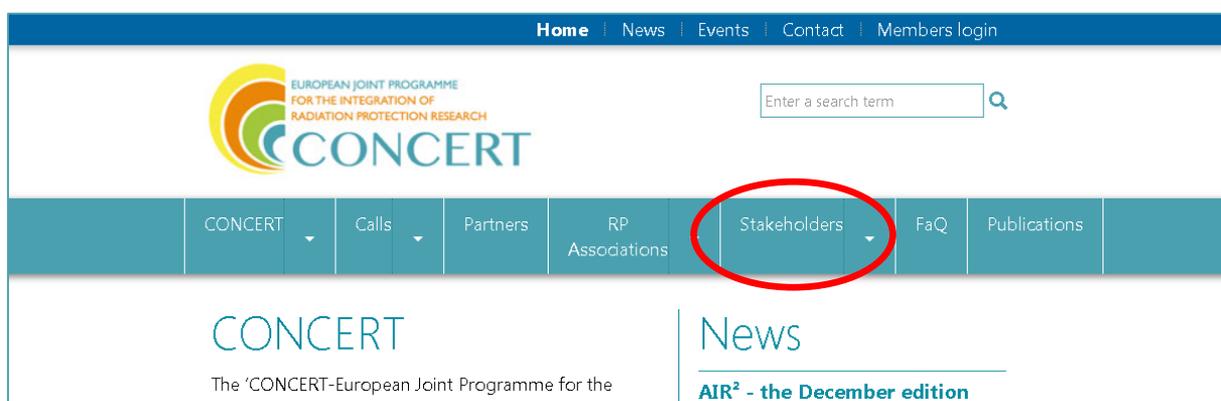
The CONCERT proposal includes a Work package (WP5) on stakeholder engagement, much of the work builds on activities undertaken within the context of the OPERRA project (<http://www.melodi-online.eu/operra.html>). Task 5.4 specifically aimed to develop general, public facing and specialist information for the CONCERT website. The work of Task 5.4 has been undertaken by DH-PHE and SCK•CEN in close cooperation with colleagues responsible for the CONCERT website (Task 1.8) with Task 5.4 focusing on content while Task 1.8 provides and maintains the IT infrastructure. The material made available on the CONCERT website at this time is considered preliminary and will be updated in light of comments/additions received from other CONCERT POMs and those who visit the pages. An update of the public stakeholder webpages is anticipated as a further deliverable, D5.4 - review and update of website material (M36).

## Approach

It is widely acknowledged that websites are an essential tool for collating and making available information to a very wide audience. Task 5.4 aimed to build website resources for CONCERT by drafting and posting information for a general audience as well as a more specialist audience. The general information aimed to become a trusted source of reliable, balanced and evidence based information on radiation risk and approaches to radiation protection. The topics covered will over time be informed by stakeholder feedback from the group (Task 5.2) and survey (Task 5.3), at the present point in time these activities have not progressed to the point where they have directly informed the material posted. We deliberately set out to utilise material from existing web resources of CONCERT partners and others to develop the pages efficiently and also promote a common understanding of the available information and evidence. The website was expected to provide a common platform linking the websites of the various associations and aiming at continued availability of the resource and information beyond the duration of CONCERT project.

## The CONCERT website public stakeholder pages

The materials described in this deliverable can be found under the 'Stakeholders' tab on the CONCERT homepage:



The screenshot shows the top navigation bar of the CONCERT website. The navigation menu includes: Home, News, Events, Contact, and Members login. Below this is a search bar with the text "Enter a search term" and a magnifying glass icon. The main navigation bar contains several menu items: CONCERT, Calls, Partners, RP Associations, Stakeholders (circled in red), FaQ, and Publications. Below the navigation bar, the page content is divided into two columns. The left column features the CONCERT logo and the text "The 'CONCERT-European Joint Programme for the Integration of Radiation Protection Research' under". The right column features the word "News" and a sub-heading "AIR<sup>2</sup> - the December edition".

By selecting the ‘Stakeholders’ tab viewers are directed to a section entitled ‘Radiation and me’. This ‘landing page’ serves to integrate the information gathered in a simple format so that viewers can opt to explore the sections that are of interest to them. The landing page additionally provides links to the MELODI, EURADOS, NERIS, ALLIANCE and EURAMED websites and associated Strategic Research agendas, the EC EURATOM programme pages and projects funded by CONCERT (currently available only for those projects initiated following the first CONCERT call).

Individual pages cover the topics, What is radiation?, Natural sources of radiation, Man-made sources of radiation, What are the effects of radiation on my health?, and Radiation risks in context.

The ‘What is radiation?’ section outlines the different forms of radiation and radiation units:

CONCERT | Stakeholders | What is ionising radiation?

## What is ionising radiation?

- Ionising radiation has existed since the Universe formed and is naturally present in our environment here on [Earth](#) and is produced and used for specific purposes by [humans](#)
- Ionising radiation is an electromagnetic wave with very high frequency – higher than radio waves used for broadcasting, microwaves used in cooking, and visible light.

**Examples of different applications using radiation**

Frequency  
 $10^4$   $10^5$   $10^6$   $10^7$   $10^8$   $10^9$   $10^{10}$   $10^{11}$   $10^{12}$   $10^{13}$   $10^{14}$   $10^{15}$   $10^{16}$   $10^{17}$   $10^{19}$   $10^{21}$   $10^{23}$

Energy  
(eV)  $10^{10}$   $10^9$   $10^8$   $10^7$   $10^6$   $10^5$   $10^4$   $10^3$   $10^2$   $10^1$  1  $10^1$   $10^2$   $10^4$   $10^6$   $10^8$   $10^{10}$

Non-ionizing radiation      Ionizing radiation

Non-ionizing radiation does not have enough energy—measured in electron volts (eV)—to make changes to atoms or molecules.

*Source: Radiation: Effects and Sources, UNEP, 2016*

- Ionising radiation gets its name from the fact that it has sufficient energy to break atomic structures and so remove electrons from chemicals leaving them in a charged state.
- Ionising radiation comes in different forms, some are produced when radioactive elements

The 'Natural sources of radiation' page briefly outlines natural background sources and provides links to information specific to some countries on natural (and in some cases artificial source) exposures. This latter series of links we hope to expand following input from POMs.

CONCERT | Stakeholders | Natural sources of ionising radiation

## Natural sources of ionising radiation

- Ionising radiation from natural sources is all around us and has been since the origin of life on Earth. It is often referred to as natural background radiation
- Cosmic radiation arrives on Earth from deep in space and the naturally radioactive elements found on Earth were formed in supernovae (the explosions that occur when stars come toward the end of their existence)
- Naturally radioactive elements are incorporated into rocks and soils and so are present in foods and building materials, although at low levels
- The largest source of human exposure to natural background radiation is from radon gas in rock, though exposures vary widely depending on local geology

Source	Percentage
Natural radioactivity in the air	40%
Direct radiation from traces of radionuclides in rocks and soil	30%
Medical	15%
Food & drink	10%
Cosmic	5%
Other	<1%

- Find out about exposures to natural radiation (and, in some cases, [artificial radiation sources](#) in your country...

The section on man-made sources of radiation very briefly describes some of the artificial sources that commonly come to mind, it is not intended to be an exhaustive listing.

CONCERT | Stakeholders | Artificial sources

## Man-made sources of radiation

There are artificial (man-made) sources of radiation that we can be exposed to in our daily lives as well as the [natural sources](#), for example:

- The use of nuclear fission for energy production, although only very small amounts of radiation enter the environment from nuclear facilities
- Fallout from historical atmospheric testing of nuclear weapons, these levels continue to decline since the initiation of international agreements to ban atmospheric tests in the 1960s
- Last but not least, the increasing use of ionising radiation in medicine. These medical are only carried out when the benefit to patient outweighs the health risk, but on average exposures to medical sources are growing.

Generally, [natural sources of radiation](#) make up the largest part of average population exposures in most countries. However, in some Western countries about half of the "average" dose to the "average" person originates from such medical applications. There is of course substantial variation in exposure to medical source between individuals.

The section, ‘What are the effects of radiation on my health’ similarly provides a brief outline of the observed health effects of exposure and provides context regarding the doses required to elicit specific health outcomes.

CONCERT | Stakeholders | Health effects

## What are the effects of ionising radiation on my health?

- Exposures to the very highest doses of ionising radiation (several Gy) can be fatal, in reality exposures at these levels never occur
- Exposures to high doses, above 0.5Gy, can lead to injury of body tissues in the short term, again such exposures are not encountered in reality outside of accidental situations
- The main health concern at real-life exposure levels is cancer that may develop many years after exposure. Raised incidence of cancers have been observed in studies of many radiation exposed populations, including the survivors of the atomic bombings of Hiroshima and Nagasaki and those exposed to radiation in the nuclear industry.

The infographic 'Radiation exposure' includes the following details:

- BACKGROUND RADIATION:** Typically measured by both naturally occurring and artificial background radiation. Levels typically range from 0.002 – 0.0035 Sv/yr.
- SOURCES:** Radon gas from the ground, Cosmic rays from space, Medical (X-rays, CT scans), Nuclear power/ research reactors.
- SYMPTOMS OF RADIATION EXPOSURE:** Generally speaking, radiation sickness is brought on by a large enough dose in a short period of time, but it has also occurred with long term exposure.
- Early symptoms, exposure levels and time to symptom onset:**

Exposure Level	Time to Symptom Onset
1-2 Sv	Hours
2-4 Sv	Days
4-6 Sv	Weeks
6-10 Sv	Months
10-15 Sv	Years
15-20 Sv	10 years
20-30 Sv	10 years
30-40 Sv	10 years
40-50 Sv	10 years
50-60 Sv	10 years
60-70 Sv	10 years
70-80 Sv	10 years
80-90 Sv	10 years
90-100 Sv	10 years

Finally we provide information on the risks associated with radiation exposure compared to risks from other common exposures/activities. Thus the ‘Radiation risks in context’ aims to allow viewers to understand the magnitude of the risks they may face from a range of agents.

CONCERT | Stakeholders | Radiation risks

## Radiation risks in context

The health impacts of ionising radiation have been extensively studied, but it is helpful to place the health risks from radiation in the context of other risks to health. The figures below are taken from the [University of Oxford Martin School Restatement of the Health Effects of low level ionising radiation](#)

*Average number of years of life lost by specific exposures:*

- Survivor of the Japanese atomic bombings, very heavily exposed (>1Gray) – 2.6 years
- 35 year old white severely obese male – 4-10 years
- Lifetime smoking male doctor – 10 years

*Annual attributable deaths worldwide from specific exposures:*

- Residential exposure to radioactive radon gas – 99,000
- Exposure to ambient particulate air pollution (PM2.5) – 3.2 million
- Tobacco smoking – 6.3 million

According to the American Association for Cancer Research (AACR) tobacco and obesity are the **top** two factors causing cancer. Exposures to ionising radiation, along with solar ultraviolet (UV) radiation is estimated to account for only 2% of the cases the factor to cause cancer.

**Estimated % of cancer cases caused by identifiable and/or**

## Conclusion

The completion of this deliverable has allowed the CONCERT project to establish a resource that provides a source of trusted and evidence based information on radiation and associated risks. This is a start of what we hope will evolve into a resource that many will use to find out more about radiation and access exposure information relating to their own country. It is envisaged that both CONCERT POMs and those who visit the webpages will contribute to their growth over time. A substantial revision is anticipated at M36.