RF and Health:
A WHO Perspective

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World Health Organization

OUTLINE

- Introduction
- Assessing the health risk
- Managing the potential risk
- Conclusions

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www.who.int/en/

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Organization

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Blood test to diagnose tuberculosis can be dangerous

WHO/Tom Pietrasik

20 July 2011 -- A 12-month analysis reveals that currently available commercial blood tests for diagnosing active TD often lead to misdiagnosis, mistreatment and potential harm to public health. WHO is urging countries to ban these tests and instead rely on accurate microbiological or molecular tests.

Disease outbreak news
Information about disease outbreaks

Emergencies and disasters
Health action in crises

Director-General
Director-General and senior management

Governance
Constitution, Executive Board and World Health Assembly

WHO guidelines
A selection of evidence-based guidelines

Blood test to diagnose tuberculosis can be dangerous

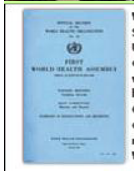
Droughts have exhausted coping capacity in the Horn of Africa

Hepatitis C is a global issue

Around 80% of people with West Nile virus have no symptoms

PEOPLE

Last but not least, WHO is people. Over 8000 public health experts including doctors, epidemiologists, scientists, managers, administrators and other professionals from all over the world work for WHO in 147 country offices, six regional offices and at the headquarters in Geneva, Switzerland.



When diplomats met in San Francisco to form the United Nations in 1945, one of the things they discussed was setting up a global health organization. WHO's Constitution came into force on 7 April 1948 – a date we now celebrate every year as World Health Day.

Delegates from 53 of WHO's 55 original member states came to the first World Health Assembly in June 1948. They decided that WHO's top priorities would be malaria, women's and children's health, tuberculosis, venereal disease, nutrition and environmental sanitation – many of which we are still working on today. WHO's work has since grown to also cover health problems that were not even known in 1948, including relatively new diseases such as HIV/AIDS.

1948

International Classification of Disease

WHO took over the responsibility for the International Classification of Disease (ICD), which dates back to the 1850s and was first known as the International List of Causes of Death. The ICD is used to classify diseases and other health problems and has become the international standard used for clinical and epidemiological purposes.

1952 Dr Jonas Salk (US) develops the first successful polio vaccine.

1967 South African surgeon Christiaan Barnard conducts the first heart transplant.

1952–1964

Global yaws control programme

One of the first diseases to claim WHO's attention was yaws, a crippling and disfiguring disease that afflicted some 50 million people in 1950. The global yaws control programme, fully operational between 1952-1964, used long-acting penicillin to treat yaws with one single injection. By 1965, the control programme had examined 300 million people in 46 countries and reduced global disease prevalence by more than 95%.

1974 The World Health Assembly adopts a resolution to create the Expanded Programme on Immunization to bring basic vaccines to all the world's children.

1977 The first Essential Medicines List appeared in 1977, two years after the World Health Assembly introduced the concepts of "essential drugs" and "national drug policy". 156 countries today have a national list of essential medicines.

1974 Onchocerciasis control programmme

WHO worked for 30 years to eliminate onchocerciasis – or river blindness – from West Africa. 600 000 cases of blindness have been prevented and 18 million children spared from the disease. Thousands of farmers have been able to reclaim 25 million hectares of fertile river land that had been abandoned because of the risk of infection.

Mr Ali Maalin (left), from Somalia, was the last person known to be infected with smallpox. Here he stands with the doctor who treated him more than 25 years ago. Ali has since worked on polio eradication campaigns.

1979

Eradication of smallpox

The eradication of smallpox – a disease which had maimed and killed millions – in the late 1970s is one of WHO's proudest achievements. The campaign to eradicate the deadly disease throughout the world was coordinated by WHO between 1967 and 1979. It was the first and so far the only time that a major infectious disease has been eradicated.

1983 Institut Pasteur (France) identifies HIV.

2003

WHO Framework Convention on Tobacco Control

21 May 2003 was a historic day for global public health. After nearly four years of intense negotiations, the World Health Assembly unanimously adopted WHO's first global public health treaty. The treaty is designed to reduce tobacco-related deaths and disease around the world.

2004 Adoption of the Global Strategy on Diet, Physical Activity and Health.

1978 The International Conference on Primary Health Care, in Alma-Ata, Kazakhstan sets the historic goal of "Health for All" – to which WHO continues to aspire.

1988 Global Polio Eradication Initiative established

Since its launch in 1988, the Global Polio Eradication Initiative has reduced the number of cases of polio by more than 99% – from more than 350 000 per year to 1956 in 2006. Spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention and UNICEF, it has immunized more than two billion children thanks to the mobilization of more than 20 million volunteers and health workers. As a result, five million children are today walking, who would otherwise have been paralysed, and more than 1.5 million childhood deaths have been averted.

THE GOAL IS TO ERADICATE POLIO WORLDWIDE SO THAT NO CHILD WILL EVER AGAIN BE PARALYZED BY THIS DISEASE.

2003 Severe Acute Respiratory Syndrome (SARS) first recognized and then controlled.

2005 World Health Assembly revises the International Health Regulations.

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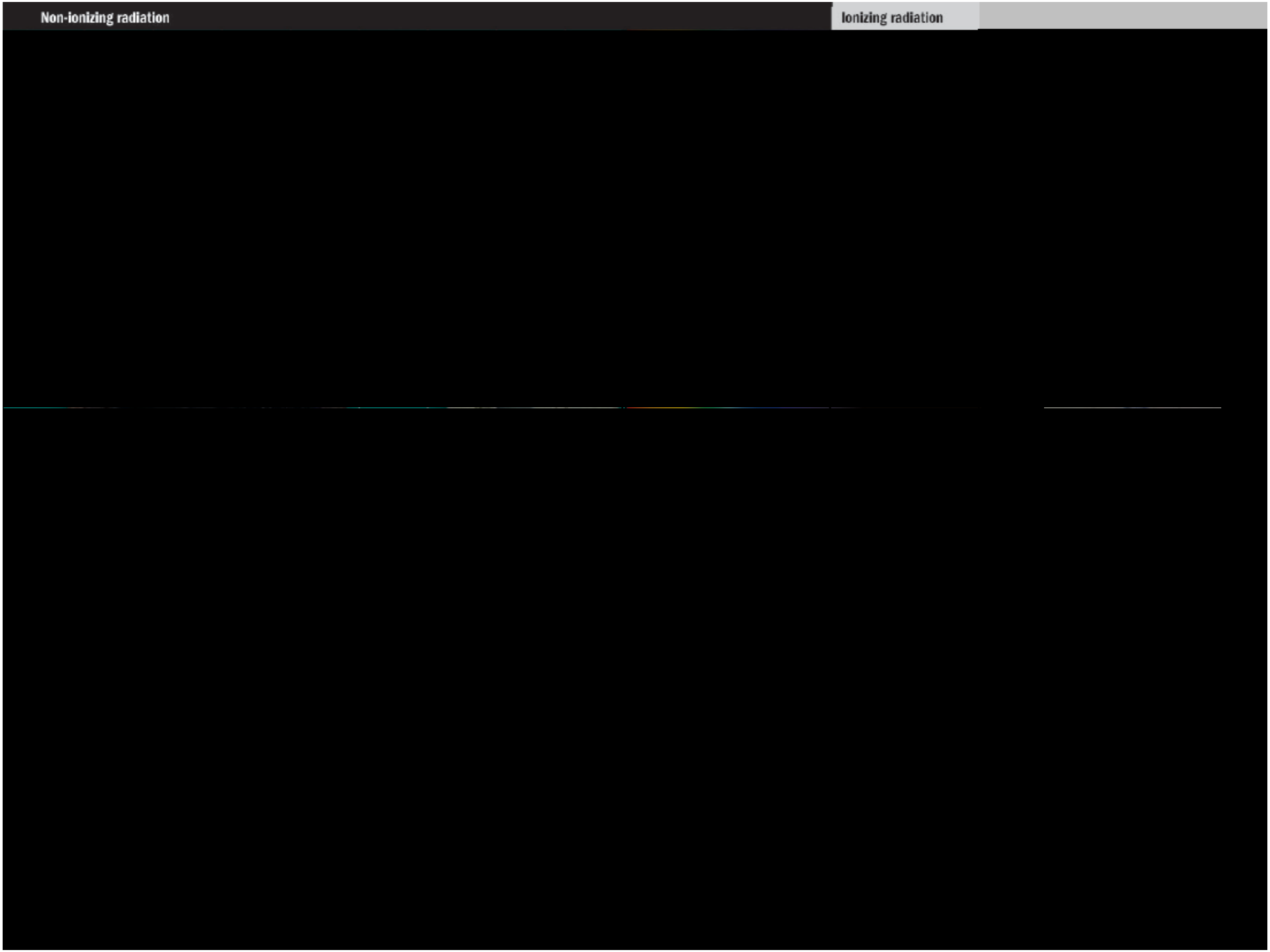

Non-ionizing radiation
Ionizing radiation

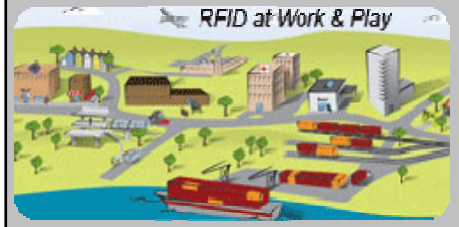
Radio Frequency Fields (100 kHz – 300 GHz)

Telecommunications

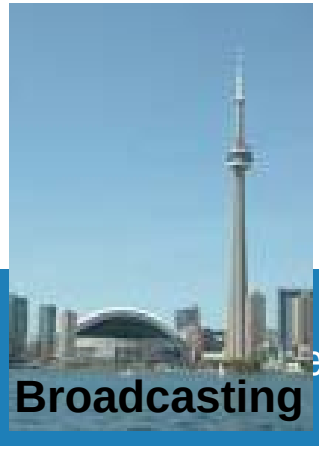
Residential sources

Commercial

Security scanners



Emerging technologies



Broadcasting

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The Present EMF Context

- Increasing EMF human exposure due to electricity demand, medical technologies and wireless devices
- Increasing concern from the public

Daily Mail
24 October 2002
Page 43

Mobiles 'boost cancer'

Radiation may make tumours grow faster

By **Tim Utton**
Science Reporter

NEW safety fears about mobile phones emerged yesterday over a possible link with cancer.

Radiation from the phones could promote the growth of tumours, according to scientists.

A new study suggests the radiation can kick cancer cells into 'high gear'

use are still unclear.

The biggest British study, led by Sir William Stewart two years ago, could find no evidence of a risk to health. But Sir William still recommended a precautionary approach, particularly in children.

The World Health Organisation has called for more research and has urged people to limit mobile use.

Now Italian scientists believe they could be closer to the truth.

Dr Fiorenzo Marinelli, of the National Research Council in Bologna, exposed leukaemia cells in the laboratory to 48 hours of continuous radio waves at a similar power and frequency to mobile phone emissions.

Initially, the radiation killed the cancer cells. But then the scientists noticed this lethal effect had gone into reverse as a 'survival mechanism' was triggered, which made them replicate at a ferocious speed.

Dr Marinelli said: 'We don't know what the effects would be on healthy human cells.

'But in leukaemia cells the response is always the same.'

The radiation may initially damage

Cancer develops when control signals in a normal cell go wrong and an abnormal cell results. Instead of destroying itself the mutant cell keeps on dividing and forms a lump or tumour.

The results of the Italian study support the belief of some scientists who say radiation can damage DNA and destroy the cell repair system – making tumours more deadly.

Dr Peter de Pomerai of the University of Nottingham, who studied effects on the body earlier this year, said the research was 'intriguing'.

Radiation may indirectly damage DNA by affecting its repair system, he said. If the DNA repair mechanism does not work as well as it should, mutations in cells could accumulate – with disastrous consequences.

'Cells with unrepaired DNA damage are likely to be far more aggressively cancerous,' said Dr de Pomerai. Dr Marinelli presented his results at the International Workshop on the Biological Effects of Electromag-

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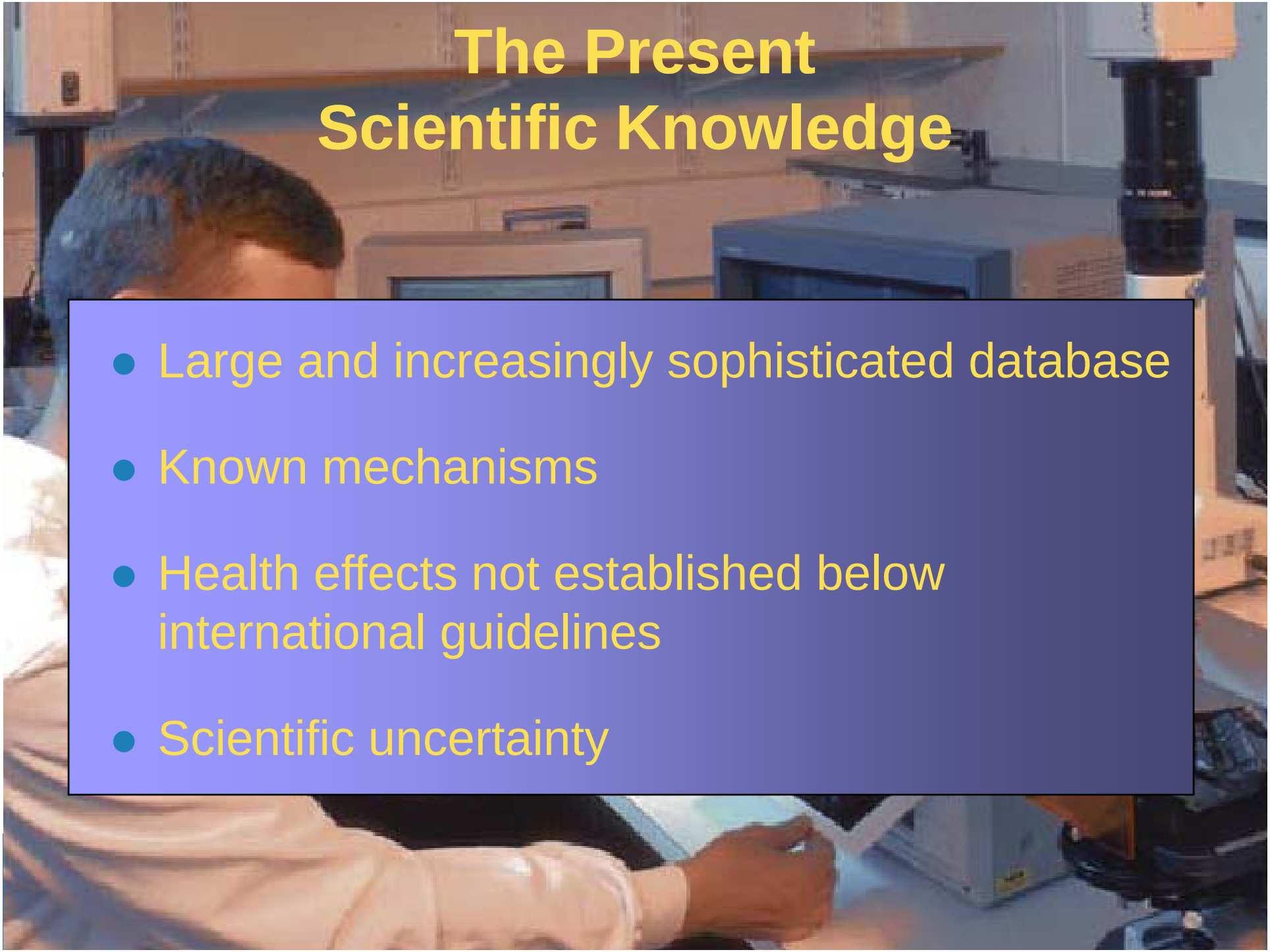
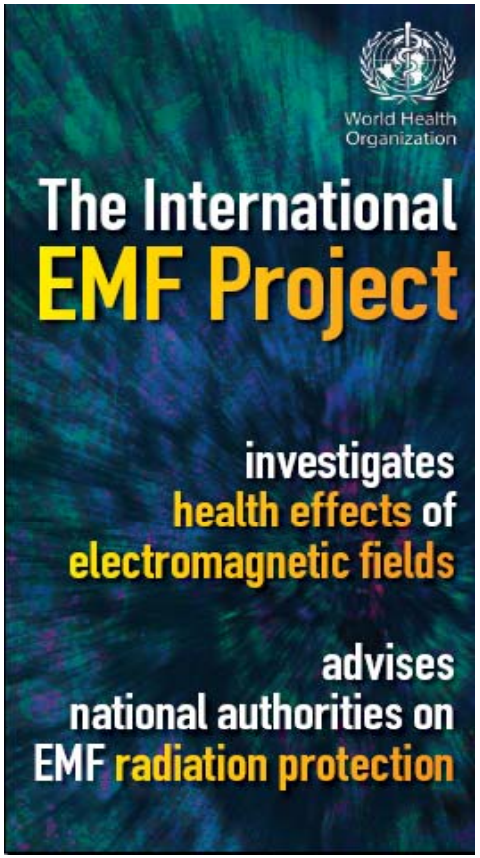


The Present Scientific Knowledge

- Large and increasingly sophisticated database
- Known mechanisms
- Health effects not established below international guidelines
- Scientific uncertainty

WHO International EMF Project

- Established in 1996
- Coordinated by WHO HQ
- A multinational, multidisciplinary effort to create and disseminate information on human health risk from EMF



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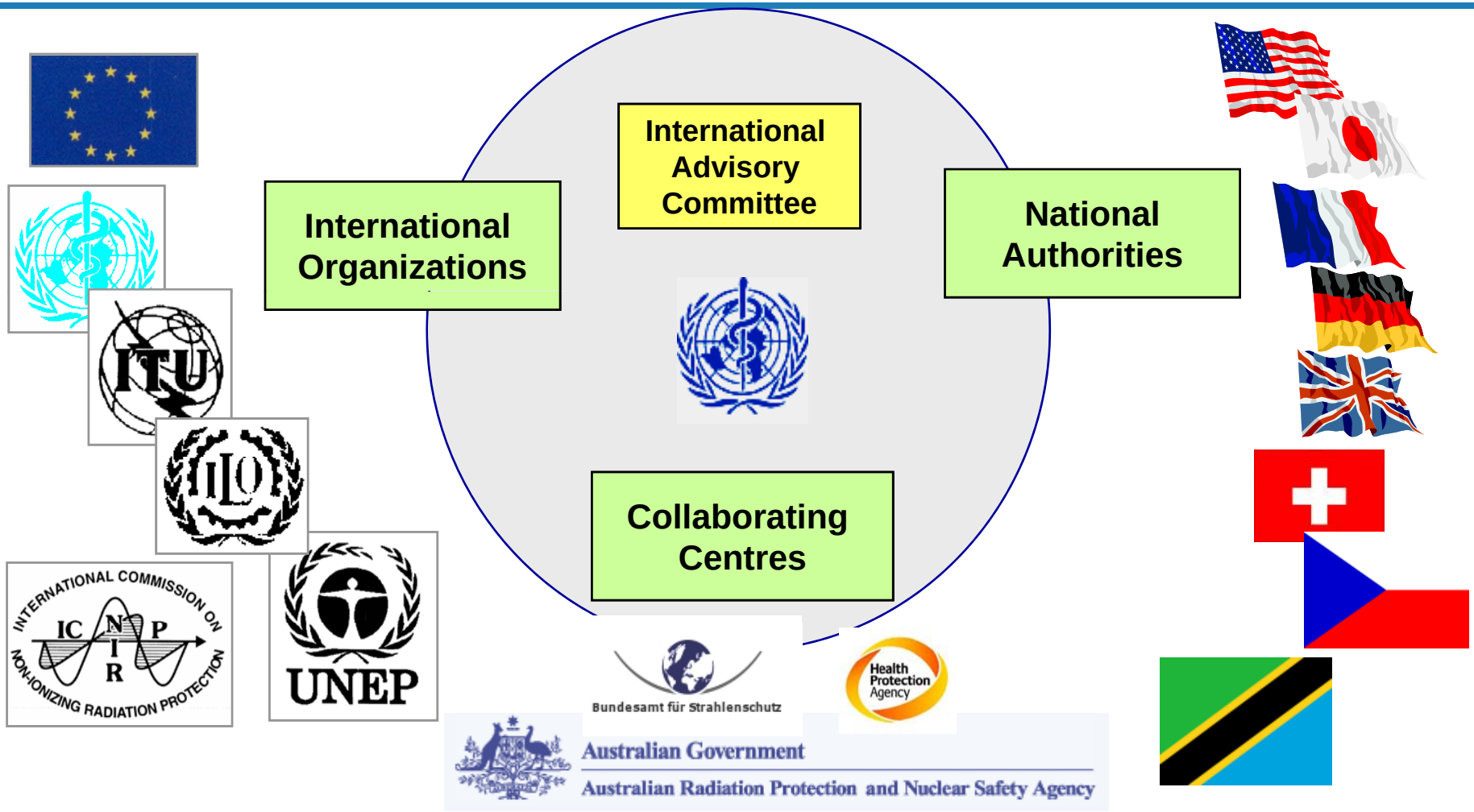
WHO Partners in Radiation



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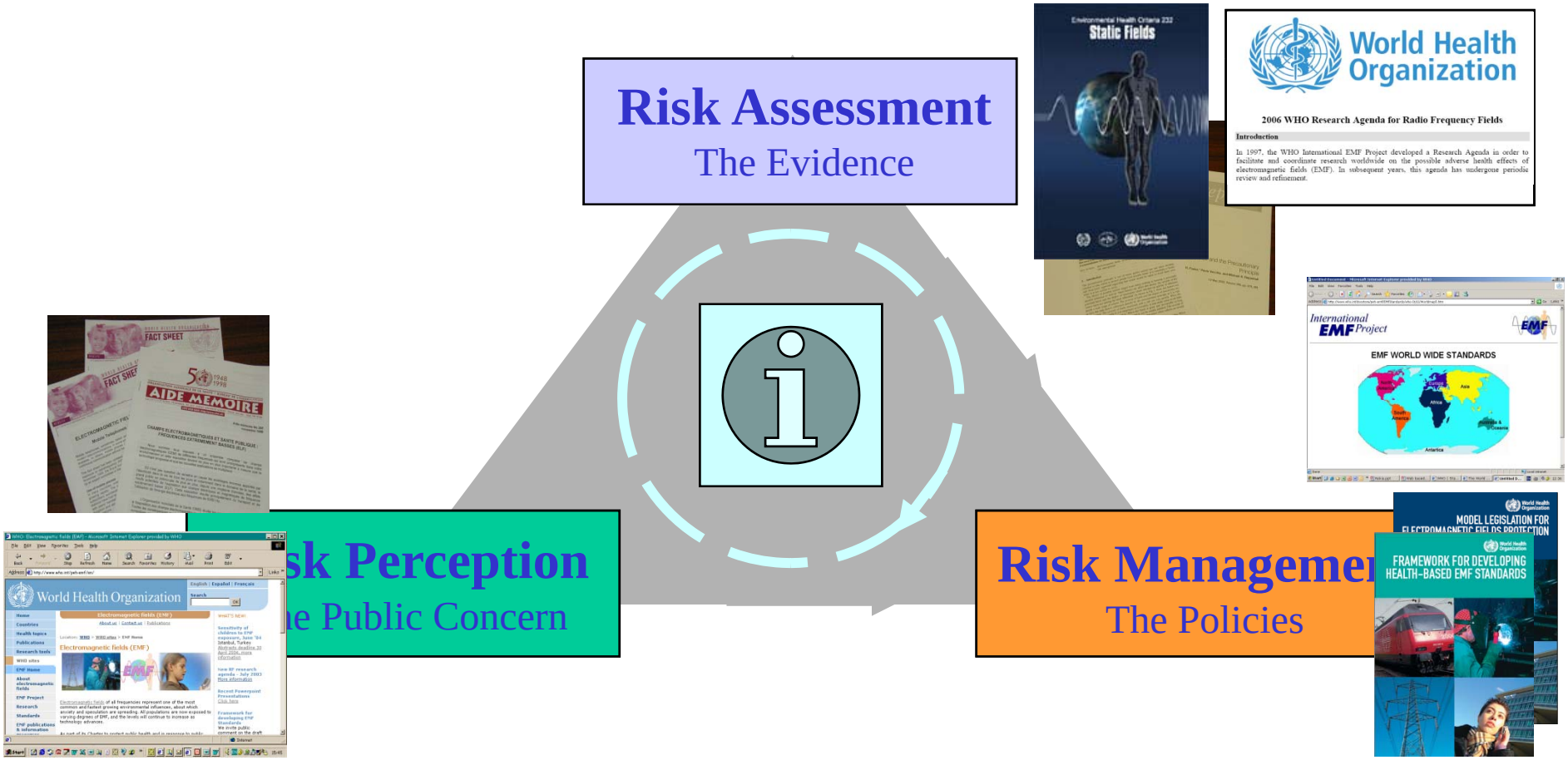
Do EMFs pose a heath risk?



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OUTLINE

- Introduction
- **Assessing the health risk**

What do we know?

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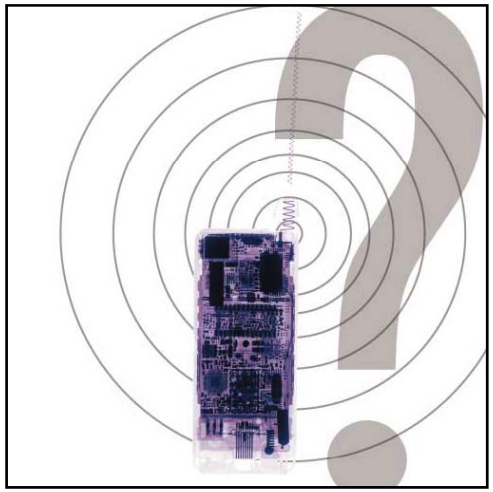

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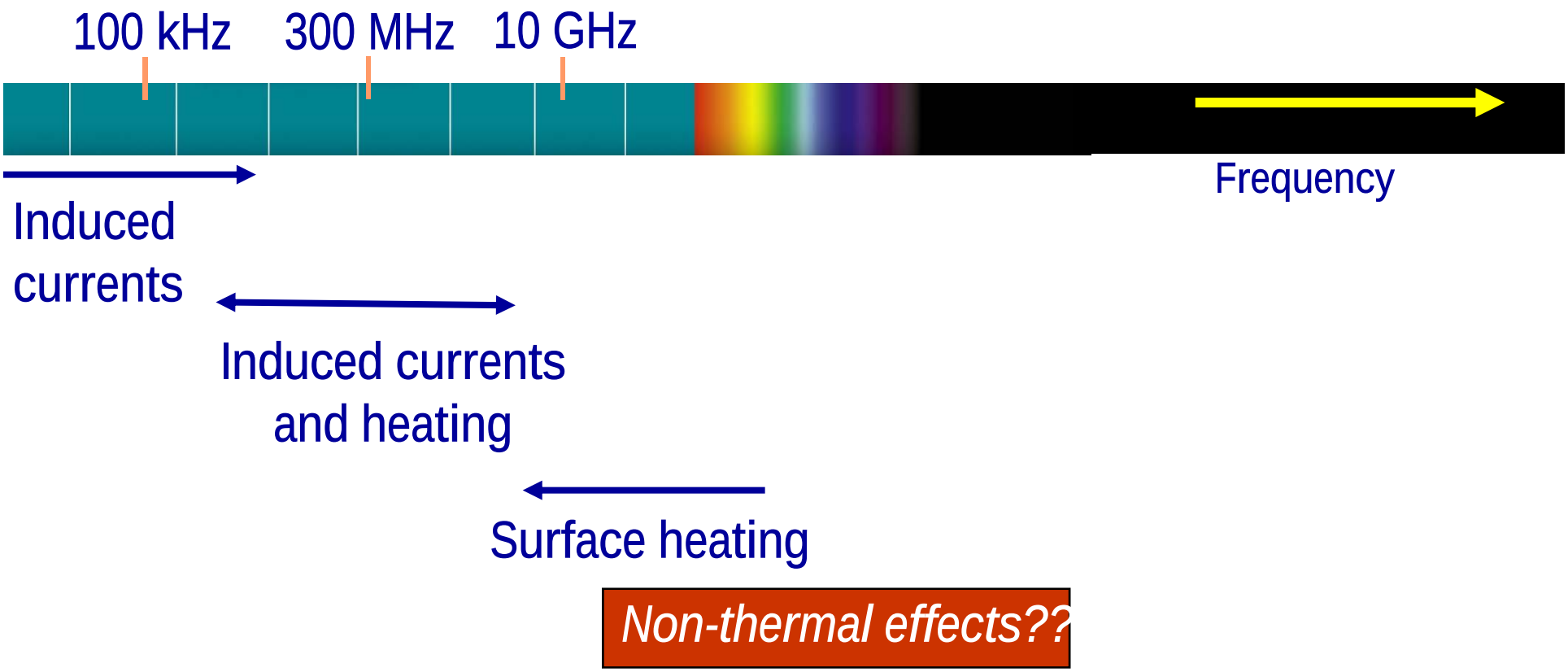
What do we know?

Mechanisms of interaction



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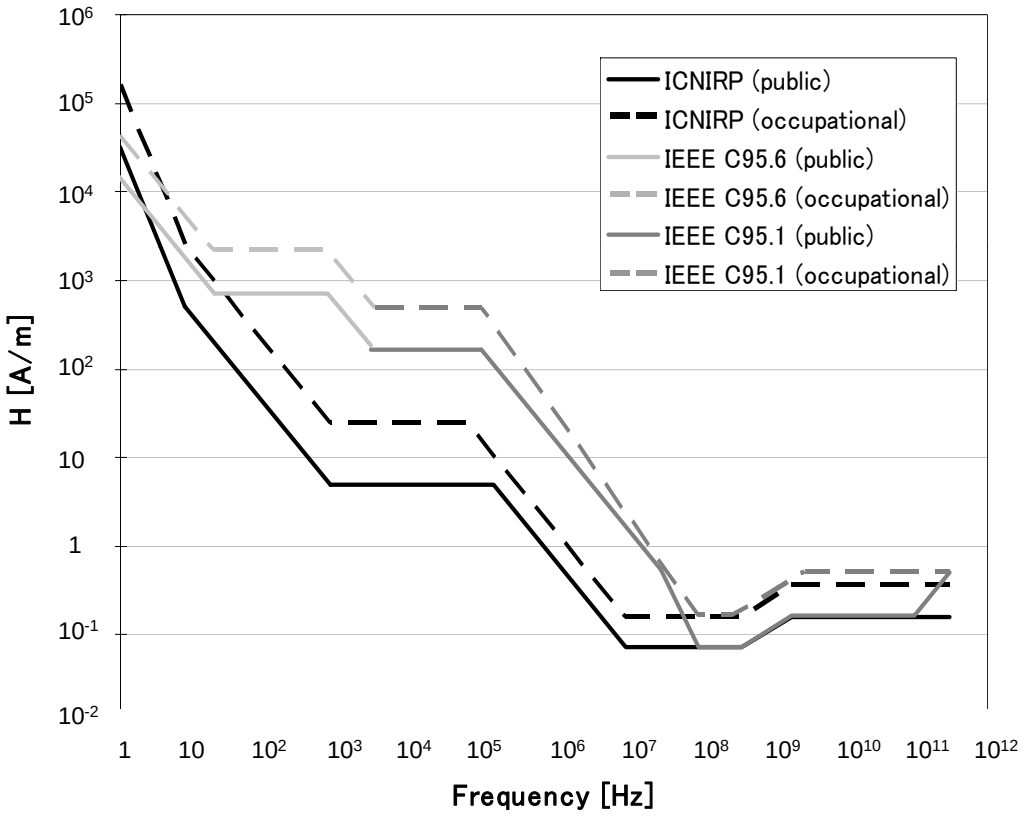
Reference Levels



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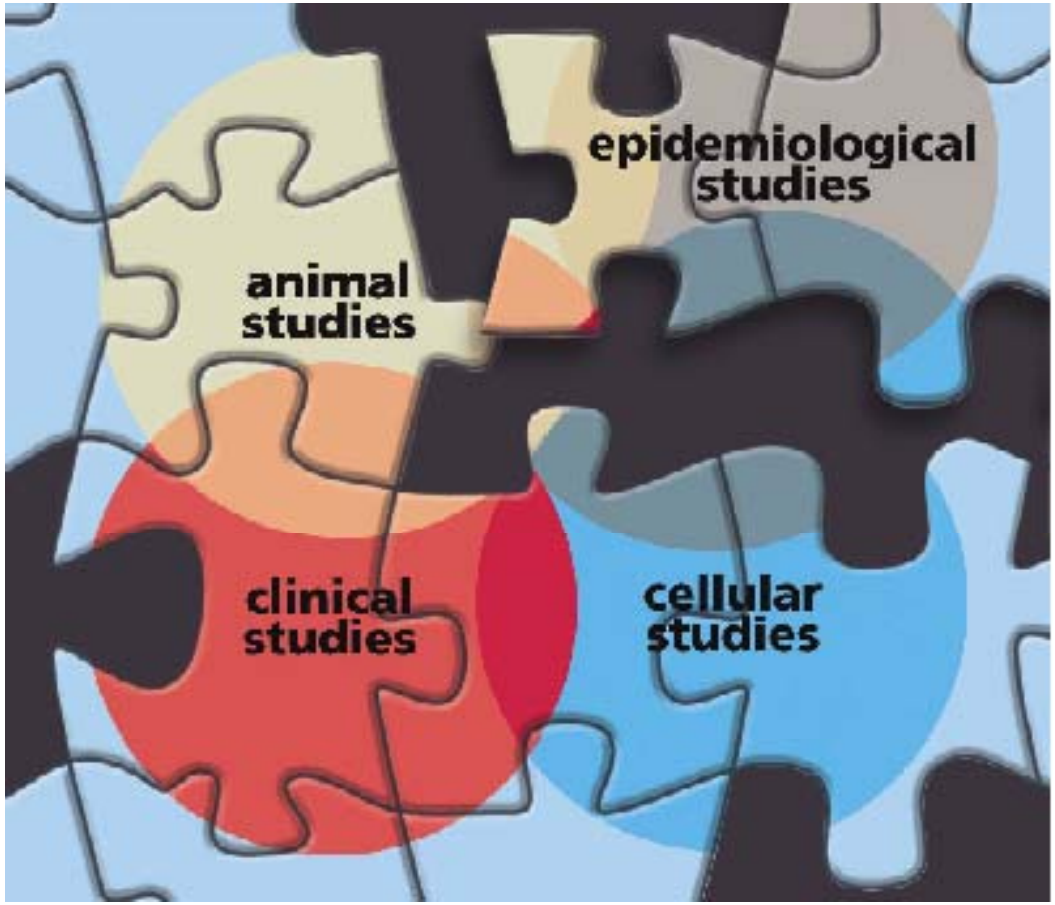
How do we evaluate

the health risk from EMF?

Research

Balance of studies needed



http://www.niehs.nih.gov/emfrapid/booklet/emf2002.pdf

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RF Studies

(WHO Database, March 2009)

Type of study	Ongoing	Not yet published	Published
Physics	77	14	538
Epidemiology	41	12	311
Human	44	11	256
Animal	42	28	834
Cellular	60	28	503
Total	264	93	2442 !!

Laboratory Studies

- Cellular studies
  - Genotoxicity
  - Gene expression
- Animal studies
  - Cancer
  - Behaviour
  - BBB
  - Skin
- Human studies
  - Sleep
  - EEG
  - Hormones
  - EHS

Media centre

Electromagnetic fields and public health: mobile phones

Fact sheet N°193
June 2011

Key facts

- Mobile phone use is ubiquitous with an estimated 4.6 billion subscriptions globally.
- The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans.
- Studies are ongoing to more fully assess potential long-term effects of mobile phone use.
- WHO will conduct a formal risk assessment of all studied health outcomes from radiofrequency fields exposure by 2012.

http://www.who.int/mediacentre/factsheets/fs193/en/index.html

Short-term effects

(WHO fact sheet 193, June 2011)

- To date, research **does not suggest any consistent evidence** of adverse health effects from exposure to RF fields at levels below those that cause tissue heating

- Research has not been able to provide support for a causal relationship between exposure to EMF and self-reported symptoms, or “electromagnetic hypersensitivity”

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Fact sheet N°296
December 2005

Electromagnetic fields and public health
Electromagnetic Hypersensitivity

Conclusions: "EHS is characterized by a variety of non-specific symptoms that differ from individual to individual… EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure."

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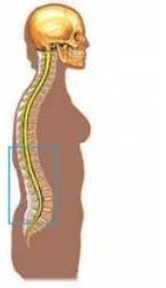
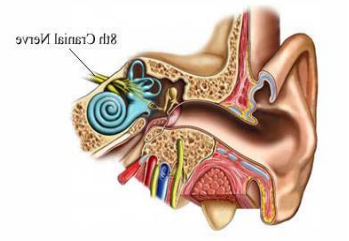
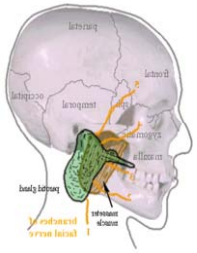
Epidemiology

Studies on mobile phones

- Tumours in head and neck
  - Glioma, meningioma, acoustic neuroma, parotid gland







- More than 15 studies on the use of mobile phones
  - Published: USA, Nordic countries, Hardell, INTERPHONE, CEFALO
  - Ongoing: MOBI-Kids, COSMOS

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INTERPHONE study

(published 18 May 2010)

Published by Oxford University Press on behalf of the International Epidemiological Association
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International Journal of Epidemiology 2010;1–20
doi:10.1093/ije/dyq079

Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case–control study

The INTERPHONE Study Group*

5 Corresponding author. Elisabeth Cardis; CREAL, Doctor Aiguader 88,
*List of members of this study group is available in the Appendix.

Accepted 8 March 2010

- **Cases:**
  - 2,765 gliomas
  - 2,425 meningiomas
  - 1,121 acoustic neuroma
  - 109 malignant parotid gland
- **Controls:**
  - 7,658

Long-term effects

(WHO fact sheet 193, June 2011)

- No increased risk of glioma, meningioma or acoustic neuroma with mobile phone use of more than 10 years
- Indications of increased risk of glioma for heavy users
  - Basis for classification of RF fields as "possible carcinogenic"
  - Biases and errors prevent a causal interpretation
  - *Reaffirmed in Interphone final report (16 March 2012)*
- No available data for long-term use (15-20 ans)
- Studies on children ongoing
  - *No causal relationship seen in CEFALO study (July 2011)*

WHO Health Risk Assessment

Risk assessment
of **all health outcomes**
(Environmental Health Criteria)

International EMF Project

Hazard identification and classification
of possible **carcinogens**
(Monographs)

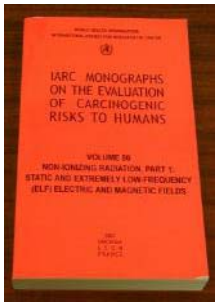
International Agency for Research on Cancer (IARC)

Centre International de Recherche sur le Cancer (CIRC)

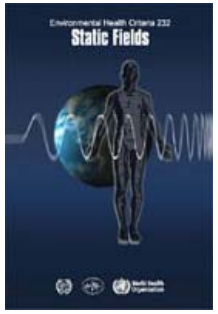
World Health Organization

Environmental Health Criteria

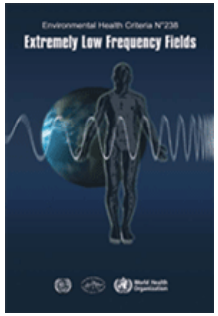
Electromagnetic Fields



IARC 2002



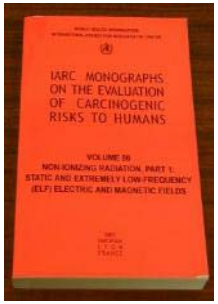
WHO 2006



WHO 2007

Static and ELF fields

RF fields



IARC 2011-12

WHO 2012-14

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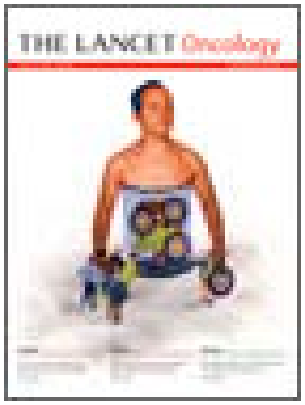
IARC Evaluation
Volume 102 - Radiofrequency Fields



The Lancet Oncology
Volume 12, Issue 7, pp. 624 - 626,
July 2011
doi:10.1016/S1470-2045(11)70147-4
Published Online: 22 June 2011

Carcinogenicity of radiofrequency electromagnetic fields

In May, 2011, 30 scientists from 14 countries met at the International Agency for Research on Cancer (IARC) in Lyon, France, to assess the carcinogenicity of radiofrequency electromagnetic fields (RF-EMF). These assessments will be published as Volume 102 of the IARC Monographs.[1]

Human exposures to RF-EMF (frequency range 30 kHz–300 GHz) can induced electric and magnetic fields and associated currents inside tissues. The most important factors that determine the induced fields are the distance of the source from the body and the output power level. Additionally, the efficiency of coupling and resulting field distribution inside the body strongly depend on the frequency, polarisation, and direction

regarding associations between use of wireless phones and glioma.

The cohort study[4] included 257 cases of glioma among 420 095 subscribers to two Danish mobile phone companies between 1982 and 1995. Glioma incidence was near the national average for the subscribers. In this study, reliance on subscription to a mobile phone provider, as a surrogate for

Published Online
June 22, 2011

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From V. Cogliano, Workshop on "Characterizing evidence in EMF risk assessment", Berlin, May 2006, http://evidence.pureres.net

Overview of the evaluation process

Cancer in humans

Sufficient evidence
Limited evidence
Inadequate evidence
Evidence suggesting lack of carcinogenicity

Cancer in experimental animals

Sufficient evidence
Limited evidence
Inadequate evidence
Evidence suggesting lack of carcinogenicity

Mechanistic and other relevant data

- Mechanistic data "weak," "moderate," or "strong"?
- Mechanism likely to be operative in humans?

Overall evaluation

Group 1	*Carcinogenic to humans*
Group 2A	*Probably carcinogenic to humans*
Group 2B	*Possibly carcinogenic to humans*
Group 3	*Not classifiable as to its carcinogenicity to humans*
Group 4	*Probably not carcinogenic to humans*

IARC Evaluation
Volume 102 - Radiofrequency Fields

- RF fields classified as **Group 2B "Possible Carcinogenic"** based on
  - **limited** human data on association between glioma and acoustic neuroma and exposure to RF-EMF from wireless phones (epidemiologic studies).
  - **limited** animal data

- Evidence for other exposures (e.g. base stations, wifi, …) and outcomes (other cancers) considered insufficient for any conclusion

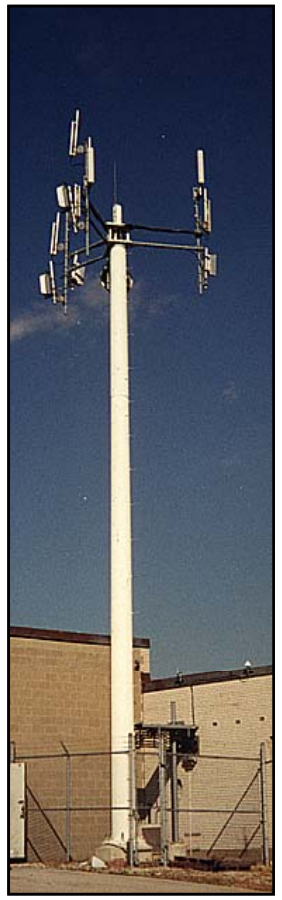
Agents Classified by IARC (950)

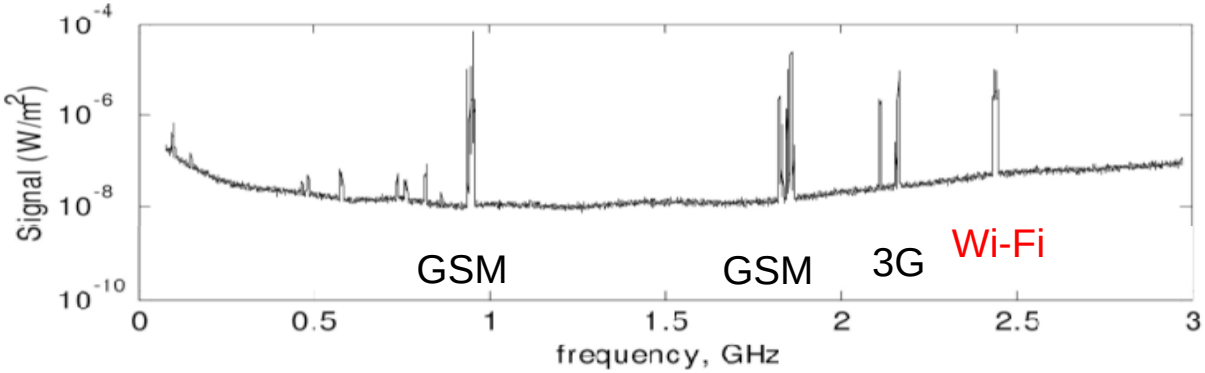
IARC Classification	Examples of Agents
Carcinogenic to humans (107) (usually based on strong evidence of carcinogenicity in humans)	**Asbestos** **Alcoholic beverages** **Benzene** **Mustard gas** **Radon gas** **Solar radiation** **Tobacco (smoked and smokeless)** **X-rays and Gamma**
Probably carcinogenic to humans (59) (usually based on strong evidence of carcinogenicity in animals)	**Creosotes** **Diesel engine exhaust** **Formaldehyde** **Polychlorinated biphenyls (PCBs)**
Possibly carcinogenic to humans (267) (usually based on evidence in humans which is considered credible, but for which other explanations could not be ruled out)	**RF fields** **Coffee** **Gasoline engine exhaust** **Pickled vegetables** **ELF magnetic fields** **Styrene**

Epidemiology

Base stations and wireless networks

- Some studies have been performed
  - Well-being and performance
  - Cancer
- Difficulty of personal exposur t





Kenneth R. Foster, *Radiofrequency exposure from wireless LANs utilizing WI-FI technology*. Health Phys. 92(3):280 –289; 2007

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Fact sheet N°304
May 2006

Electromagnetic fields and public health
Base stations and wireless technologies

Conclusions:

"Considering the very low exposure levels and research results collected to date, **there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects"**

OUTLINE

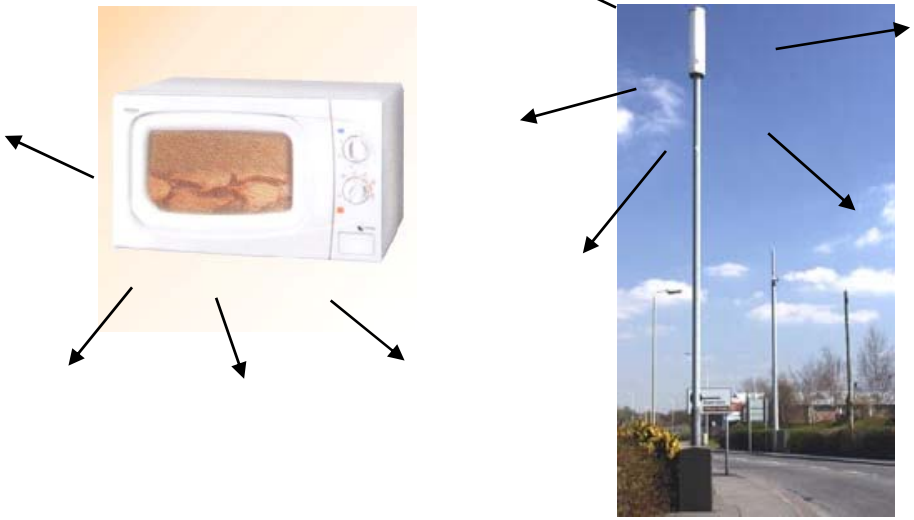
- Introduction
- Assessing the health risk
- **Managing the health risk**
  - **Developing standards and regulations**
  - **Communicating the scientific knowledge**

WHO and STANDARDS

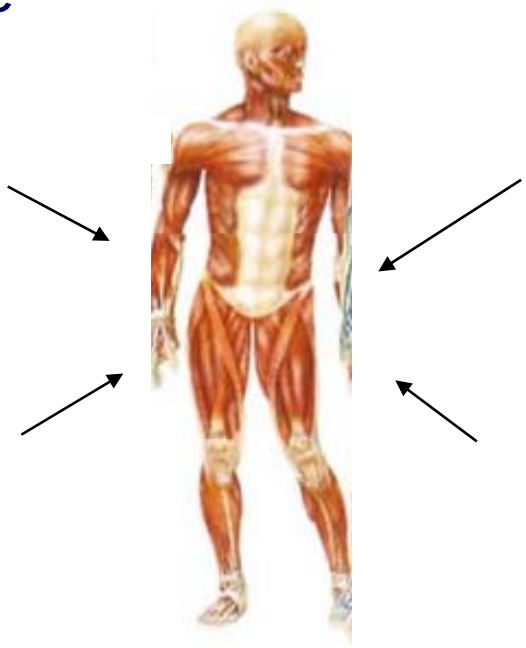
- WHO does NOT develop EMF standards but facilitates international consensus on standards
- International bodies, ICNIRP and IEEE/ICES, develop international guidelines for human protection from EMF exposure

Norms, Standards and Guidelines

- **Emission standards** have specifications that limit the EMF emissions from devices



- **Exposure standards** have specifications that limit EMF exposure to people



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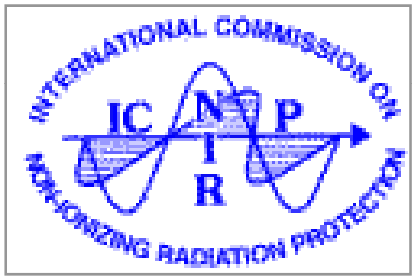
Relevant Authorities

Non-governmental and international organizations

- **Emission standards**
- **Exposure standards**
- **Measurements standards**



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National management approaches

- Relevant authorities
  - National level

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República Federativa do Brasil — Imprensa Nacional

SEÇÃO 1

Ano CXLVI Nº 84

Brasília - DF, quarta-feira, 6 de maio de 2009

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Ação Direta de Inconstitucionalidade e
Ação Declaratória de Constitucionalidade

AG. REG. NA AÇÃO DIRETA DE INCONSTITUCIONALIDADE 4.071-5 (2)
PROCED. : DISTRITO FEDERAL
RELATOR : MIN. MENEZES DIREITO
AGTE.(S) : PARTIDO DA SOCIAL DEMOCRACIA BRASILEIRA - PSDB
ADV.(A/S) : AFONSO ASSIS RIBEIRO E OUTRO (A/S)
AGDO.(A/S) : PRESIDENTE DA REPÚBLICA
ADV.(A/S) : ADVOGADO-GERAL DA UNIÃO
AGDO.(A/S) : CONGRESSO NACIONAL

Decisão: Preliminarmente, o Tribunal, por maioria e nos termos do voto do Relator, rejeitou a admissão do *amicus curiae*, vencidos a Senhora Ministra Cármen Lúcia e os Senhores Ministros Carlos Britto, Celso de Mello e o Presidente. E, no mérito, por maioria, desproveu o recurso de agravo, vencidos os Senhores Ministros Marco Aurélio, Carlos Britto e Eros Grau. Votou o Presidente, Ministro Gilmar Mendes. Ausente, justificadamente, a Senhora Ministra Ellen Gracie. Plenário, 22.04.2009.

EMB.DECL.NA AÇÃO DIRETA DE INCONSTITUCIONALIDADE 2.791-3 (3)
PROCED. : PARANÁ
RELATOR ORIGINÁRIO : MIN. GILMAR MENDES
RELATOR PARA O ACÓRDÃO : MIN. MENEZES DIREITO
EMBTE.(S) : GOVERNADOR DO ESTADO DO PARANÁ
ADV.(A/S) : PGE-PR - CESAR AUGUSTO BINDER
EMBDO.(A/S) : ASSEMBLEIA LEGISLATIVA DO ESTADO DO PARANÁ

Decisão: O Tribunal, por unanimidade, conheceu dos embargos. Em seguida, após o voto do relator, dando provimento aos embargos, no que foi acompanhado pelos Senhores Ministros Carlos Britto, Cezar Peluso e Ellen Gracie (Presidente), e dos votos dos Senhores Ministros Menezes Direito, Cármen Lúcia, Ricardo Lewandowski e Marco Aurélio, que os rejeitavam, o julgamento foi suspenso para colher os votos dos Senhores Ministros Joaquim Barbosa,

Atos do Poder Legislativo

LEI Nº 11.934, DE 5 DE MAIO DE 2009

Dispõe sobre limites à exposição humana a campos elétricos, magnéticos e eletromagnéticos; altera a Lei nº 4.771, de 15 de setembro de 1965; e dá outras providências.

O PRESIDENTE DA REPÚBLICA
Faço saber que o Congresso Nacional decreta e eu sanciono a seguinte Lei:

Art. 1º Esta Lei estabelece limites à exposição humana a campos elétricos, magnéticos e eletromagnéticos, associados ao funcionamento de estações transmissoras de radiocomunicação, de terminais de usuário e de sistemas de energia elétrica nas faixas de frequências até 300 GHz (trezentos gigahertz), visando a garantir a proteção da saúde e do meio ambiente.

Parágrafo único. Estão sujeitos às obrigações estabelecidas por esta Lei as prestadoras de serviço que se utilizarem de estações transmissoras de radiocomunicação, os fornecedores de terminais de usuário comercializados no País e as concessionárias, permissionárias e autorizadas de serviços de energia elétrica.

Art. 2º Os limites estabelecidos nesta Lei referem-se à exposição:

I - da população em geral aos campos elétricos, magnéticos e eletromagnéticos; e

II - de trabalhadores aos campos elétricos, magnéticos e eletromagnéticos em razão de seu trabalho.

Art. 3º Para os fins desta Lei, são adotadas as seguintes definições:

I - área crítica: área localizada até 50 (cinquenta) metros de hospitais, clínicas, escolas, creches e asilos;

II - campos elétricos e magnéticos: campos de energia in-

World Health Organization

National management approaches

- Relevant authorities
  - National level
  - Provincial level

World Health Organization

National management approaches

- Relevant authorities
  - National level
  - Provincial level
  - Local level
    - Dispense building and planning permits
    - Direct contact with public and operators
    - May introduce further conservative measures based on politics rather than science
      - Many examples (e.g. Salzburg, Toronto, Paris, …)

Management Options

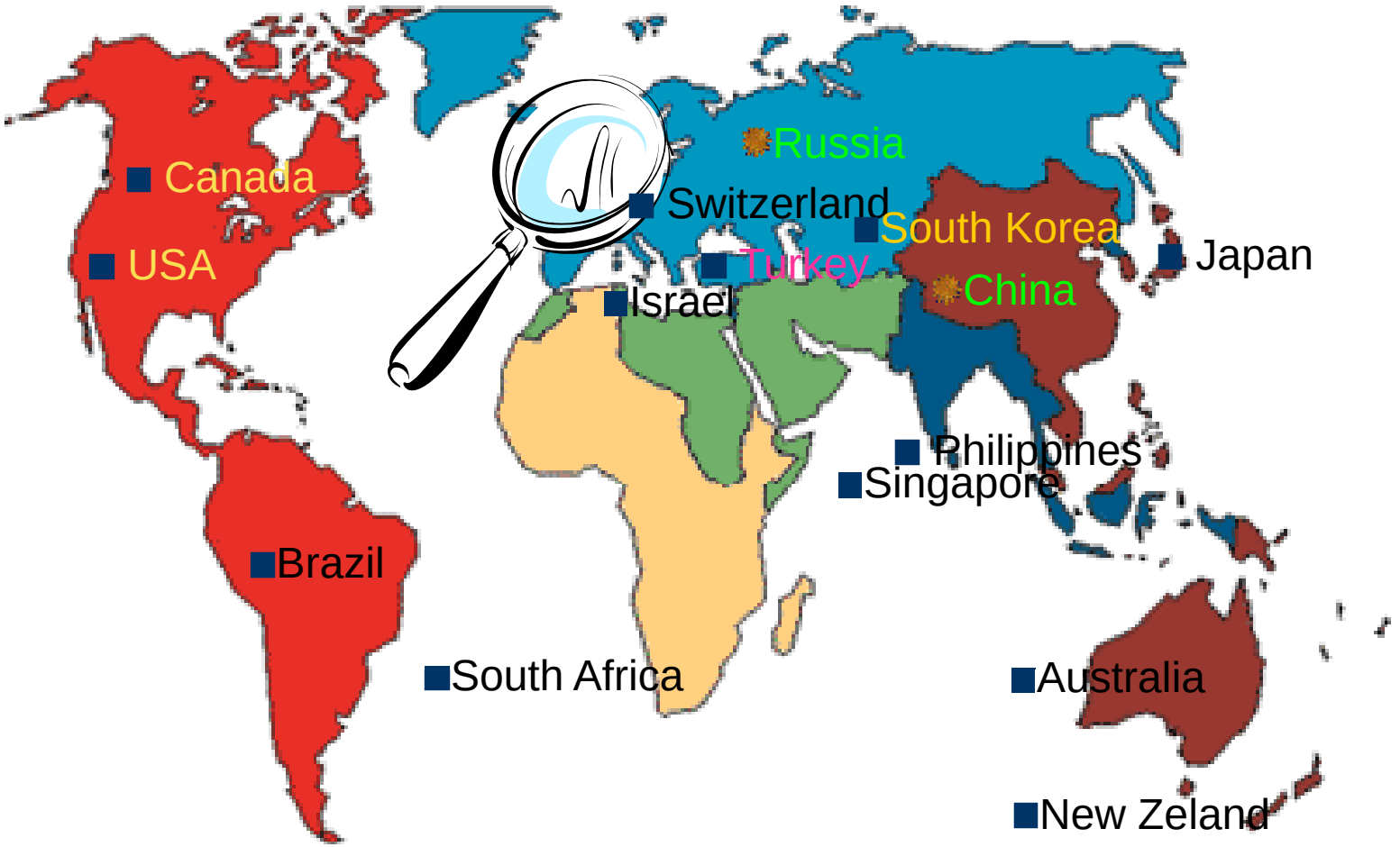
Reduce concern

Reduce uncertainty

Reduce exposure

- No action
- Communication
- Research
- Planning measures
- Engineering measures
- Exposure limits
- ….

Worldwide standards



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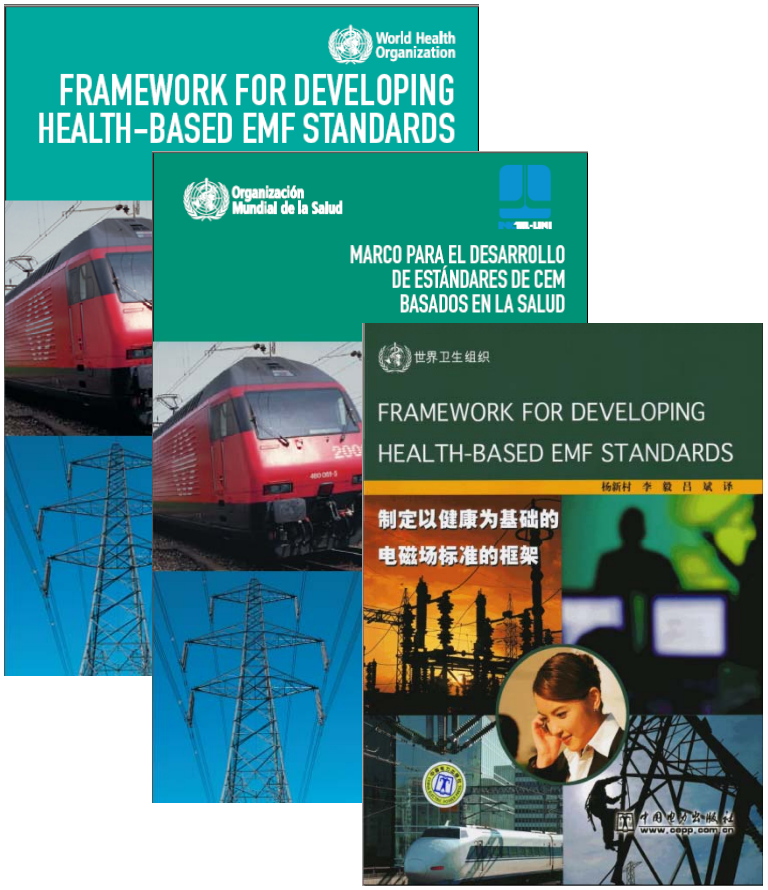
Policy documents ….



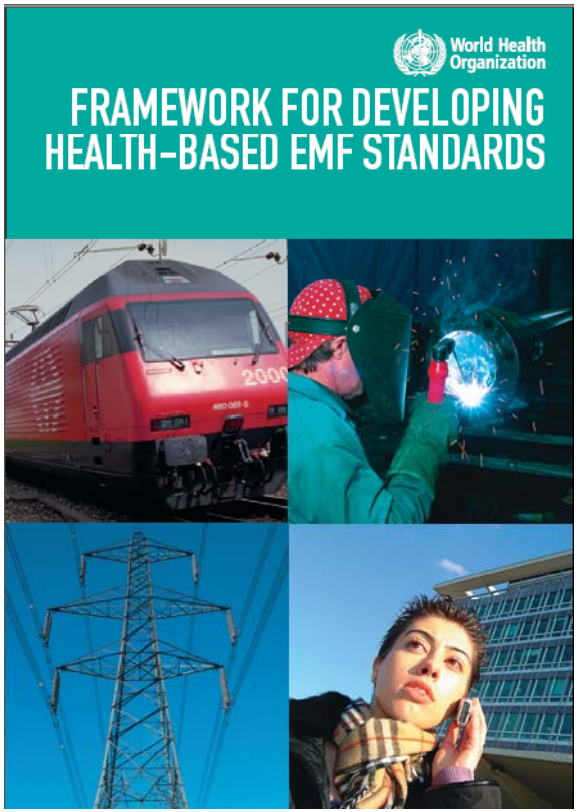
http://www.who.int/peh-emf/standards/

World Health Organization

Framework for Developing EMF Standards

Motivation

- Concerns about public safety because of increasing EMF exposures from new technologies
- Many countries currently considering EMF standards
- Large differences between national standards



http://www.who.int/peh-emf/standards/framework/en/index.html

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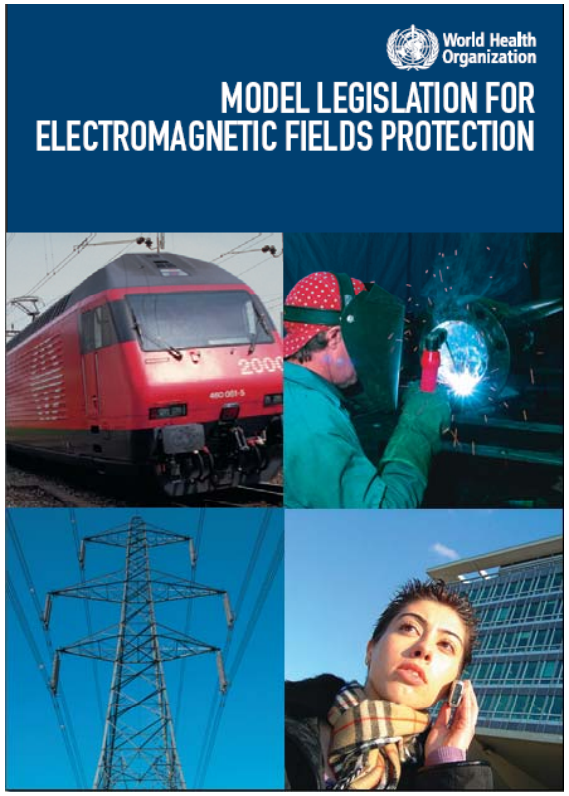
Model Legislation

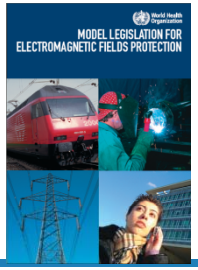
- To assist countries without appropriate legislation to protect their population from EMF
- Provides a legal framework to provide protection from EMF

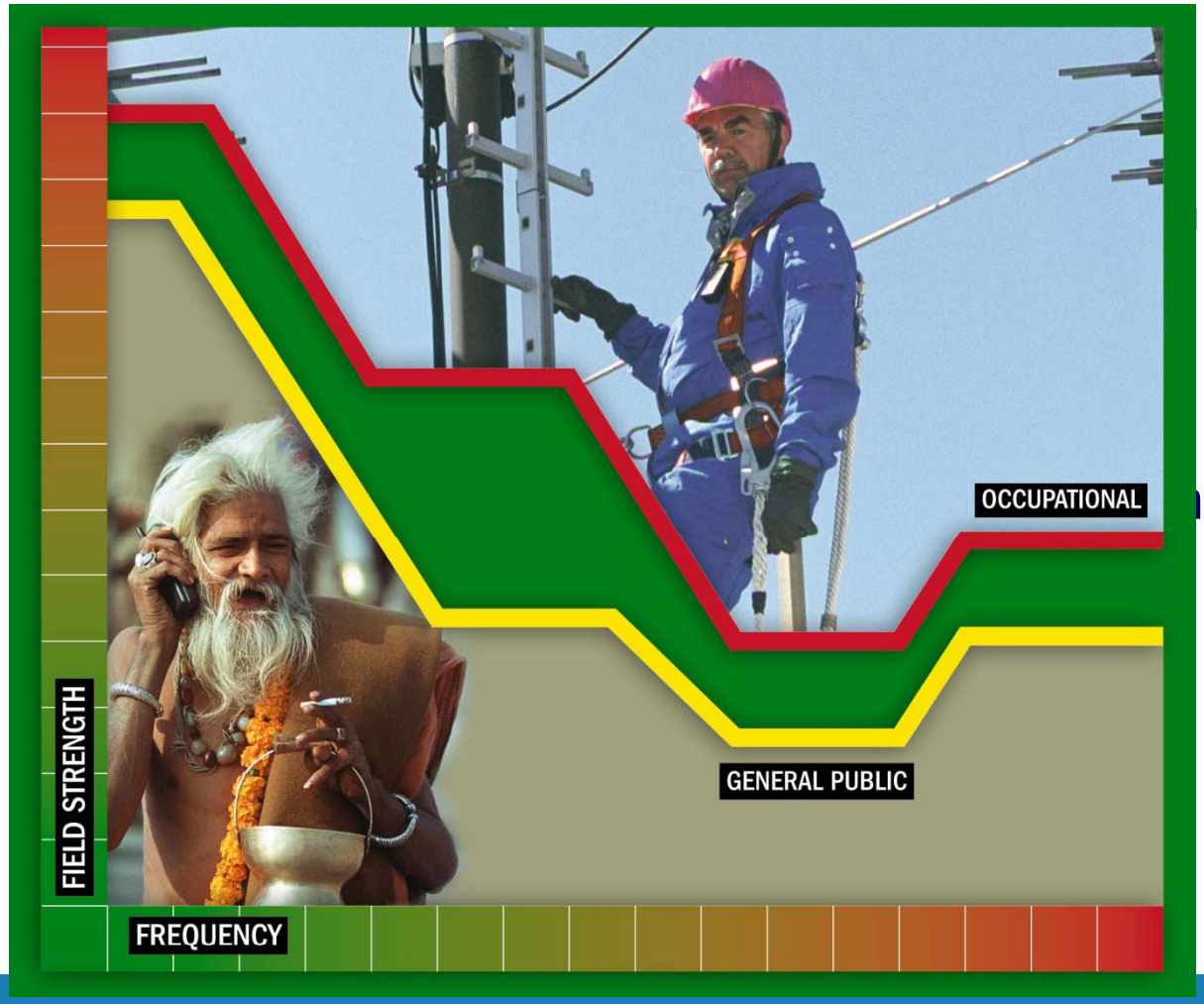


http://www.who.int/peh-emf/standards/emf_model/en/index.html

World Health Organization

Model Legislation



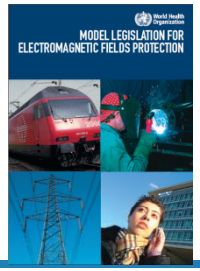


EMF that will provide
effects from any

of the public and

World Health Organization

Model Legislation



- Purpose
  - to establish limits on human exposure to EMF that will provide protection against known adverse health effects from any installation or device emitting such fields
- Scope
  - Minimum requirements for the protection of the public and workers
  - EMF frequency range 0 to 300 GHz

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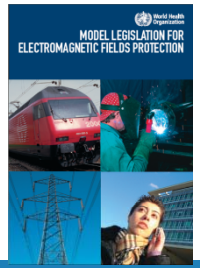
Model Legislation



- **EMF limits:**
  - Adoption of international standards to limit
    - exposure of people to EMF (e.g. ICNIRP guidelines)
    - emissions of EMF from devices (e.g. IEC and IEEE device emission standards)
  - Uniform application of the Act across the national jurisdiction

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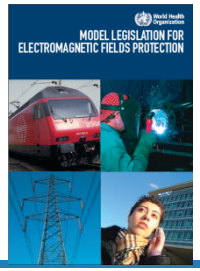
Model Legislation (cont'd)



- Compliance
  - Develop range of options that the Minister may consider appropriate
  - Establish or nominate an agency to administer compliance
- Enforcement
  - Owner of installation to ensure compliance in public places and to provide training to workers (else general public status)
- Record keeping

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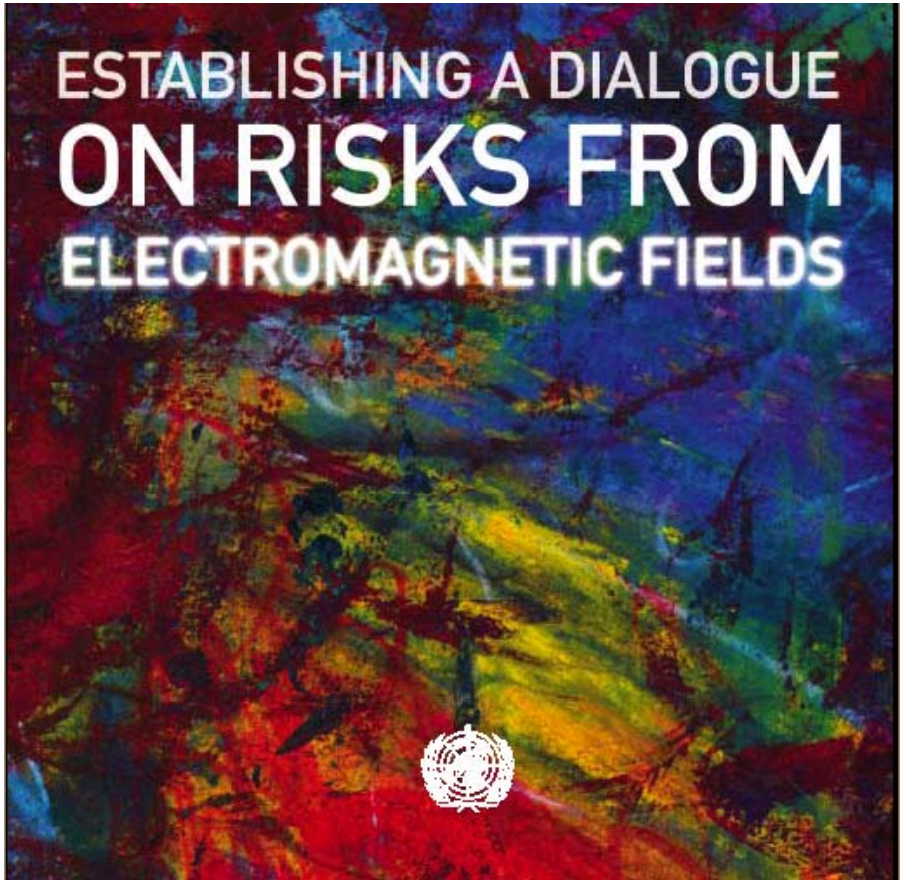
Risk Perception and Communication

WHO Risk Handbook



- For programme managers who need basic information on EMF risk perception, communication and management
- Available in English
- Translated into Spanish, Italian, German, French, Russian, Bulgarian, Dutch, Polish, Portuguese, Hungarian and Japanese
- Available on the web www.who.int/emf

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Elements of Risk Perception

- Extent of health risk
- Probability of occurrence
- Uncertainty
- Ubiquity
- Pattern of exposure
- Delayed effect
- Inequity and injustice
- Voluntary vs. involuntary exposure

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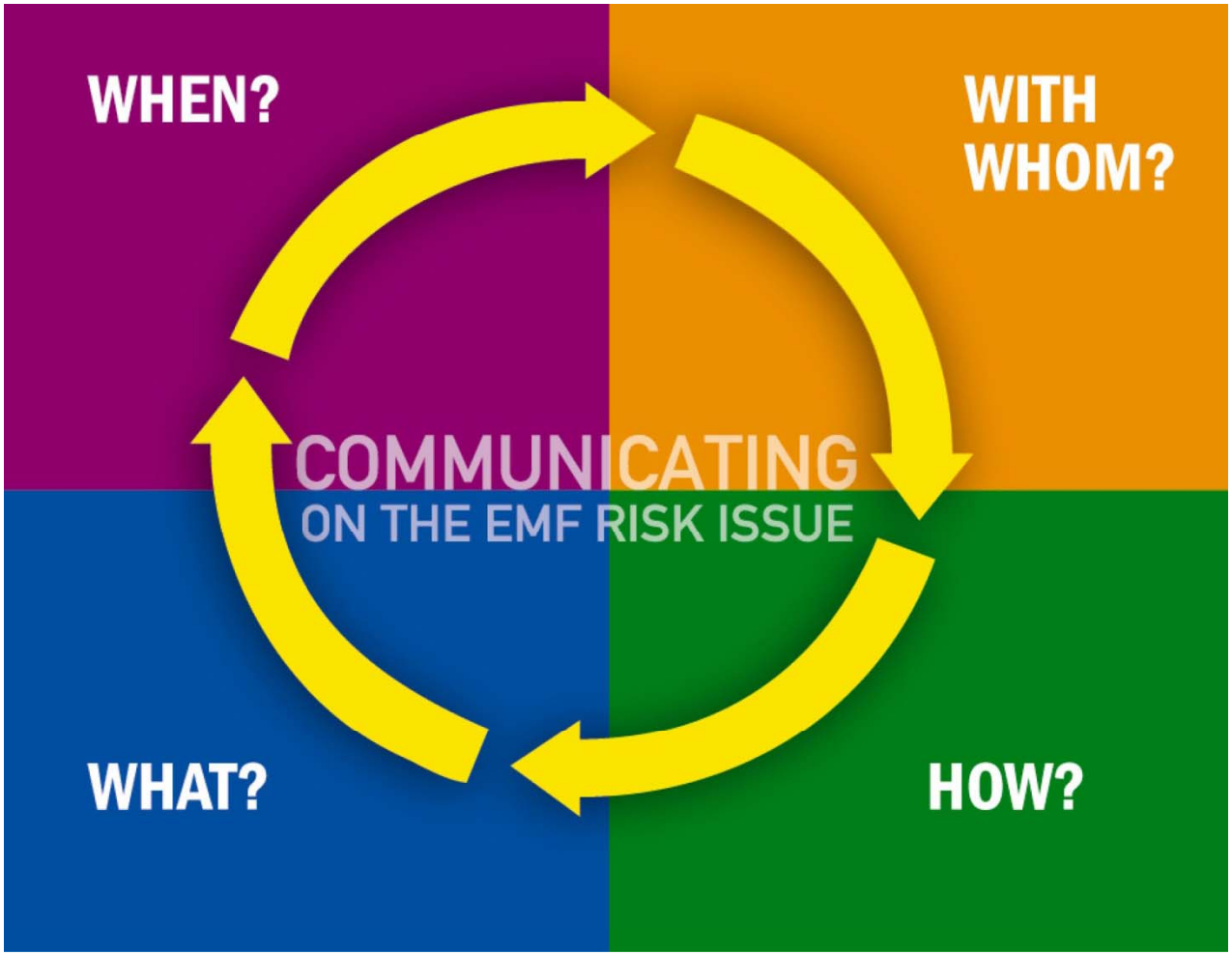
Managing EMF Risk Communication



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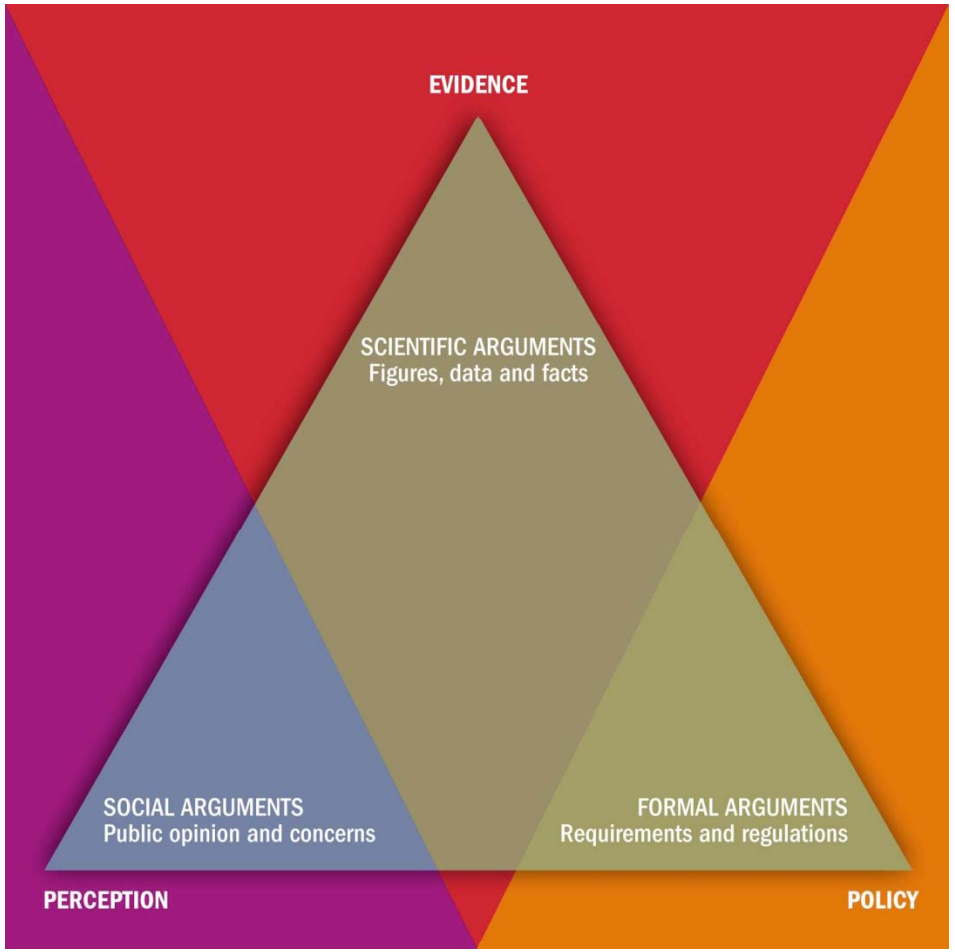
The Message

What to Communicate?

- Communicating the science
- Explaining policy measures
- Putting the EMF risk in perspective



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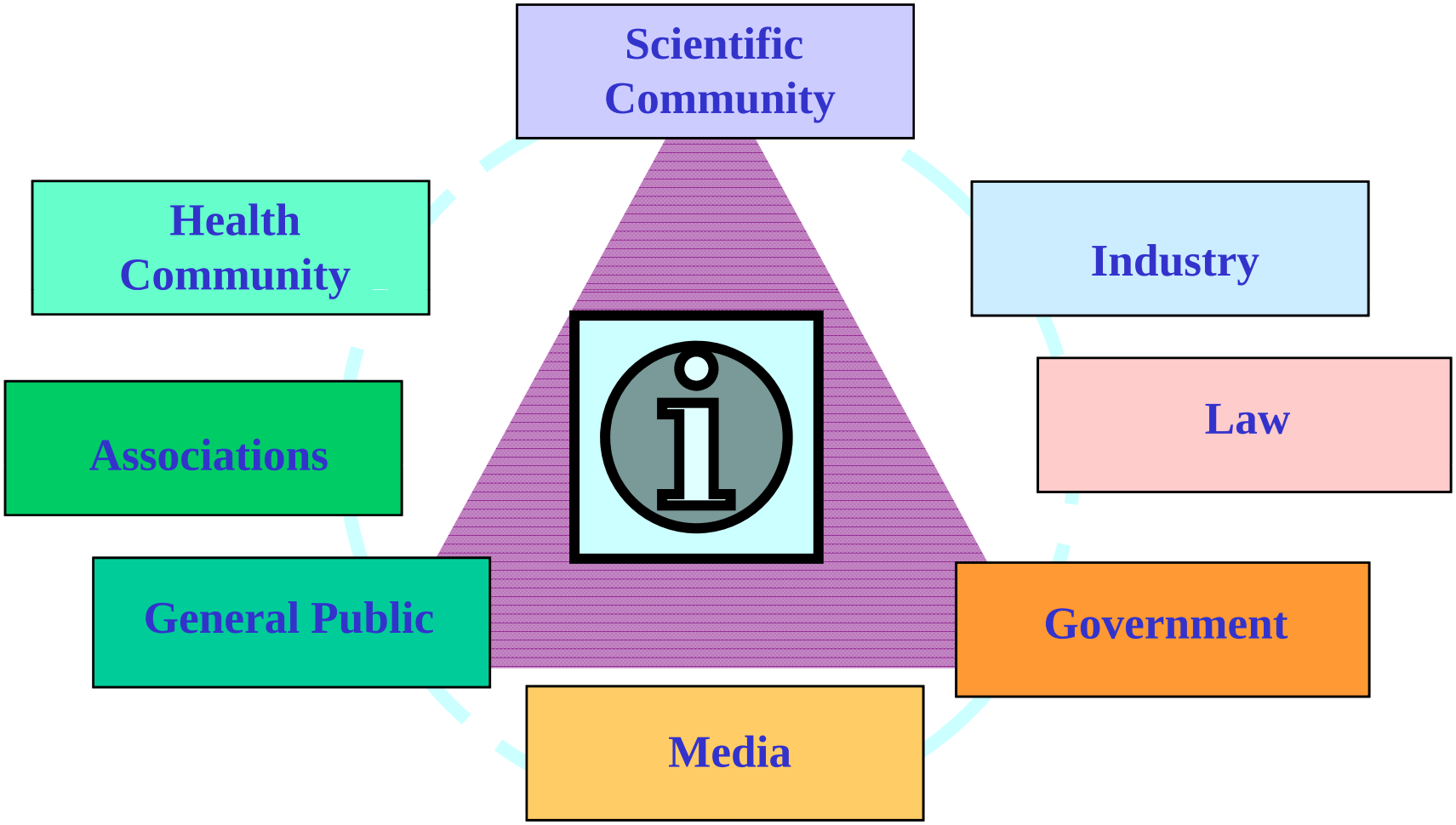
Stakeholders

With whom to communicate?



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Health and Safety Implications of Exposure to Electromagnetic Fields in the Frequency Range 300 Hz to 10 MHz
The precautionary principle and EMF: implementation and evaluation
Science Reprint
Science and the Precautionary Principle
BIOLOGICAL EFFECTS, HEALTH CONSEQUENCES AND STANDARDS FOR PULSED RADIOFREQUENCY FIELDS
EFFECTS OF ELECTROMAGNETIC FIELDS ON THE LIVING ENVIRONMENT
WORLD HEALTH ORGANIZATION
FACT SHEET
AIDE MEMOIRE
1948 1998
ELECTROMAGNETIC FIELDS
Mobile Telephones
CHAMPS ELECTROMAGNETIQUES ET SANTE PUBLIQUE : FREQUENCES EXTREMEMENT BASSES (ELF)
Environmental Health Criteria N°238
Extremely Low Frequency Fields
World Health Organization
MODEL LEGISLATION FOR ELECTROMAGNETIC FIELDS PROTECTION
ONOGRAPHS EVALUATION RCINOGENIC TO HUMANS
World Health Organization
FOR DEVELOPING EMF STANDARDS
ESTABELECENDO UM DIÁLOGO SOBRE RISCOS DE CAMPOS ELETROMAGNÉTICOS
ORGANIZAÇÃO MUNDIAL DE SAÚDE
WHO | Electromagnetic fields - Microsoft Internet Explorer provided by WHO
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.who.int/peh-emf/en/
Google IARC Go Bookmarks Popups okay Check
عربي | 中文 | English | Français | Русский | Español
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Home
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Electromagnetic fields
EMF
Electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations are now exposed to varying degrees of EMF, and the levels will continue to increase as technology advances.
As part of its Charter to protect public health and in response to public
Participating countries & entities in EMF Project
WHAT'S NEW!
Fact sheet N°322
Exposure to extremely low frequency fields
Full text
ELF Environmental Health Criteria N°238
Chapters available to download
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OUTLINE

- Introduction
- Assessing the health risk
- Managing the potential risk
- **Conclusions**

Challenges to governments….

- Rapidly evolving RF technologies
- Launched on the market before health evaluation
- Disparities in risk management measures and regulations around the world
- Concern from the public

Conclusions

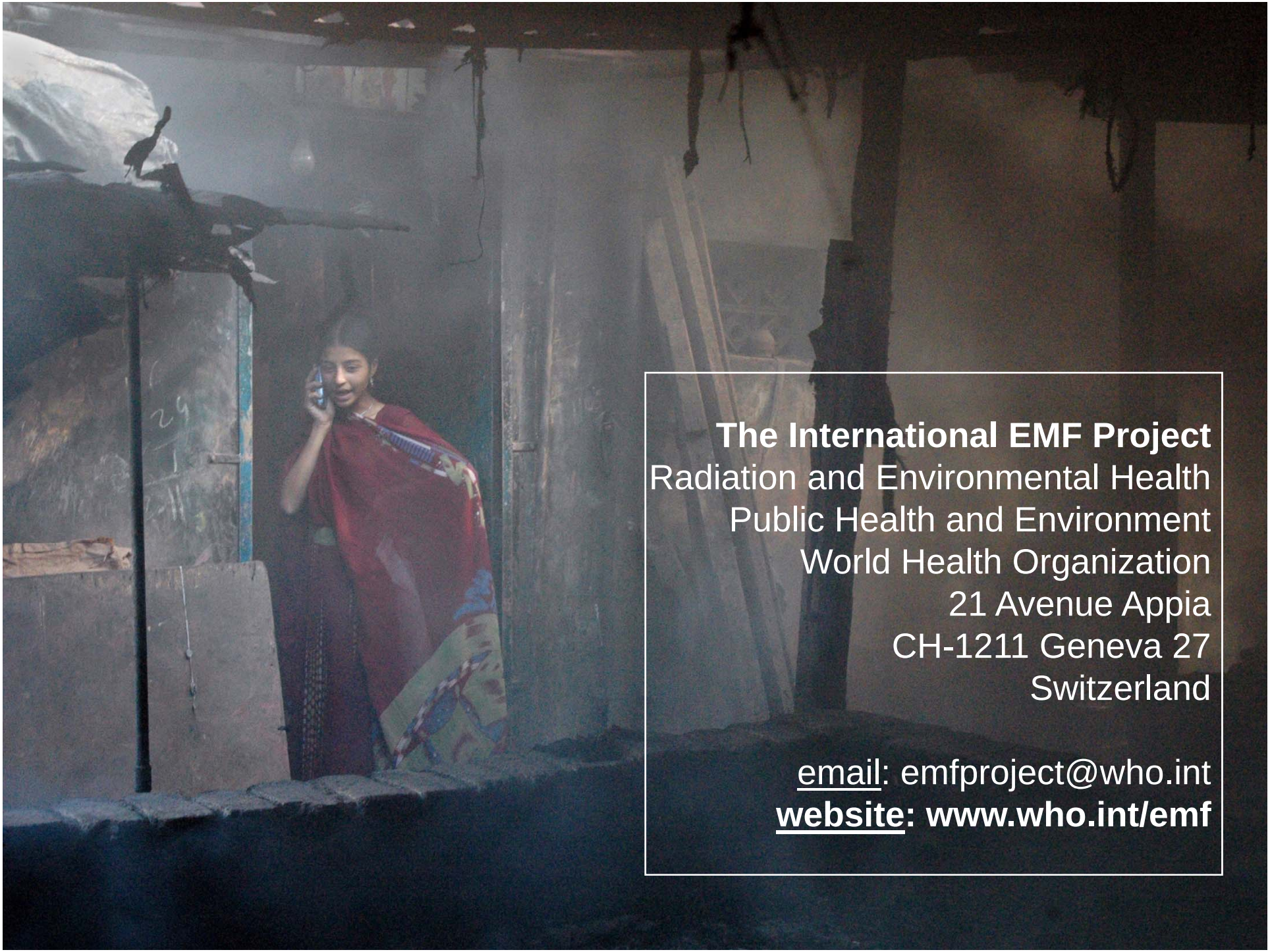
- Need for clear roles and responsibilities in government on this topic
- Need for adoption and compliance of health-based standards
- Need for a public information program and dialogue with stakeholders
- Need for promoting research to reduce uncertainty

We are a "global village"

International Advisory Committee

- **Latest meeting: 5-6 June 2012, Geneva, Switzerland**
- The mandate of the IAC is to
  - **provide oversight on the conduct of the Project**
  - **provide a forum for peer discussion**

The Project is open to any WHO Member State government, i.e. department of health, or representatives of other national institutions concerned with radiation protection



The International EMF Project
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Public Health and Environment
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email: emfproject@who.int
website: www.who.int/emf