RF and Health: A WHO Perspective

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World Health Organization

OUTLINE

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

WHO values

WHO has been at the forefront of improving health around the world since 1948.

Health:

is a state of complete physical, mental and social well-being, not just the absence of disease or infirmity

is the fundamental right of every human being, everywhere

is crucial to peace and security

depends on the cooperation of all individuals and States

should be shared: extending knowledge to all peoples is essential

Our leadership priorities give focus and direction to our work. They are areas where it is vital for WHO to lead —the key issues which stand out from the body of our work.

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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.

1952–1964

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%.

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

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

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 Moallin (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.

Our vision

Health is a fundamental human right; everyone has the right to the highest possible level of health.

Who we are

World Health Organization is the United Nation's specialized agency for health, made up of 194 Member States, and supported by more than 7,000 staff based in 154 countries, six regional offices, and headquarters in Geneva.

What we do

Our primary role is to direct and coordinate international health, we:

- provide leadership on matters critical to health
- shape the health research agenda
- define norms and standards for health
- articulate policy options for health
- provide technical support and build capacity
- monitor health trends

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Our reform story

The first decade of the 21st century brought unprecedented challenges and opportunities for people's health. Old public health problems persist and new ones emerged. New technologies, ageing populations, globalization, migration, climate change, disasters and emergencies all increase the complexity of the health challenges we face.

The global public health landscape is crowded and poorly coordinated. This demands renewed leadership in global health from WHO; focused on the main priorities in global health, responding on rapid emerging needs, adapting to new ways of working, and using resources efficiently and effectively.

Reform – our aims

1 Programmatic reform to improve people's health

2 Governance reform to increase coherence in global health

3 Managerial reform in pursuit of organizational excellence

Reform – our pathway

Programmes & Priorities

Leadership priorities give focus and direction to WHO's work:

- Advancing universal health coverage
- Achieving the health-related Millennium Development Goals
- Addressing the challenge of noncommunicable diseases and mental health
- Implementing the International Health Regulations
- Increasing access to essential, high-quality and affordable medical products
- Reducing health inequities by addressing the social, economic and environmental determinants of health

Governance

Reforms of the World Health Assembly, Executive Board and its subcommittees, and Regional Committees will strengthen the oversight of WHO, harmonize governance processes, enhance strategic decision-making, and streamline reporting and communication.

Strengthened engagement with partners and stakeholders in global health, such as UN agencies, NGOs, civil society, foundations, academia and industry, will better align actions to promote health and well-being. This engagement is guided by principles based on WHO's intergovernmental identity and science-based approach.

Management

Revitalizing managerial processes and organizational structures will build an organization that is more effective, efficient, responsive, objective, transparent, and accountable.

Key elements include a new approach to results-based management, a new financing mechanism, a new human resource model, and a strengthened culture of evaluation.

Areas and outcomes

What success looks like

- A world in which gaps in health outcomes are narrowed
- A world in which people have access to the medical products and services that they need
- A world in which the sick and vulnerable are protected from impoverishment
- A world in which countries have quality health systems that meet the expectations and needs of their people
- A world which puts health and well-being at the centre of sustainable development
- A world which achieves internationally agreed health targets and goals:
  - Reduced child and maternal deaths
  - Fewer people dying from HIV, TB and malaria
  - '25 by 25' – 25% fewer premature deaths from noncommunicable diseases by 2025
- A world in which populations are protected from disease outbreaks and harm from natural disasters
- A world without polio

2011
- EB128 Discussion on future of financing of WHO leads to calls for reform
- EB129 & WHA64 Endorsement of WHO reform agenda
- Regional Committee Meetings Member States discuss concept paper on reform
- Special session of EB dedicated to WHO reform

2012
- EB130 requests WHO to prepare report covering all aspects of reform for submission to WHA65
- Member States meeting on Programmes and Priority setting
- EB131 & WHA65 reviews consolidated report on reform, draft outline of the 12th general programme of work, stage one evaluation report and draft implementation framework
- Regional Committee Meetings Member States discuss draft 12th general programme of work and proposed programme budget 14-15

2013
- Extraordinary meeting of the PBAC to focus on the financing of WHO
- WHA66 adopts a general programme of work 2014-19 and approves the whole programme budget 2014-15, defining the strategic direction for WHO, and sets up a new financing mechanism. EB133 discusses principles of engagement with non-state actors
- Financing Dialogue with Member States and other donors, with the aim of increasing the predictability, alignment, transparency and flexibility of WHO funding

2014
- EB134 reviews outcome of Financing Dialogue, proposals for streamlined reporting of Member States and hosted partnerships

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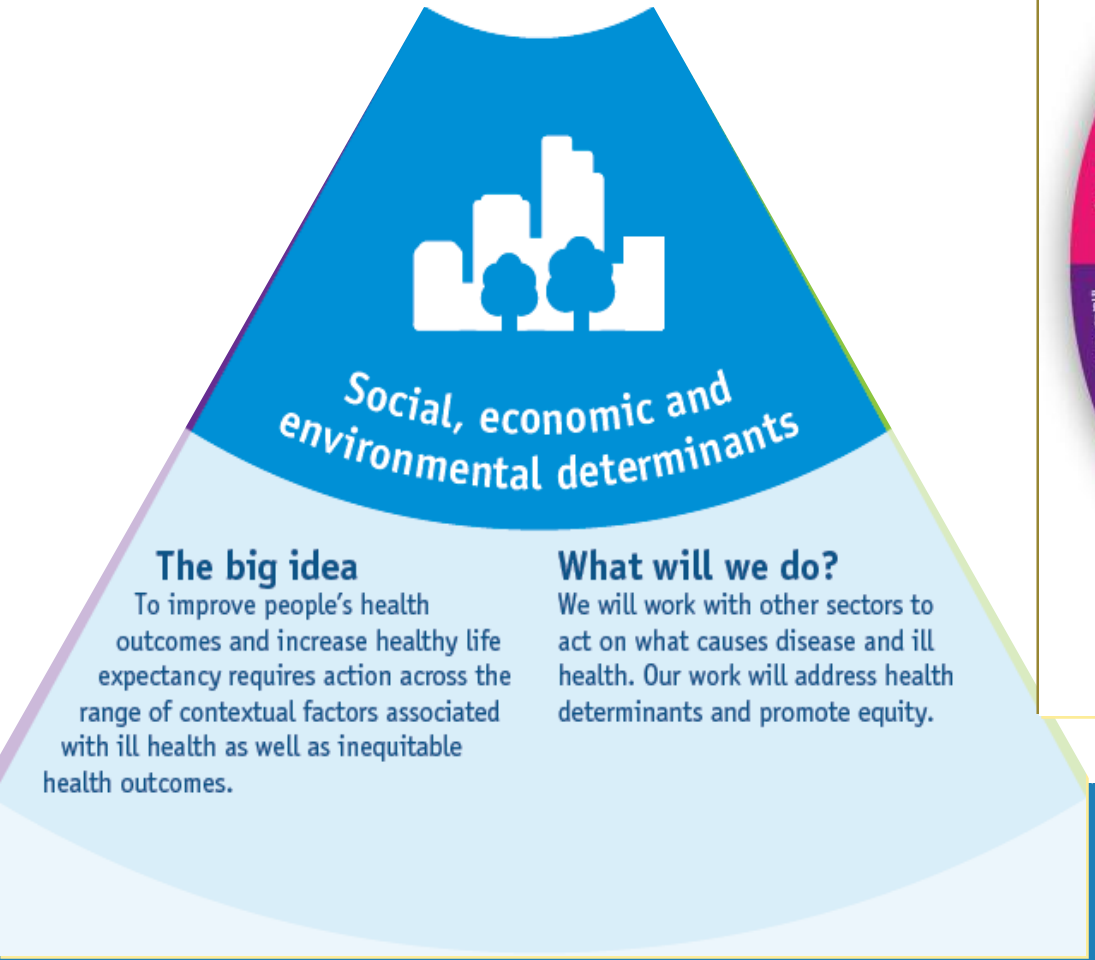
Twelfth General Programme of Work
2014/2019



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WHO
Department of Public Health, Environmental and Social Determinants of Health

- Climate change
- Air pollution (indoor and outdoor)
- e-waste
- Energy and health
- Housing and health
- Water, sanitation and health
- Radiation…

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Conference on Health & Climate
27th – 29th August 2014

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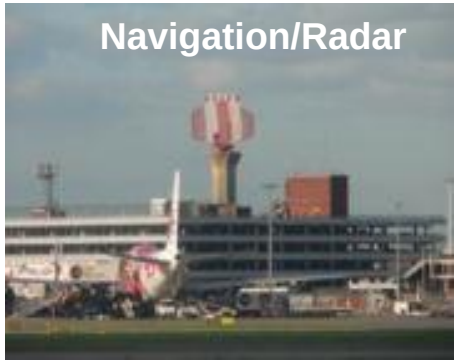
The Present EMF Context

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

"Using EMF to achieve the smartest sustainable city"

Telecommunications



Navigation/Radar

Broadcasting

Residential sources

Commercial

Security scanners

Emerging technologies

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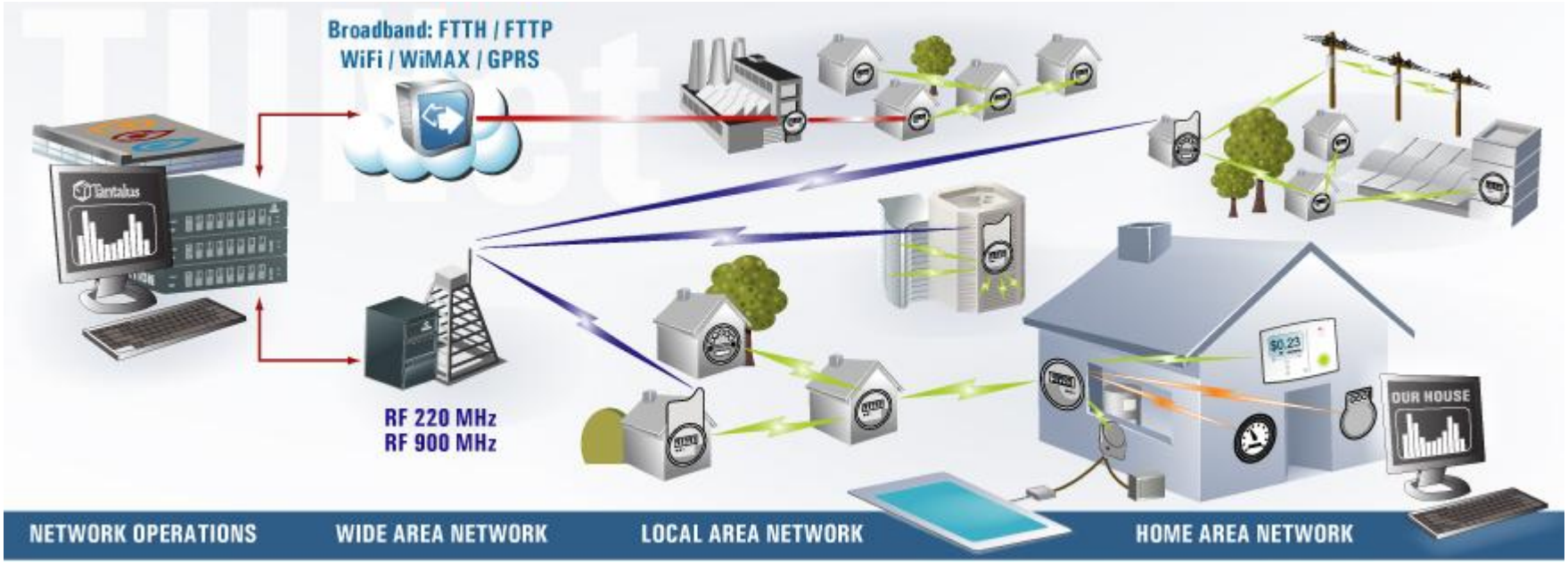
Source: M. Röösli, 2014

ICT and smart cities



http://www.tantalus.com/tech_overview.php

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Applications using radiofrequency fields

Smart Meters

- Smart meters are increasingly being installed in homes and businesses to collect/report on electrical, water and natural gas consumption
- Allows remote real-time monitoring using two-way (radio) communication to relay information to the utility companies and to the consumers to help manage their energy use
- Increased public resistance due to concerns about health, privacy and cost to consumers

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Daily Mail
24 October 2002
Page 43

Mobiles 'boost cancer'

Radiation may make tumours grow faster

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

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

Stop Smart Meters!

Fighting for health, privacy, and safety

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Defend Your Analog Meter | Sample Letter to Utility | SSM Bulletins | Press Releases | Local Contacts | Links | Order/ Download Flyers

The Present Scientific Knowledge

Large and increasingly sophisticated database

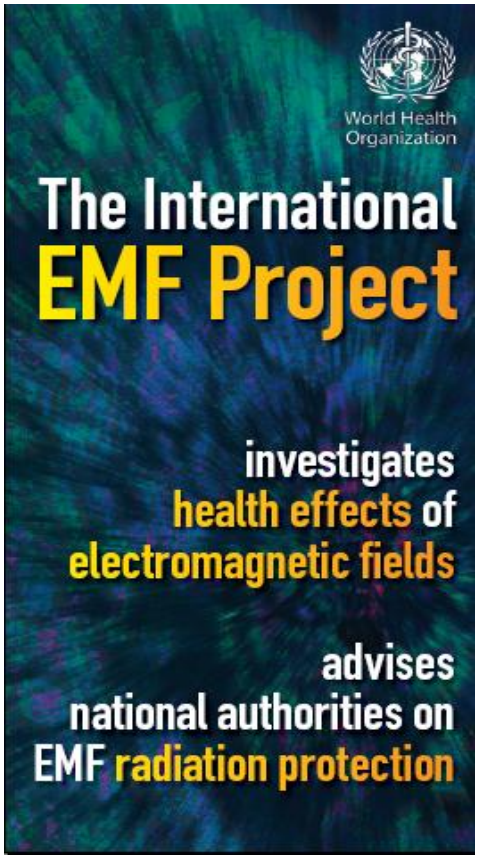
Known mechanisms

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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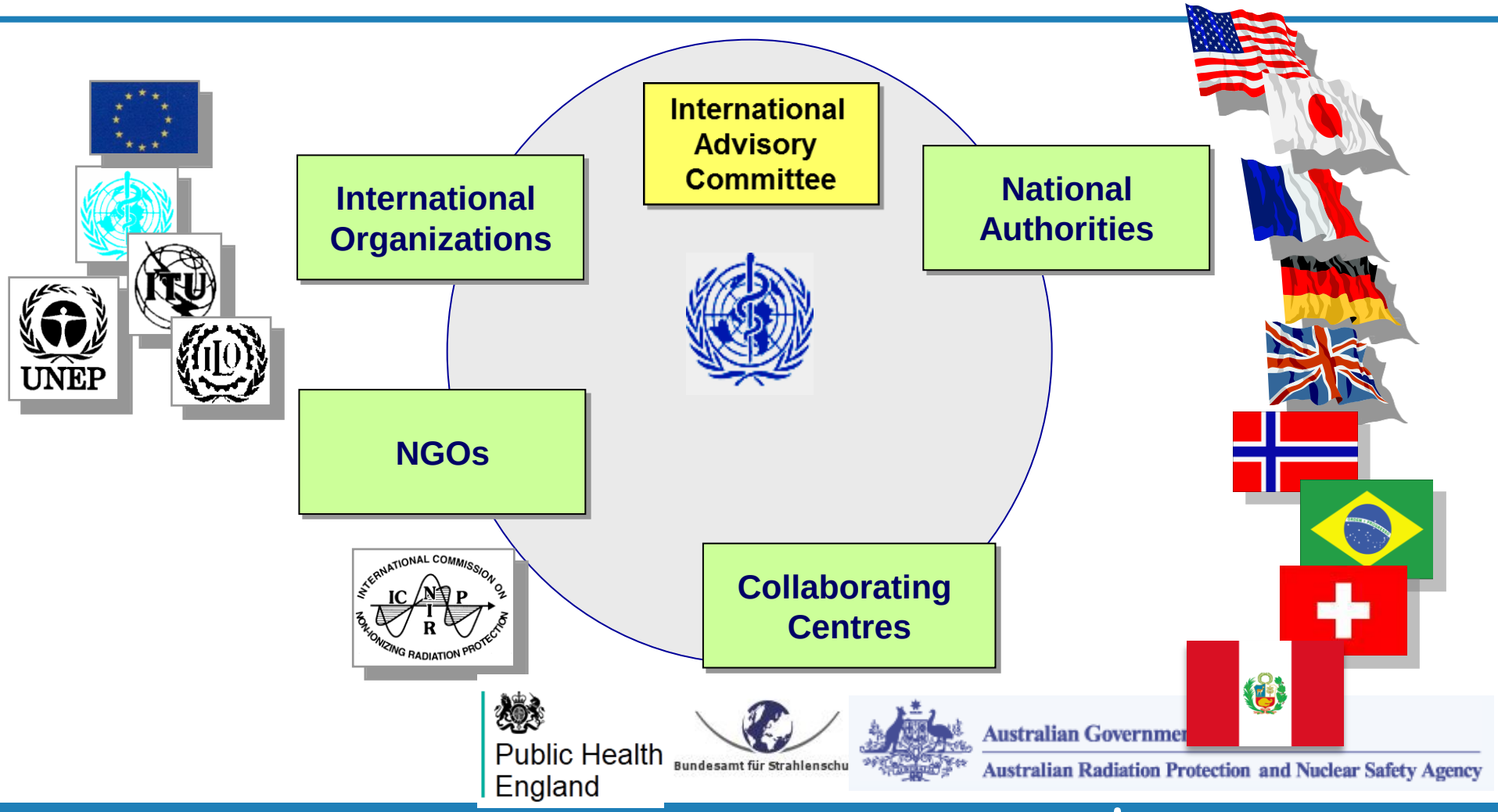
WHO Partners in Radiation



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mHealth
an ITU/WHO initiative

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ITU and WHO launch mHealth initiative to combat noncommunicable diseases

Plan to save lives and reduce costs agreed at ITU Telecom World 2012

Joint ITU/WHO news release

17 OCTOBER 2012 | DUBAI, UNITED ARAB EMIRATES - The International Telecommunication Union (ITU) and WHO today launched a new partnership called the 'mHealth' Initiative to use mobile technology, in particular text messaging and apps, to help combat noncommunicable diseases (NCDs) such as diabetes, cancer, cardiovascular diseases and chronic respiratory diseases.

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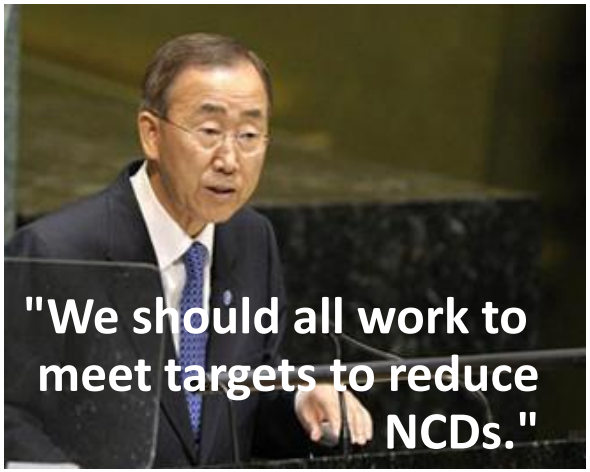
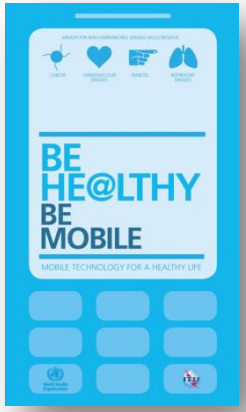


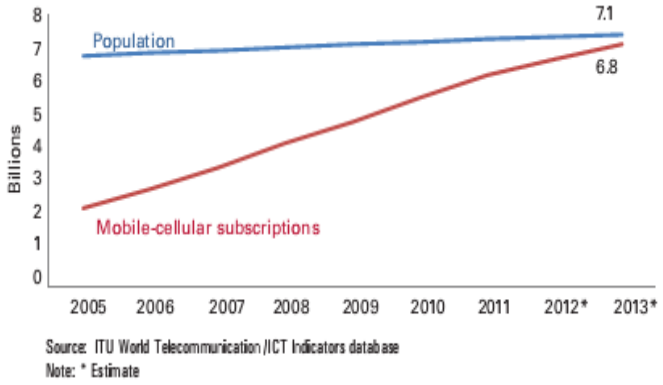
US$ 7T

Healthcare costs & productivity losses 2011-2025

9M

Premature deaths / year





6.8 Billion

Mobile cellular subscriptions

Source, WHO, 2013.

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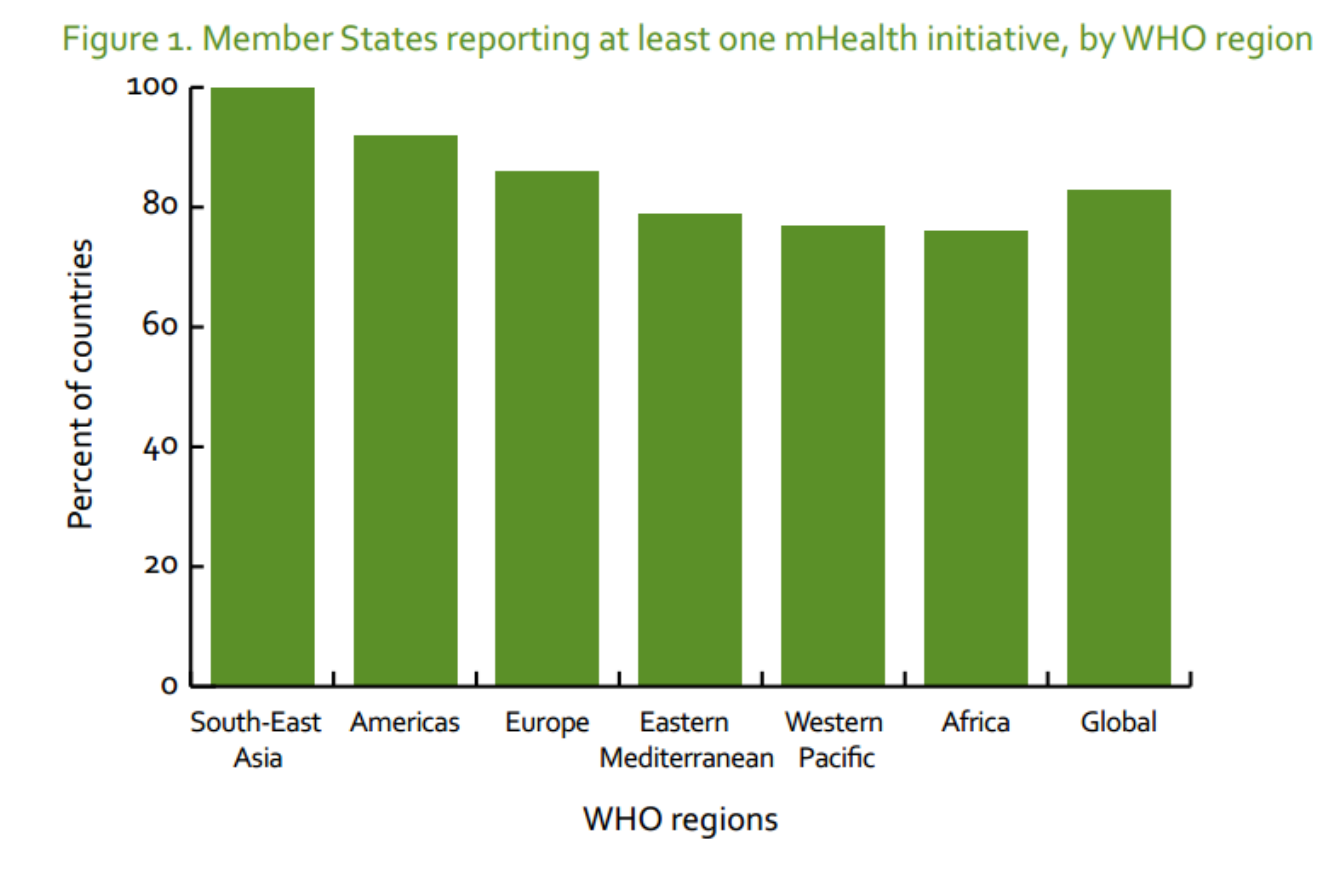
mHealth initiatives



Source: WHO, 2011. mHealth: new horizons for health through mobile technologies: second global survey on eHealth.

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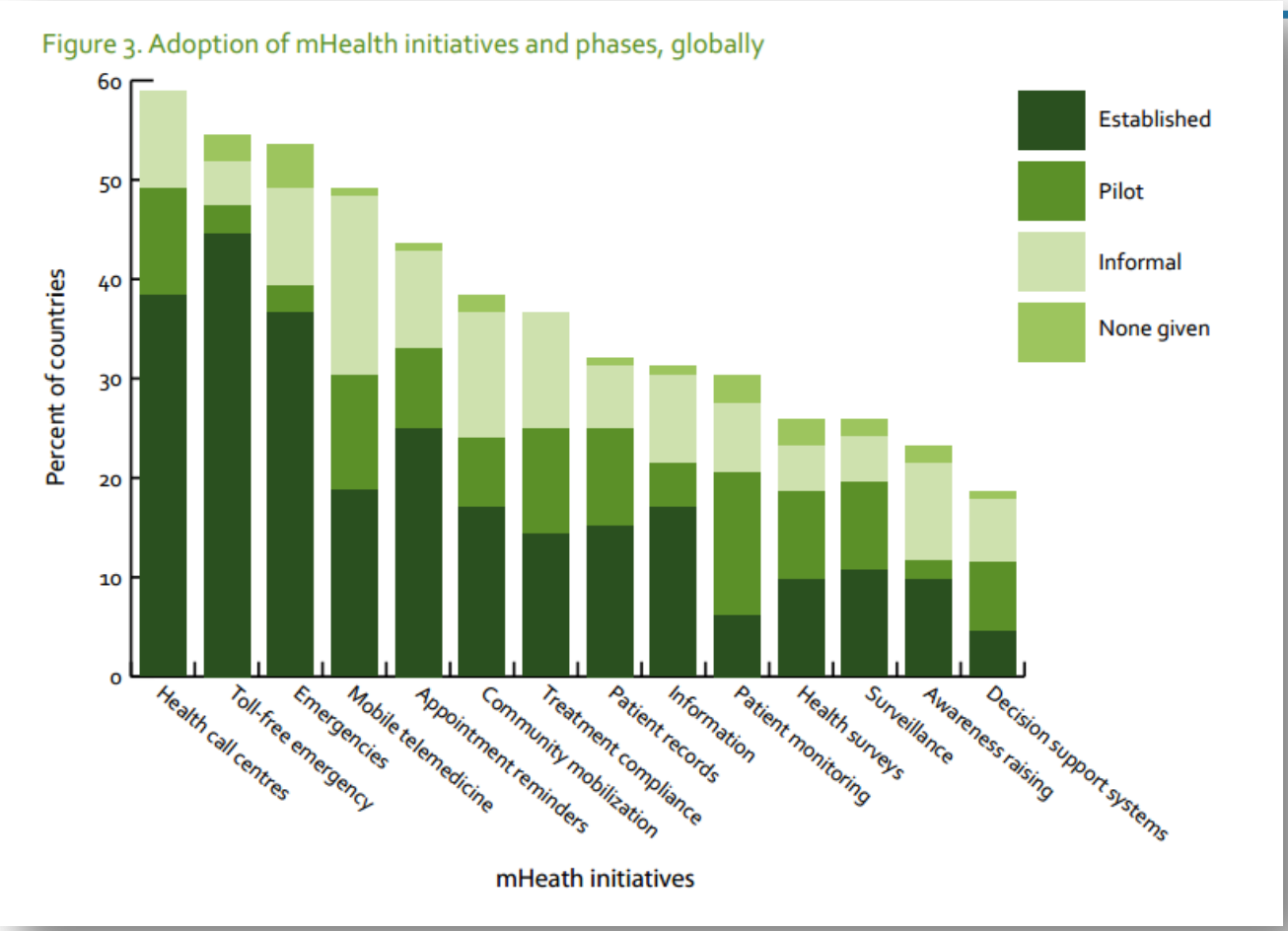
mHealth initiatives



Source: WHO, 2011. mHealth: new horizons for health through mobile technologies: second global survey on eHealth.

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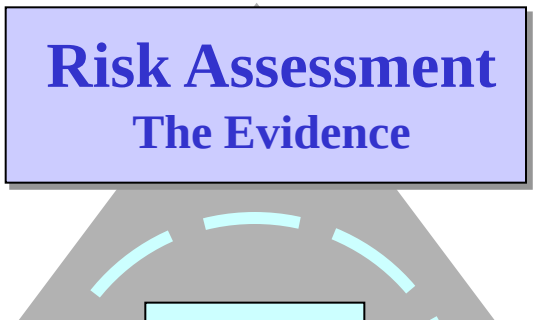
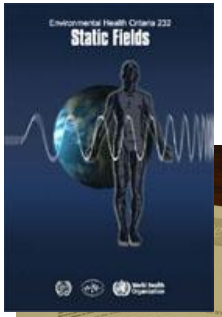
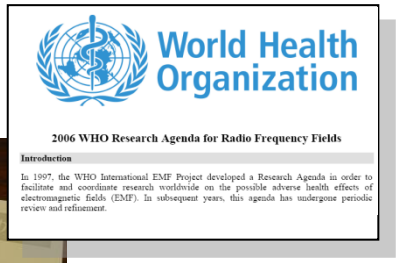
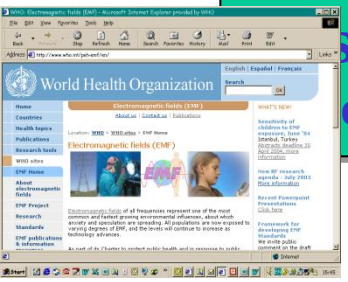
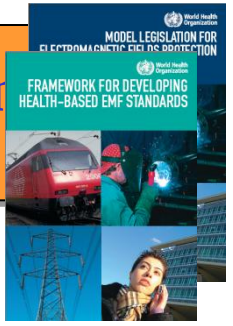
Do EMFs pose a heath risk?











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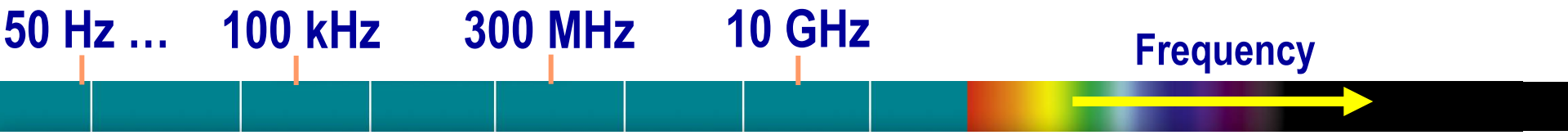
OUTLINE

- Introduction
- **Assessing the health risk**

What do we know?



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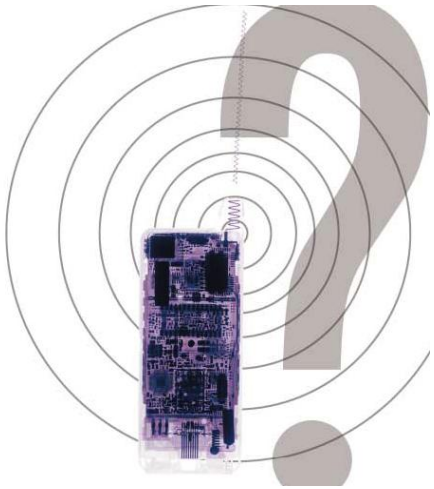

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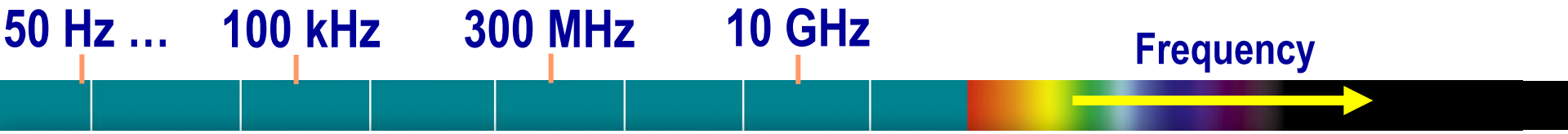
What do we know?

Mechanisms of interaction



Induced currents

Induced currents and heating

Surface heating

Non-thermal effects??

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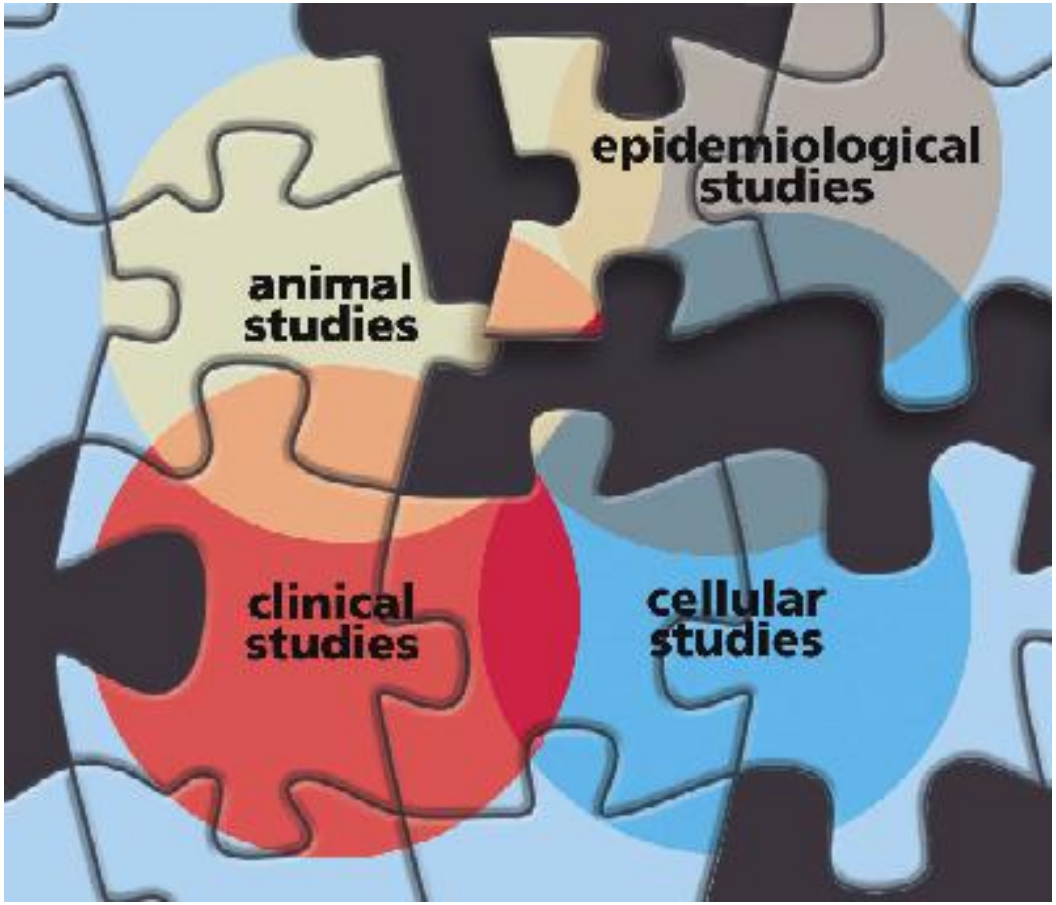
What type of research is needed?

Research

Balance of studies needed



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

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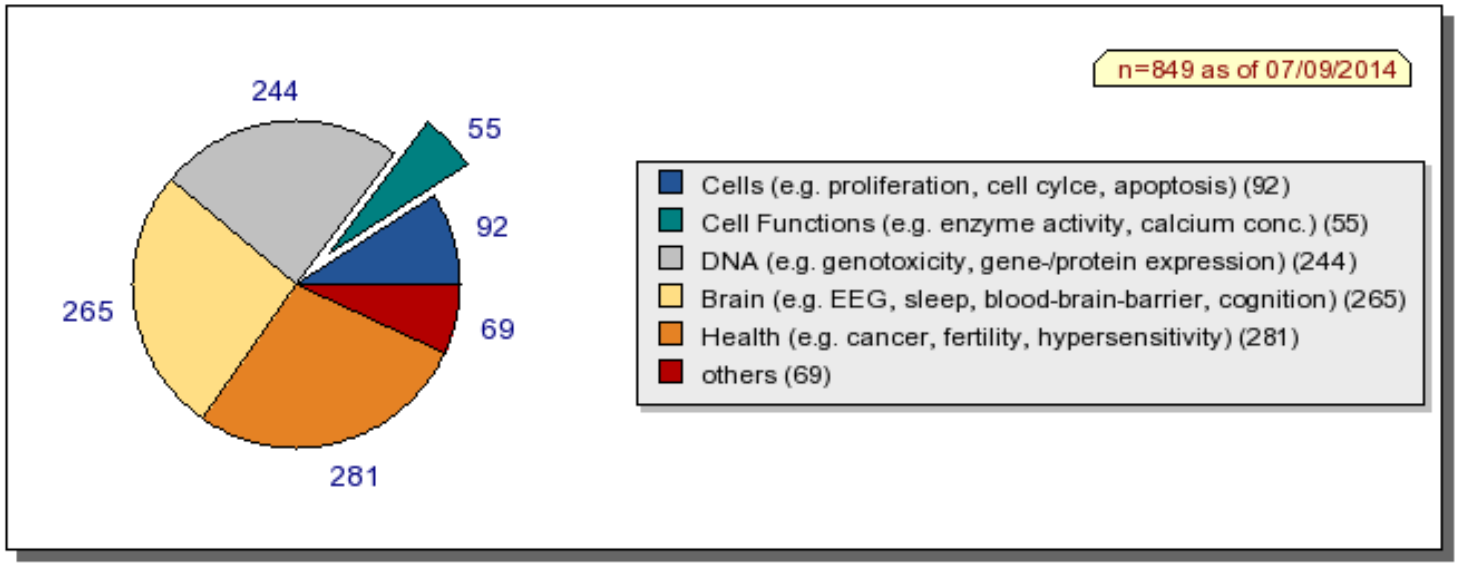
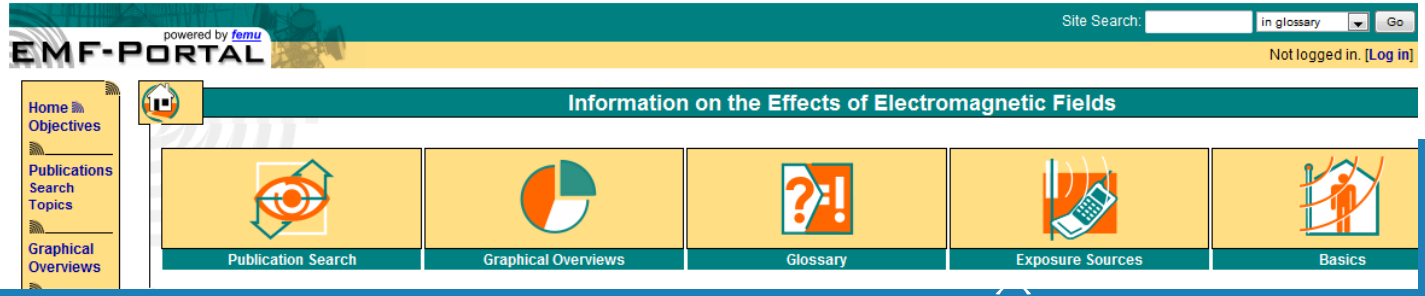
Laboratory Studies

Mobile phone-related experimental studies



From http://www.emf-portal.de/



Laboratory Studies

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

Short-term effects

(WHO fact sheet 193, June 2011)

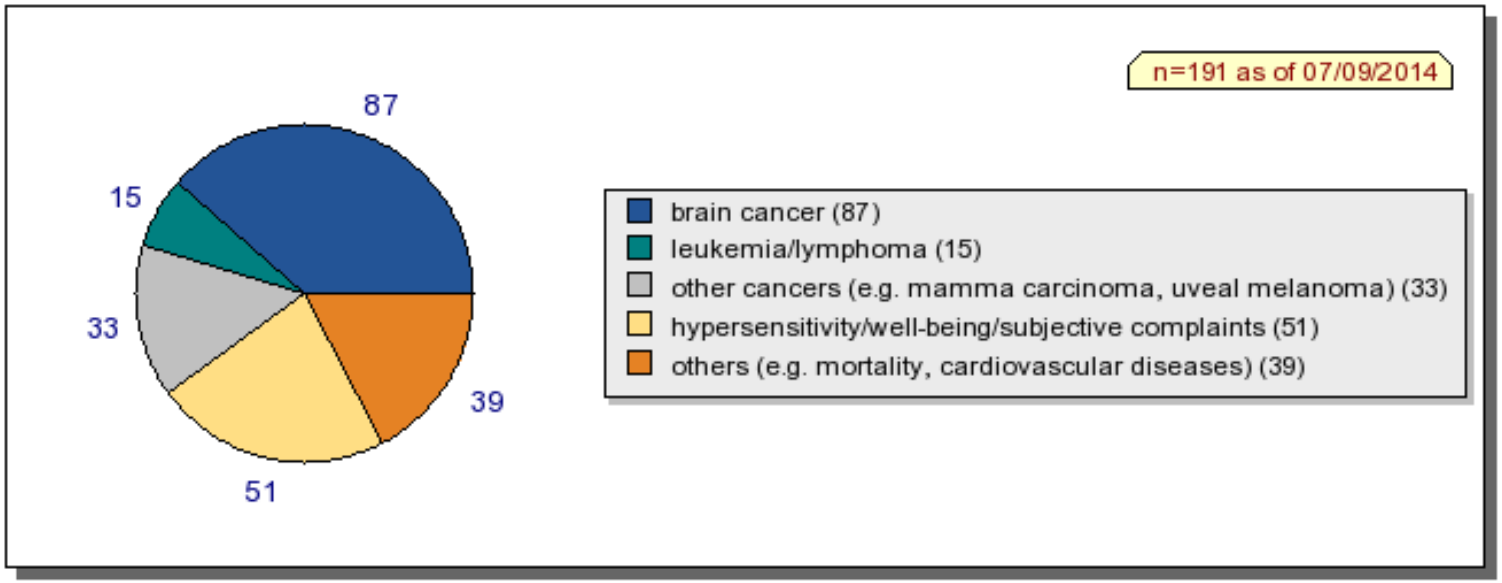
- To date, research **does not suggest any consistent evidence** of adverse health effects from exposure to RF fields at levels below those that cause tissue heating.

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

Epidemiological studies

Studies on mobile phones

Mobile phone related epidemiological studies



From http://www.emf-portal.de/

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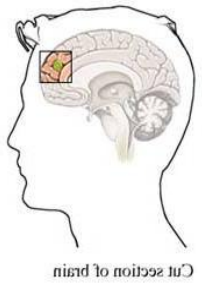
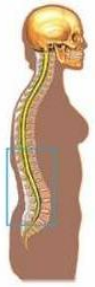
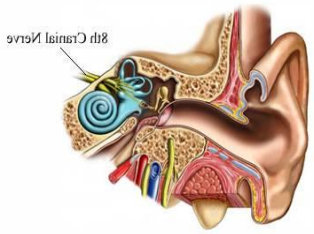
Epidemiological studies

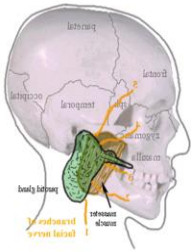
Studies on mobile phones

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









- Numerous studies on the use of mobile phones
  - Published: USA, Nordic countries, 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

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 > 10 years
- Indications of increased risk of glioma for heavy users
  - But biases and errors prevent a causal interpretation
- No available data for long-term use (15-20 years)
- Studies on children ongoing

Organización Mundial de la Salud

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.

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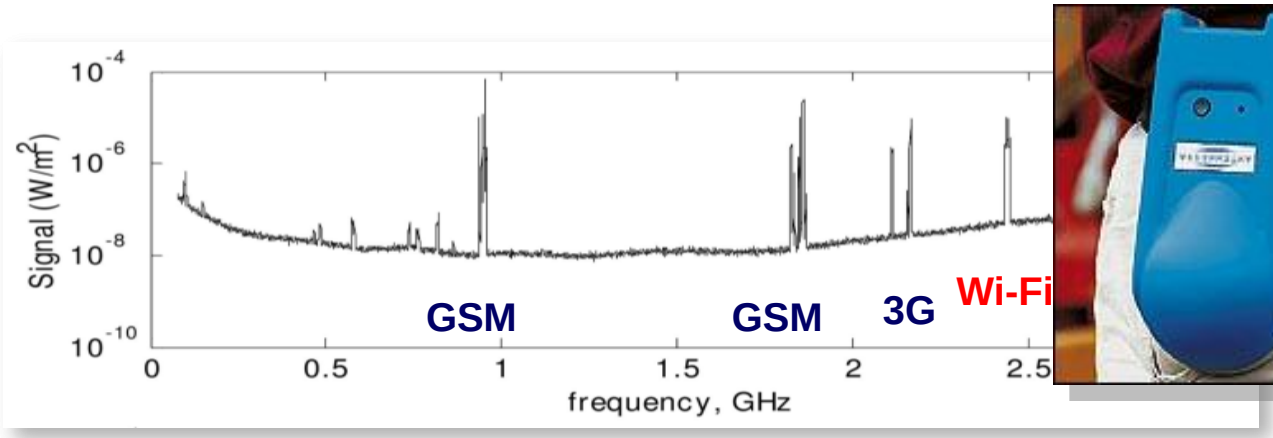
Epidemiological studies

Base stations and wireless networks

- Some studies have been performed
  - Well-being and performance
  - Cancer

- Difficulty of personal exposure assessment



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

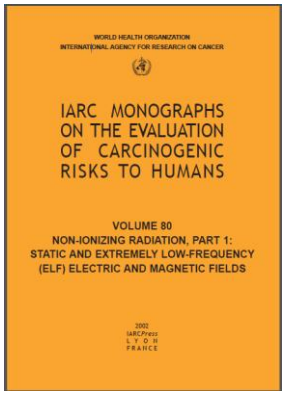
Conclusions:

"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"

How do we evaluate

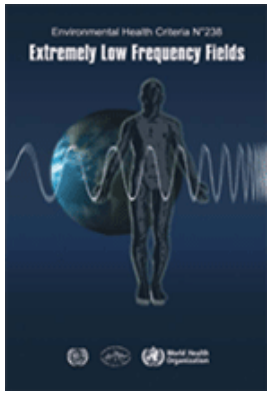
the health risk from EMF?

WHO Monographs on Electromagnetic fields

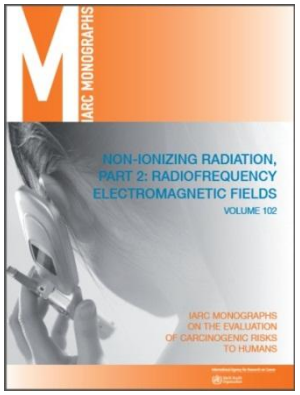


2002

2006



2007



2013

RF Fields

2015-16

World Health Organization

Health Risk Assessment

Problem Formulation

Hazard Identification

Review key research to identify any potential health problems that an agent can cause

Cancer

Exposure Assessment

Determine the amount, duration and pattern of exposure to the agent

Exposure-Response Assessment

Estimate how much of the agent it would take to cause varying degrees of health effects that could lead to illnesses

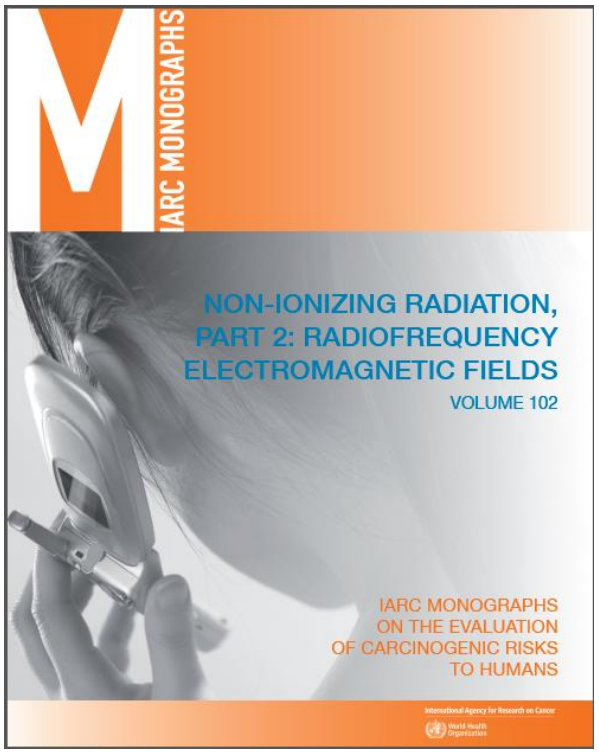
Risk Characterization

Assess the risk for the agent to cause cancer or other illnesses in the general population

World Health Organization

IARC Evaluation of Radiofrequency Fields
Volume 102 (2013)

- RF fields classified as "*possibly carcinogenic to humans*" *(Group 2B)* based on
  - **limited evidence in humans**, based on positive association between glioma and acoustic neuroma and exposure to RF-EMF from wireless phones (epidemiologic studies)
  - **limited evidence in experimental animals** for the carcinogenicity of RF-EMF
  - **weak mechanistic evidence** relevant to RF-EMF-induced cancer in humans
- Evidence for other exposures (e.g. base stations, Wi-Fi) and outcomes (other cancers) considered insufficient for any conclusion



World Health Organization

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 ELF magnetic fields Coffee Gasoline engine exhaust Pickled vegetables Styrene

Health Risk Assessment (cont'd)

International EMF Project

Problem Formulation

Hazard Identification

Review key research to identify any potential health problems that an agent can cause

Exposure Assessment

Determine the amount, duration and pattern of exposure to the agent

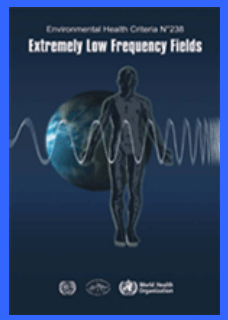
Exposure-Response Assessment

Estimate how much of the agent it would take to cause varying degrees of health effects that could lead to illnesses

Risk Characterization

Assess the risk for the agent to cause cancer or other illnesses in the general population

All studied outcomes



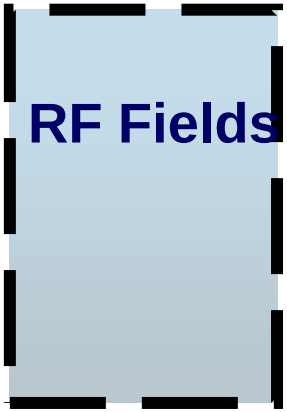
World Health Organization

Scope

- Frequency range:
  - 100 kHz - 300 GHz
  - Include UWB, pulses, mm-waves
- Sources:
  - RFID, EAS, mobile telephony, radar, smart meters, …
- Health benefits not included
  - Hyperthermia, MRI, medical treatments, diathermy, RF ablation surgery
- Systematic review of scientific evidence of health risks
- Update on research recommendations
- Review of national RF policies

EHC on RF Fields
Process

- (Systematic) search for papers
  - Predefined and registered search criteria
  - First selection based on title
  - Second selection based on abstract or full paper
  - Apply inclusion and quality criteria



NEED HELP WITH TRANSLATION OF CHINESE PAPERS

World Health Organization

EHC on RF Fields

Preamble

1. Summary and recommendations for further study
2. Sources, measurements and exposures
3. Electric and magnetic fields inside the body; SAR and heat
4. Biophysical mechanisms; tissue heating
5. Brain physiology and function
6. Auditory, vestibular and ocular function
7. Neuroendocrine system
8. Neurodegenerative disorders
9. Cardiovascular system and thermoregulation
10. Immune system and haematology
11. Fertility, reproduction and development
12. Cancer
13. Health risk assessment
14. Protective measures

World Health Organization

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Radio Frequency Fields

Consultation on the scientific review for the upcoming WHO Environmental Health Criteria

The consultation is open until 15 November 2014

The World Health Organization is undertaking a health risk assessment of radiofrequency electromagnetic fields, to be published as a monograph in the Environmental Health Criteria Series. This publication will complement the monographs on static fields (2006) and extremely low frequency fields (2007), and will update the monograph on radiofrequency fields (1993).

The draft chapters of this document containing the scientific content are now open for consultation by RF experts. We are seeking comments on the accuracy and completeness of these chapters. Please note that the literature searches have been done up to December 2012 (in a few instances to December 2013), so the more recent studies are currently not included. While the searches and chapters will be updated before finalization of the document, any suggestions for inclusion of peer reviewed studies are welcomed. The introductory chapters, summary, health risk assessment and protective measures will be added at a later stage.

The public consultation will be open through 15 November 2014. After this time, a revised draft will undergo peer-review by an external expert group and will be published in the Environmental Health Criteria series.

In delivering your comments, please consider the document "Review Principles" which describes the overarching criteria used in developing the chapters.

Please provide your comments in the boxes below using page numbers to reference specific items within the draft chapters.
Note that all comments will be collated and considered, but no individual feedback will be given.

If you have questions, please contact us at: emfproject@who.int

Fields marked with an asterisk (*) are mandatory.

Contact and Organization Details

Country *

Organization name *

Last name *

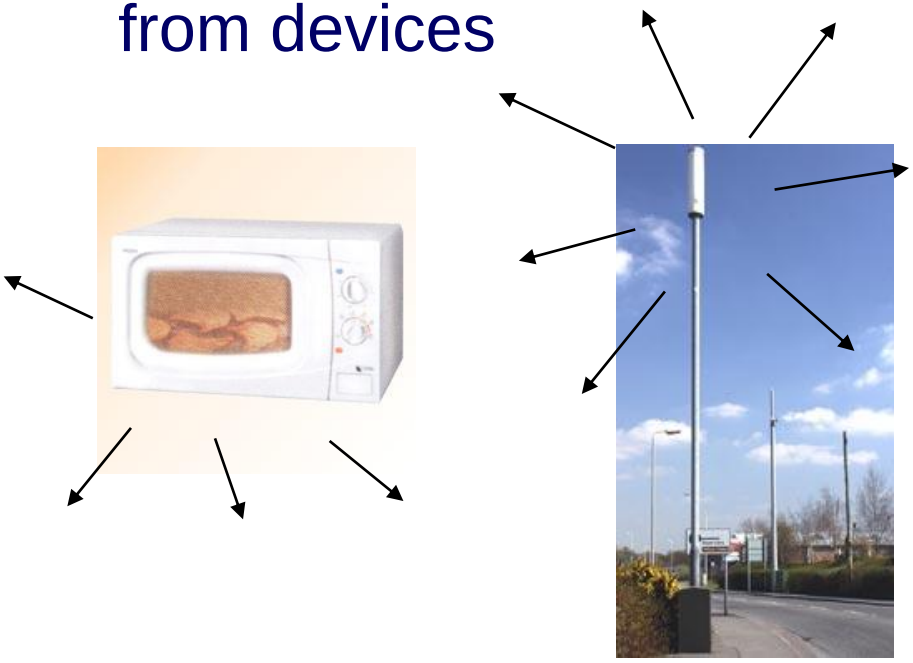
Expert Consultation End September 2014

OUTLINE

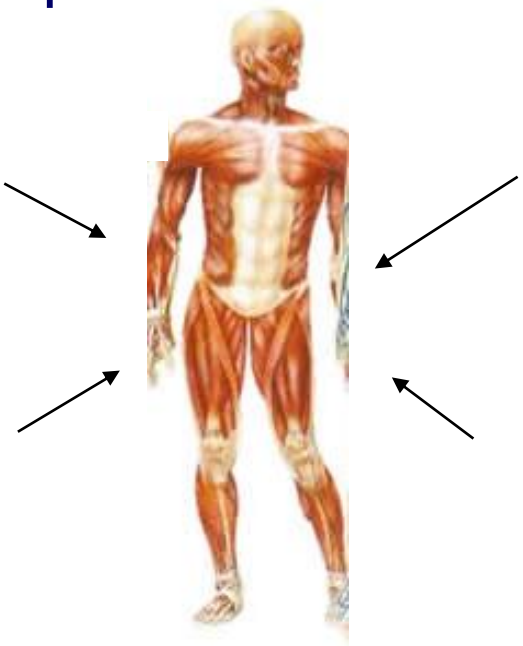
- Introduction
- Assessing the health risk
- **Managing the health risk**

Standards and Guidelines

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



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



World Health Organization

Relevant Authorities

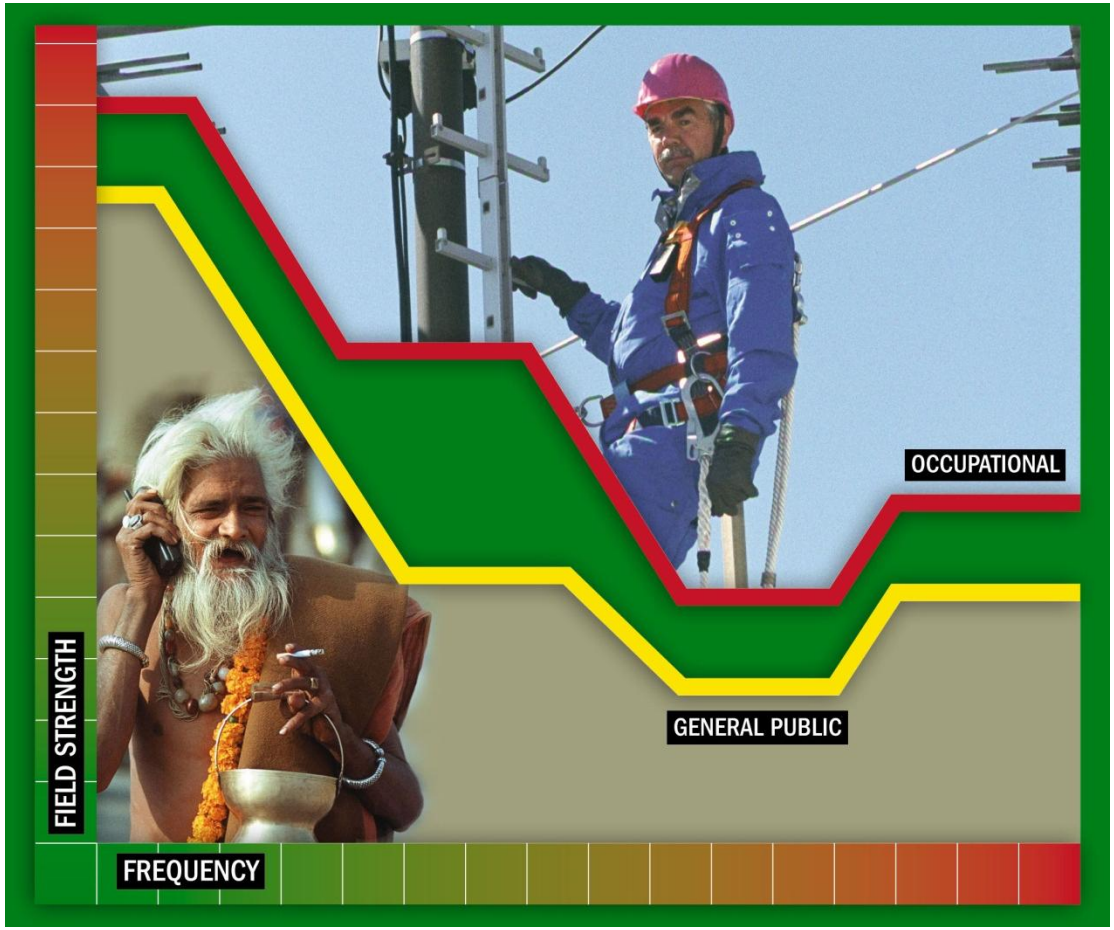
Non-governmental and international organizations

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

- **Exposure standards**

World Health Organization

Reference Levels



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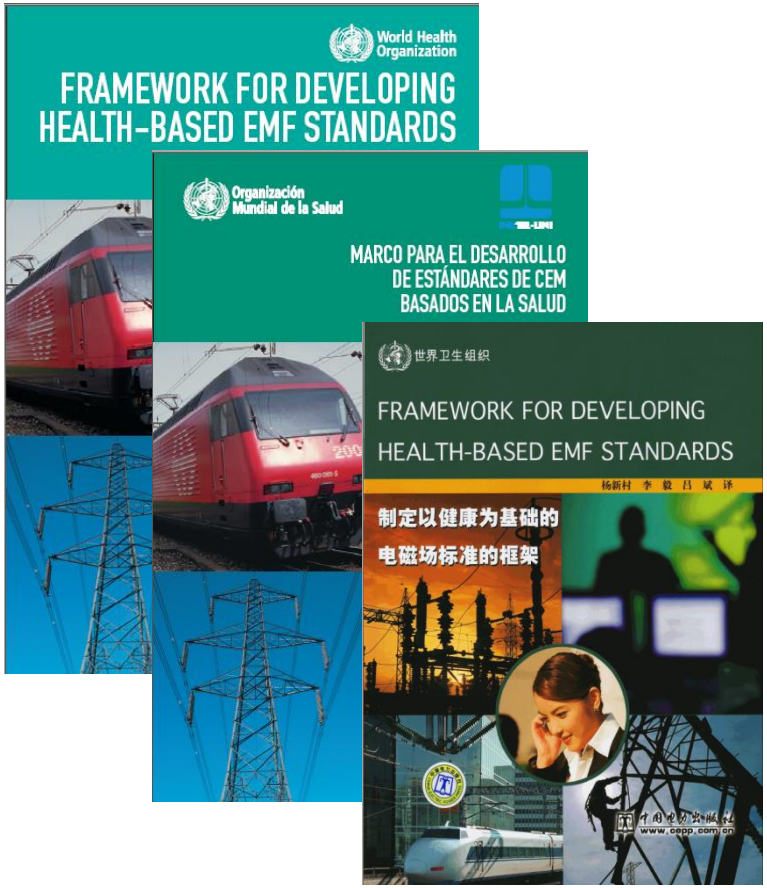
Policy documents ….



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

World Health Organization

National management approaches

- Relevant authorities
  - National level

Ministry of Health
Ministry of Labour
Ministry of the Environment
Ministry of Telecommunications
Ministry of Energy
Ministry of Transport
….

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

Management Options

Reduce concern

Reduce uncertainty

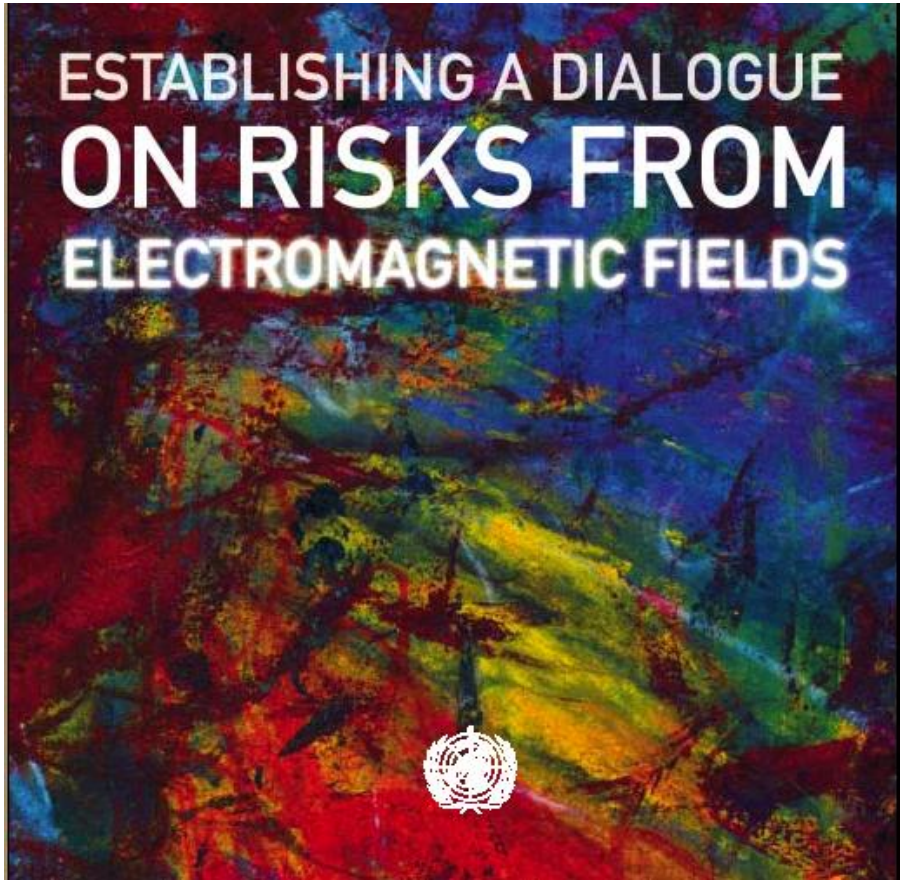
Reduce exposure

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

World Health Organization

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 Chinese, Spanish, Italian, German, French, Russian, Bulgarian, Dutch, Polish, Portuguese, Hungarian and Japanese

Available on the web
www.who.int/emf

World Health Organization

OUTLINE

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

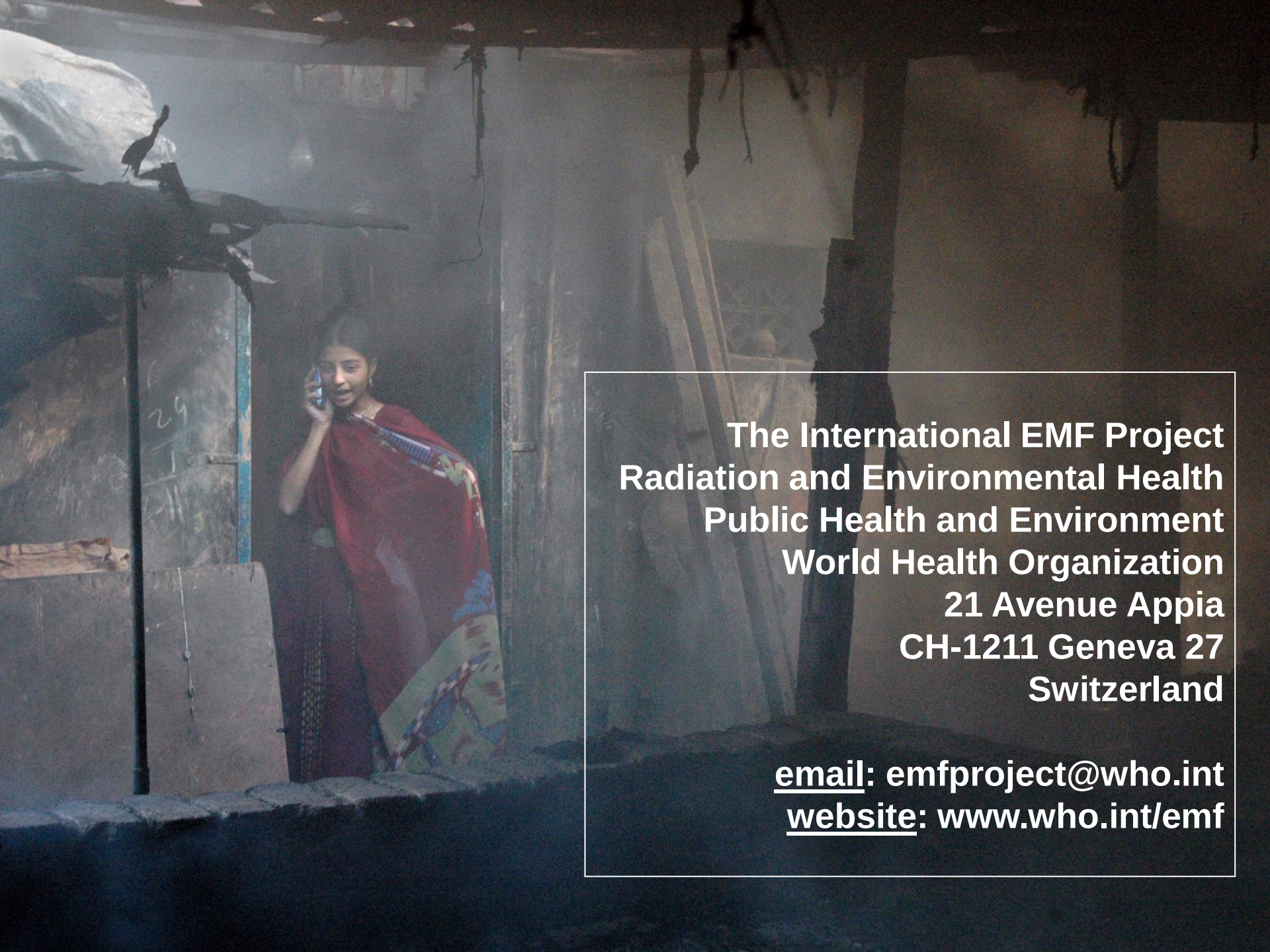
Challenges to governments….

- 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"



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