



EU Standards dedicated Mobile and Base Station



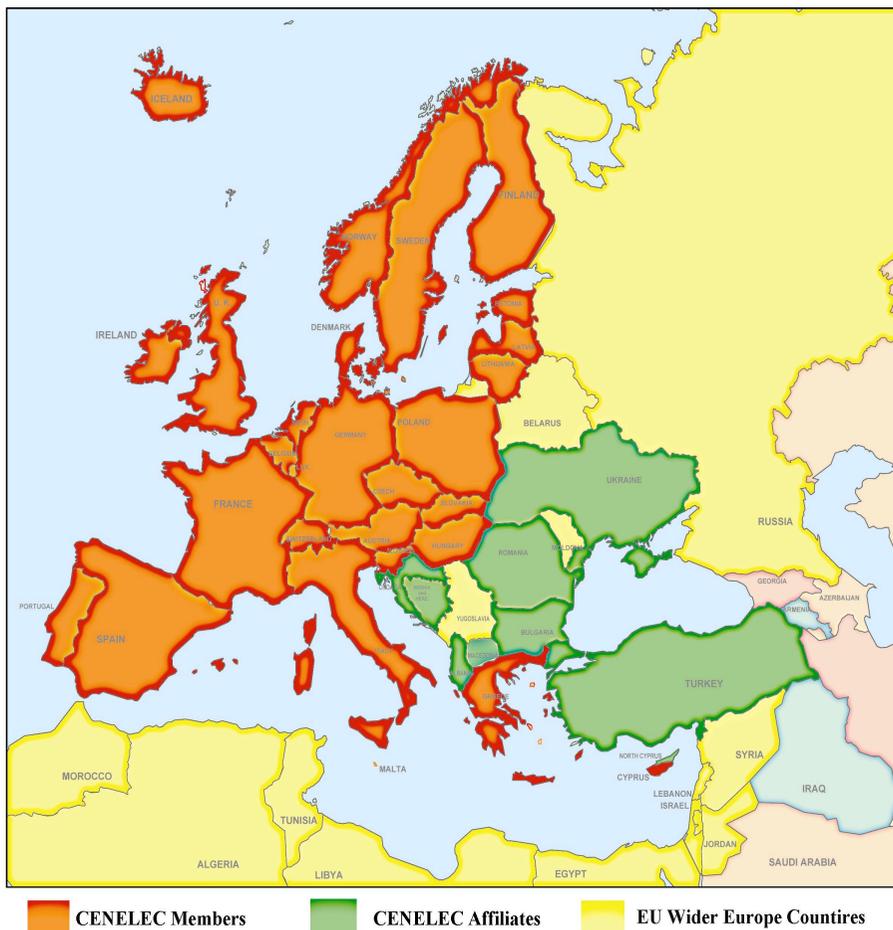
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Whist Lab

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Convenor of the CENELEC TC106x WG1

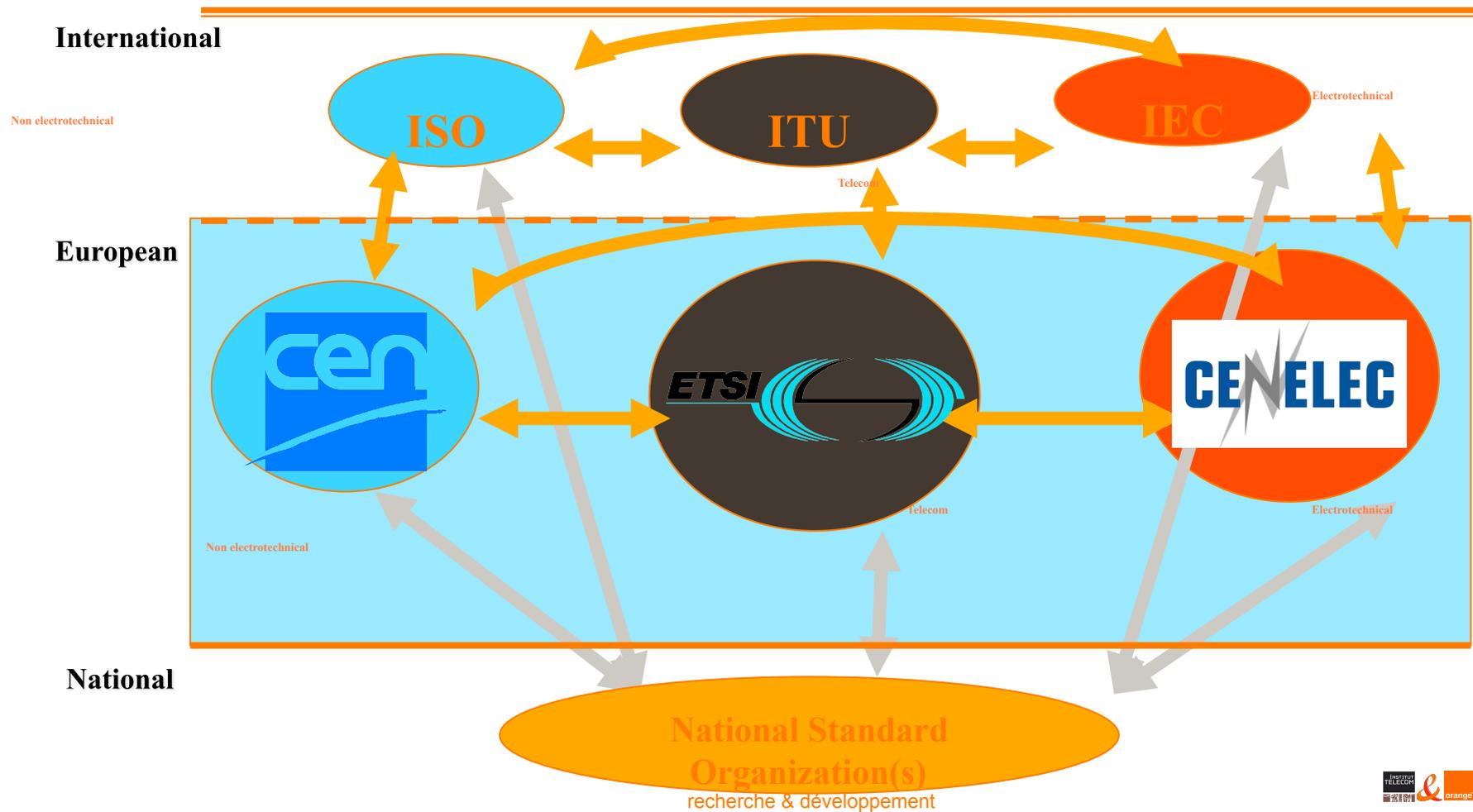
Gaborone 2010



- ➔ Composed of the National Electrotechnical Committees of 30 European countries.
- ➔ In addition, 9 National Committees are participating in CENELEC work with an Affiliate status.
- ➔ Voluntary standard
- ➔ Vote is weighted depending on Gross National Product (GNP) ex: Fr=29 Is=3.



International framework





European Framework



ESTABLISHED: 1961



HEADQUARTERS:
BRUSSELS

ESTABLISHED: 1959



HEADQUARTERS:
SOPHIA ANTIPOLIS

ESTABLISHED: 1988



EU directives and CENELEC mandate.

■ European Directives

- LV: 73/23/EEC of 19 February 1973 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits
- RTTE :1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity, including limitation of exposure from electromagnetic fields.
- 2001/95/EC of 3 December 2001 on general product safety
- 2004/40/EC of 29 April 2004 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)

■ CENELEC Mandate

- The European Commission has given CENELEC, CEN and ETSI the task of preparing the necessary standards for the implementation of these directives under the mandate M/305 and with reference to the Council Recommendation 1999/519/EC.



RTTE and Harmonized standards

■ RTTE

- The RTTE directive establishes a regulatory framework for the placing on the market, free movement and putting into service in the Community of radio equipment and telecommunications terminal equipment.
- Essential requirements: protection of the health and the safety

■ Harmonized standards

- Harmonized standards don't require transposition in national standards, but give presumption of conformity directly after publication in the OJ
- The list of harmonised standards in the context of the RTTE Directive have been published in the OJ



EU: Product & Generic vs Basic standards

■ Basic standards standards

- **give detailed measurement and/or calculation methods**, test instrumentation and basic test set-up to be implemented for the evaluation of physical quantities relevant to demonstrate the compliance to the basic restrictions and/or the reference levels defined in the European Recommendation 1999/519/EC.
- **shall not include prescribed limits** and shall not contain compliance criteria

■ Generic standards

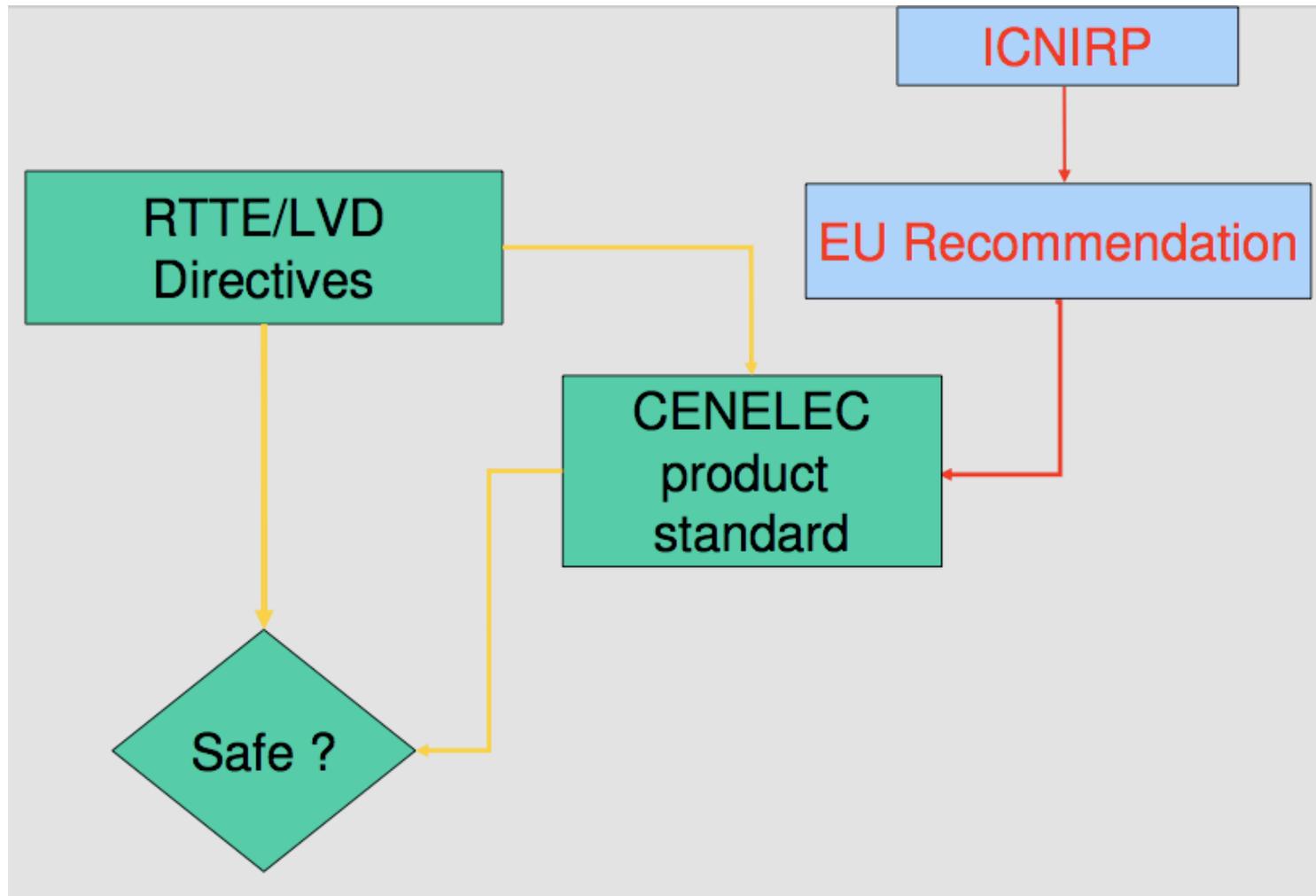
- give reference to limits for basic restrictions and/or reference levels in accordance with the values provided in the Council recommendation 1999/519/EC, general assessment methods (measurement and/or calculations) and compliance assessment criteria applicable

■ Product standards

- give reference to basic restrictions and/or reference levels in accordance with the values provided in the Council recommendation 1999/519/EC, assessment methods (measurement and/or calculations) and compliance assessment criteria
- may define specific EMF requirements in the form of emission limits when it can be validated that compliance with the required limit will result in compliance with the requirements stated in the Council recommendation.
- should precisely specify the assessment methods to be used



Product standards and CE marking

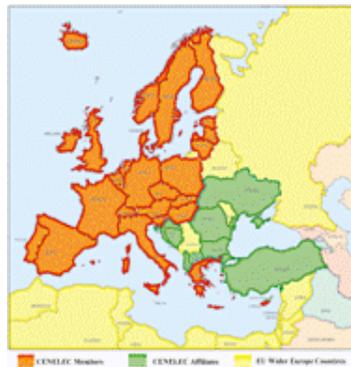


EU standards dedicated to mobile and base station

- Put on the market mobile



- Put on the market base station
- Put into service base station
- In situ measurement





EU Standards dedicated to wireless systems

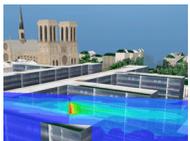
■ Mobile standards

- Close to the head
 - Handsets compliance (EN50360 & EN50361) adopted in 2001
 - IEC 62209-1 replaced the EN50360 in 2006
- Body worn
 - IEC 62209-2 adopted in 2009.



■ Base station

- Putting base stations on the market (EN50383, EN50384 & EN50385) adopted in 2002 revised in 2008
- Putting base stations into service (EN50400, EN50401) adopted in 2005
- Market enforcement tool (in situ), EN50492 adopted in 2008

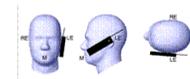


■ Low power

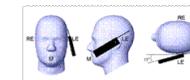
- Compliance of systems that are emitting less than 20 mW (EN 50371) adopted in 2002

■ Worker

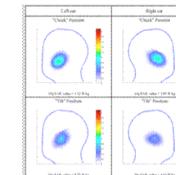
- EN 50499 workers' exposure assessment adopted in 2008



"Cross" position of the wireless device on the left side



"Cross" position of the wireless device on the right side

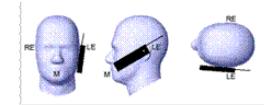
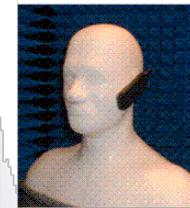




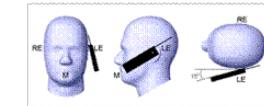
Product and basic standards dedicated to Mobile

Basic and product standards for handset

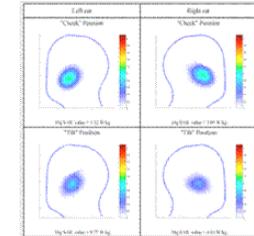
- Close to the head
 - Handsets compliance (EN50360 & EN50361) adopted in 2001
 - Range : 300 MHz to 3 GHz
 - IEC 62209-1 replaced the EN50360 in 2006
- Body worn
 - IEC 62209-2 adopted in 2009.
 - Range 30 MHz to 6 GHz



Closest position of the wireless device on the left side



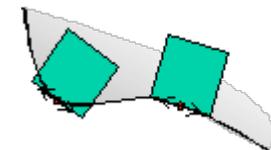
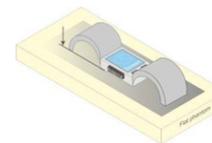
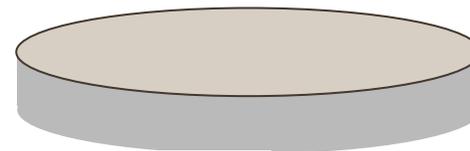
100 position of the wireless device on the left side



phantom and liquid definition

Test positions and protocol

Uncertainty estimation





Put Base Station on the market

- Basic and product standards to demonstrate the compliance of the product when it is put on the market
- EN 50383, EN 50384 and EN50385 Adopted by CENELEC in 2001. EN50383 has been revised in 2008
- EN 50385 is published in OJCE in 2002

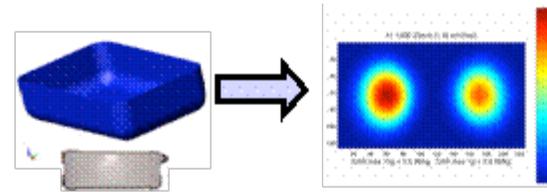
**Measurement and Simulation
Phantom and position
Range: 110 MHz to 40 GHz.**



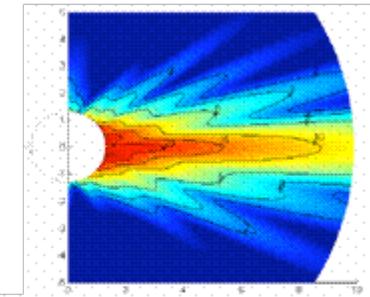
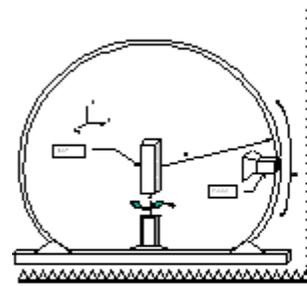


EN50383 content

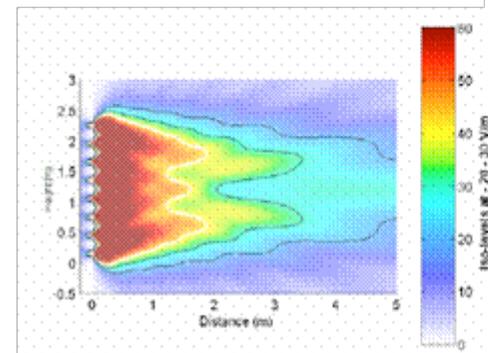
- SAR measurement
 - Limited to local SAR



- E-Field measurement
 - Surface scanning
 - Volume scanning

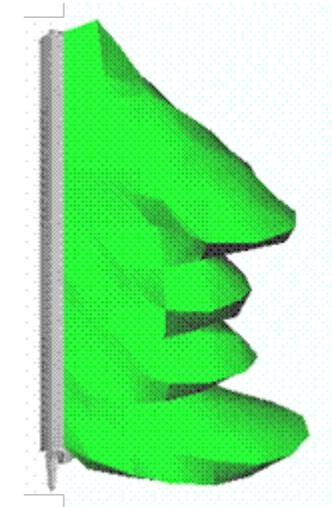
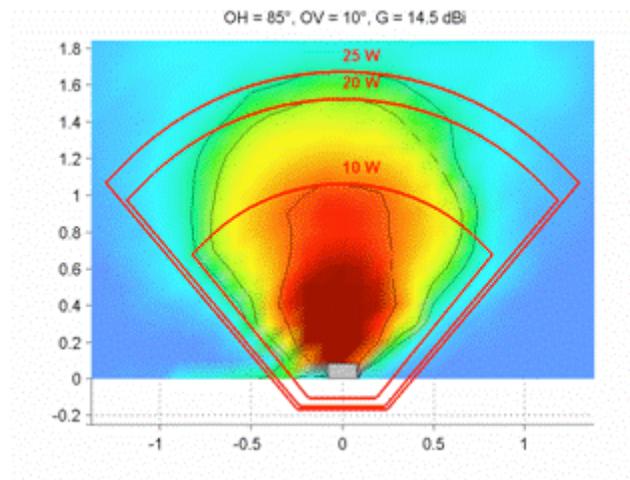
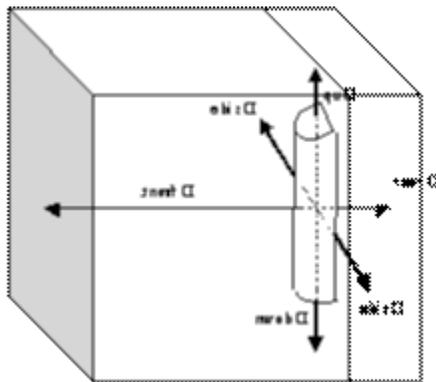


- E-Field simulation
 - In free space





Determine compliance boundaries





Put Base Station into service

- Basic and product standards to demonstrate the compliance of the product when it is put into service
- EN50400 and EN50401 adopted by CENELEC in 2005
- EN504991 published in OJEC in 2006

Range 110 MHz to 40 GHz.

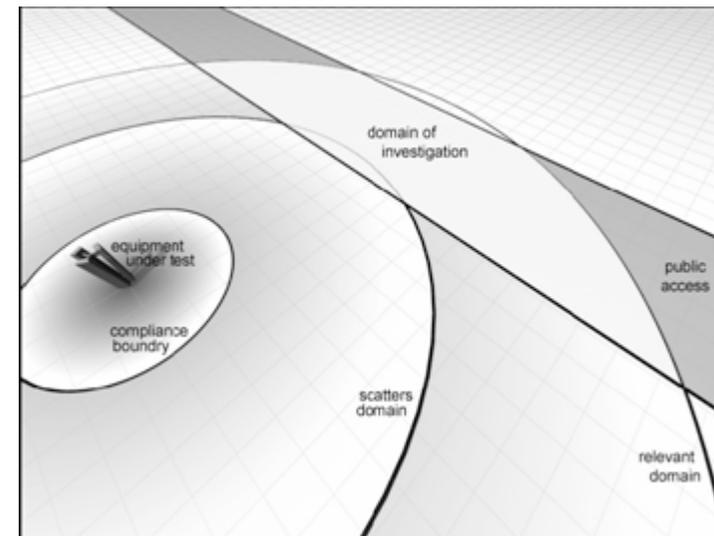
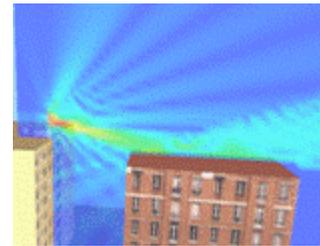




EN50400

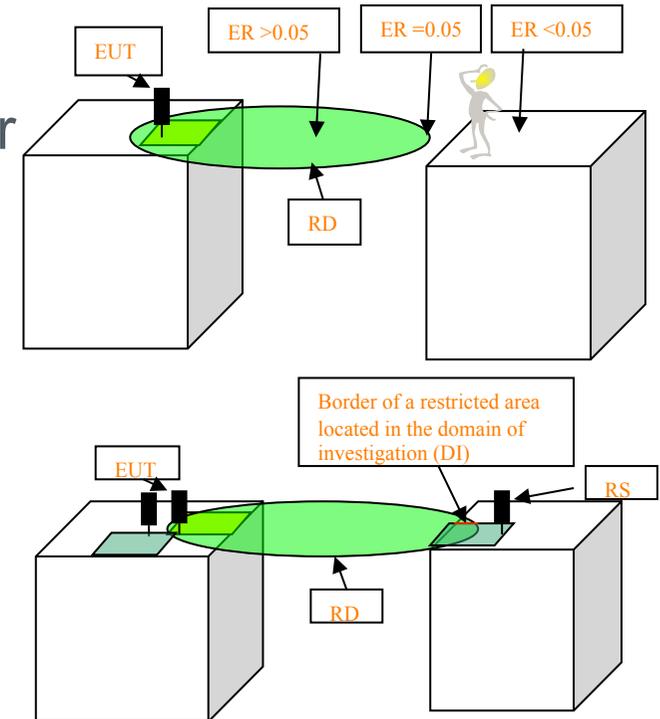
Specify when it is put into service in its operational environment, the methods to assess the value of the Total Exposure Ratio or to establish whether the Total Exposure Ratio is less than or equal to one in relevant areas where the general public has access.

- Take into account
 - - the environment
 - - the other sources
- With a manageable method ...



Putting into service

- Manage the product compliance boundaries that are modified by the other sources and the environment
- Manage modification of the compliance boundary of pre existing sources when the product is putting into service
- Pre calculation can be done using the « family approach »

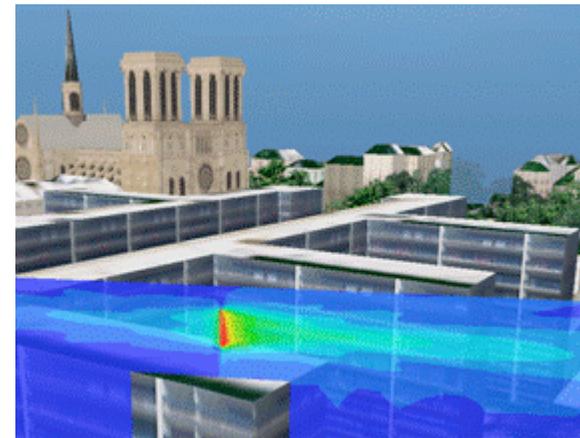




In situ measurement

- This standard specifies the **measurement methods** that shall be used to determine *in-situ* the electromagnetic field for human exposure assessment in the frequency range 100 kHz to 300 GHz
- EN50492 adopted in 2008

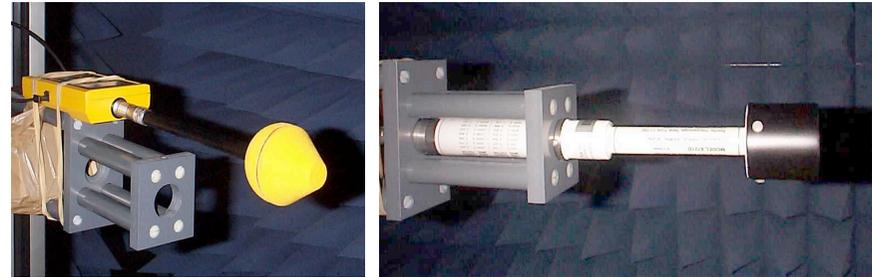
Range 100 kHz to 300 GHz.





2 major types of measurement systems

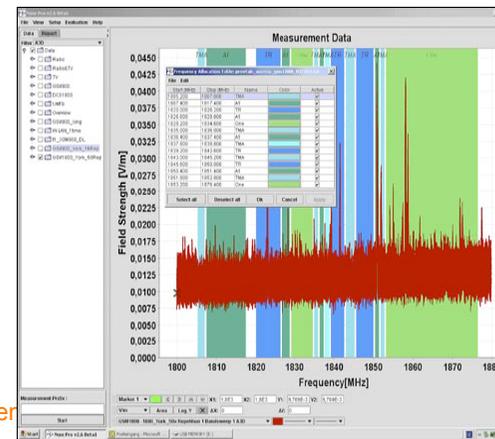
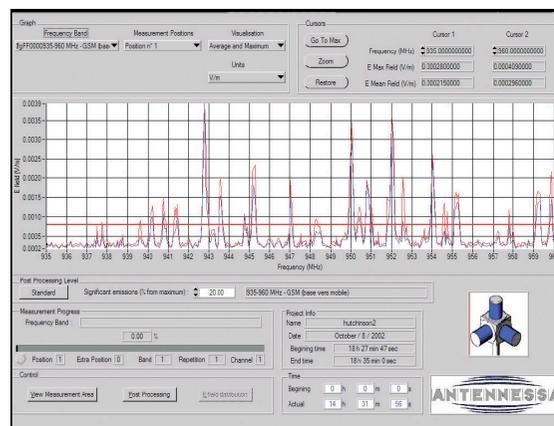
- Broadband probes
 - First solutions for survey
 - Fast, easy
- Frequency selective systems
 - Similar to propagation or EMC frequency measurements
 - More involved in terms of equipment and use
 - But knowledge of emissions





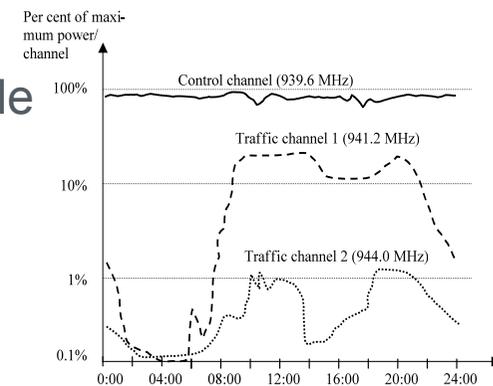
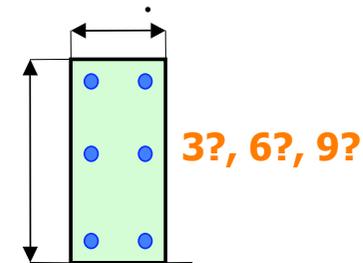
Global vs Comprehensive

- Global exposure assessment
 - Broadband probes
 - Frequency selective systems (post-processing)
 - No information on the contributors on the TER
 - Hazardous extrapolation to the maximum exposure
- Comprehensive exposure assessment
 - Frequency selective systems
 - Information on the components of the exposure by service
 - Reasonable extrapolation to the maximum exposure



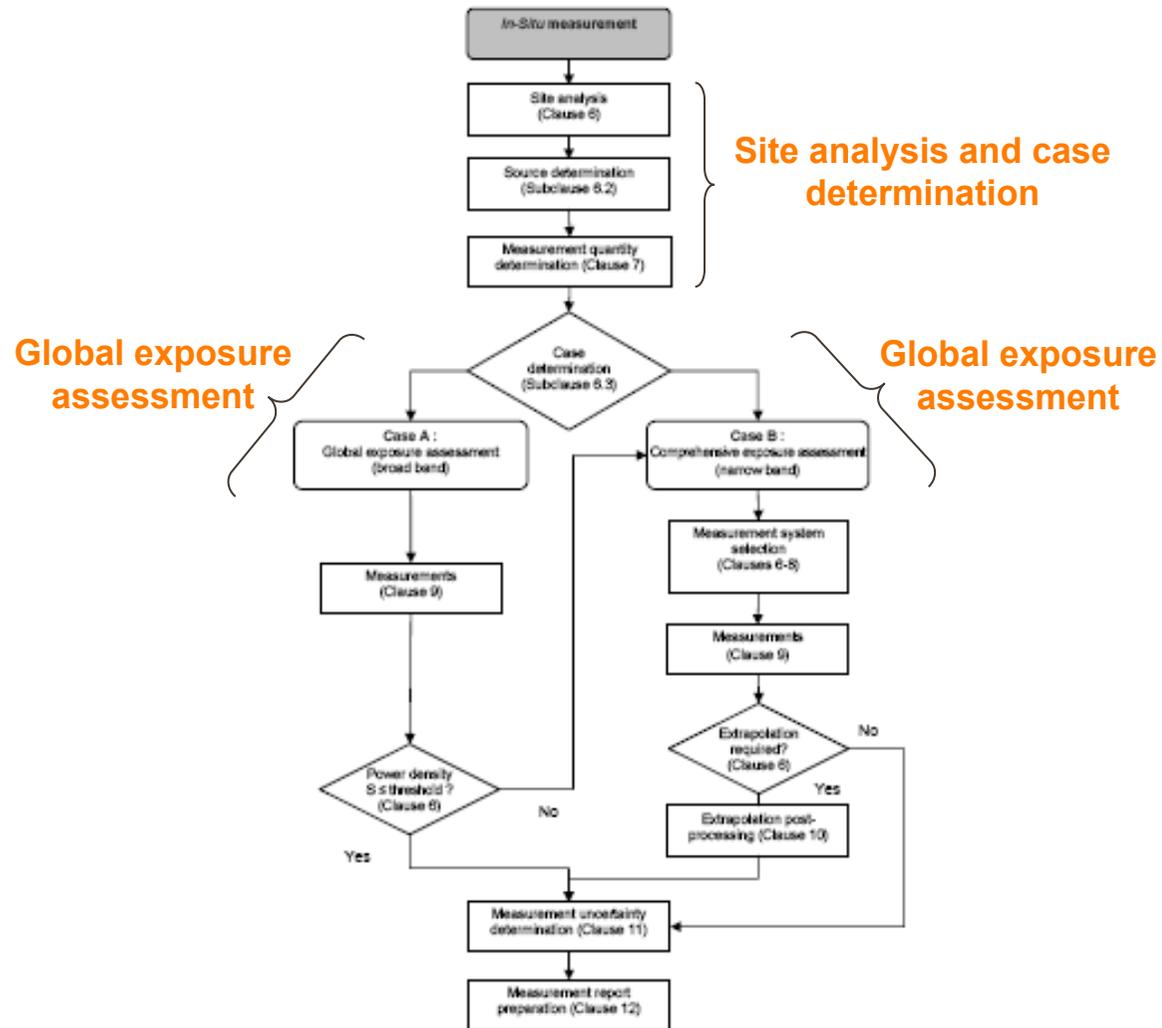
Method

- Standard defines methods to carry out In Situ measurement
 - Specify basic requirements of measurement system
 - E.g.: Sensitivity, isotropy, frequency selectivity
 - Specify the measurement protocol
 - E.g.: measurement method versus situation, averaging
 - Extrapolate to the maximum traffic
 - Specify the post processing method applicable to GSM, UMTS. Wifi.





in situ Flowchart





Low power devices: Exclusion clause

- EN 50371 GENERIC STANDARD adopted in 2002

- If a system emits less than 20mw then
 - SAR over 10g is less than 2 W/kg
 - Power density over 20 cm² is less than 10 W/m²

- Then the system is compliant. No SAR or E field measurement required
 - Range 10 MHz to 300 GHz



As conclusion

Dans la confusion trouver la simplicité
De la discorde faire jaillir l'harmonie
Au milieu de la difficulté se trouve l'opportunité

Albert Einstein,
Trois règles de travail