



Memorandum of Understanding

For the implementation of a European Concerted
Action Research Action designated as

COST Action 281

“Potential Health Implications from Mobile Communication Systems“

The signatories of this Memorandum of Understanding, declaring their common intention to participate in the concerned Action referred to above and described in the Technical Annex of the Memorandum have reached the following understanding

1. The Action will be carried out in accordance with the provisions of the document COST400/94 “Rules and Procedures for Implementing COST Actions”, the contents of which are fully known to the Signatories.
2. The main objective of the Action is to obtain a better understanding of possible health impacts of emerging technologies, especially related to communication and information technologies, that may result in exposure to electromagnetic fields.
3. The overall cost of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at 75 Million € in 2000 prices.
4. The Memorandum of Understanding will take effect of being signed by at least five Signatories.
5. The Memorandum of Understanding will remain in force for a period of 5 years, unless the duration of the Action is modified according to the provisions of the document referred to in Point 1 above.

TECHNICAL ANNEX COST Action 281

“Potential Health Implications from Mobile Communication Systems”

A. Background

During the last century, technological advances have rapidly changed the working and living conditions of most Europeans. The pace of such changes shows no sign of diminishing in the new century; indeed it may be increasing even further. One especially prominent example is the increasing development of communications and information technology, first as the spreading of computer technology in the 1970's and 80's, followed by the rapid expansion of mobile telephony systems in the 90's. New emerging systems aim to integrate these two, into an all pervasive mobile information society.

These developments, exemplified by systems such as Bluetooth and WLAN, and developments in electronic article surveillance and radio frequency identification systems, transportation systems, new military applications of high energy EM fields, etc., will result in increasingly widespread exposures of the general public, as well as various occupational groups, to electromagnetic fields (EMFs). Measurements and estimations show that the exposure levels from this multitude of sources will, in many cases, be fairly low. In terms of health implications of these exposures, an evaluation can be made using guidelines based on the European Council recommendation that was published recently, or similar guidelines for occupational exposure situations.

However, these new technological developments and their ubiquitous deployment in the European society are raising problems that may complicate or obscure such evaluations. On the one hand, such problems are related to scientific risk assessment and on the other hand to risk perception and risk management.

Guidelines are based on results of research performed at hitherto commonly used frequencies, modulation schemes etc., which have been expanded to e.g. other frequencies by extrapolation. A new technical application may, however, challenge the basis for such portability, as various signal characteristics may be different.¹

Such potential situations currently exist with the emerging 3rd generation mobile phones (UMTS) as well as different broadband applications. The ability to respond to the question of portability between already existing situations and emerging ones rests on a co-ordinated effort of evaluation and, as the need is seen, further research efforts.

¹ For example, current research efforts into possible adverse health effects of specific GSM-type signals were at least partly launched because of uncertainty in the portability of previous data on e.g. continuous wave, 2.45 GHz signals to pulsed, 0.9 GHz GSM signals

Substantial research efforts concerning the possibility of adverse health reactions to low-level electromagnetic field exposures are currently ongoing in most European countries, both within the 5th Framework Programme and under the umbrella of national programmes in some countries. These national programmes have been closely linked to and co-ordinated by previous COST Actions devoted to “Biomedical Effects of Electromagnetic Fields”, and have, in some cases, been initiated at least partially in response to these earlier COST Actions.

Both harmonisation of standards development and research into adverse health effects of electromagnetic fields are carried out globally. European research is, however, prominent in this respect.² The co-ordination efforts and the forum for scientific exchange that were provided by earlier COST Actions have contributed to the strong standing of European research in this field. This has also been indicated by the increase attention given to European programmes, including previous COST Actions, from outside Europe.

With the increasing spread of many sources of exposure, essentially out of (perceived) control of many individuals, there is increased concern among the public, especially among those who do not receive or perceive the immediate advantages of this development.³ Thus, the basis for the guidelines and/or the ability of them to cover new situations (by extrapolation) is challenged in the public debate.

Various precautionary approaches to public protection from electromagnetic fields have been adopted in some countries in Europe and elsewhere. These precautionary approaches have been adopted at least partially for political reasons. There is a need for a co-ordinated discourse of the scientific background for such approaches, in order to assess the advantages and disadvantages of these approaches. The relationship between these non-regulatory precautionary strategies and the Precautionary Principle as expressed by the European Commission on February 2, 2000 is also relevant. An independent European science-based forum for discussion on such issues could form a valuable basis for risk communication efforts in order to respond to these public concerns.

In the European Council recommendation⁴ of July 1999, the member countries were recommended to support research into electromagnetic fields and health, and to inform the public about these matters. It is understood that compliance issues with national standards and guidelines (mostly based on the European Council recommendation) and direct efforts of risk communication are best dealt with at the national level (the principle of subsidiarity). However, due to new communication technologies, our world becomes more and more inter-linked and any national action will be compared at least to actions of neighbouring countries. Furthermore, expertise in this interdisciplinary and specialised research area is not spread evenly among member states, and needs to be co-ordinated. If not, divergence in compliance issues and in risk communications may create confusion and actually work contrary to intentions of the EU Recommendation. The inclusion in this Action of both European Union and Eastern European countries that apply for membership in the Union will also enhance further harmonisation of guidelines and safety considerations.

Within the International Electromagnetic Field Project of the World Health Organisation (WHO), harmonisation efforts are under way to achieve international agreement on a common framework for guideline development. As WHO will have to provide a broad umbrella for world-wide activities, a concerted European input will be very valuable.

² In the WHO EMF database on ongoing research, about 50% of reported projects were European (Sept 2000).

³ Currently, increased opposition from various groups to the deployment of base stations for mobile telephone systems can be found in several European nations.

⁴ Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz – 300 GHz. Document 8550/99, July 5th, Bruxelles.

B. Objectives and benefits

The main objective of the Action is to obtain a better understanding of possible health impacts of emerging technologies, especially related to communication and information technologies, that may result in exposure to electromagnetic fields.

Some secondary objectives of the Action are the providing of:

- a scientific evaluation of available data for use by various decision makers involved in risk management of electromagnetic fields,
- a basis for risk communication efforts related to emerging technologies, electromagnetic fields and possible health risks, and
- data on electromagnetic field exposures related to emerging technologies on a European level,

A major benefit of this action will be to enable a common response across European nations at an early stage of the technical development. In addition, the fact that this Action will be composed primarily of individuals from the European research community will also facilitate early initiation of research efforts where such are deemed appropriate.

The community added value of this Action will be the:

- early onset of relevant research for unresolved or emerging issues of electromagnetic field exposures and possible health risks,
- provision of independent information on matters of public concern, and
- provision of independent advice to the relevant authorities at the national and European level.

In these ways, this Action will also contribute to improved conditions for further technical and industrial development, because it will increase the concordance, and an acceptance of this concordance, between technical development and public health.

C. Scientific programme

In order to fulfil these objectives, the scientific programme of the Action will:

- Monitor development of emerging technologies where major changes in public or occupational exposure to electromagnetic fields are likely.
- Investigate the possibility of health issues related to such exposures, and, where appropriate, define specific research efforts that may be needed.
- Evaluate the scientific basis for new exposure situation and/or health issues. Co-operation with other international bodies having similar aims will be important.

The emphasis of this activity will be towards various information and communications technologies, but attention should also be given to other areas such as electronic surveillance or identifications systems, transport systems and medical applications. Further developments in these are likely to cause changes in exposure, and may have issues in common (e.g. pulsed fields). This new COST Action should be responsive to emerging problems and react flexibly if a new prominent issue in this field is identified.

The actual activities of the Action include the following:

- providing a forum for interdisciplinary discussion between researchers, and between researchers and representatives of various organisations (national and international authorities, industries, etc.)
- forming, as appropriate, Short Term Missions or Task Groups in order to further elucidate specific issues. Such issues can arise from the discussion within the Action, or by external requests from appropriate bodies.

Some issues require a more general approach, such as the trend towards broadband sources, more ubiquitous exposure etc. Accordingly, the activity within this new Action should also attempt to develop a scientific understanding of these general issues, which can be applied to more detailed and concern-triggered questions. Some currently important examples which all relate to telecommunication issues are:

- Is a pulsed radiofrequency signal more biologically effective than a non-pulsed signal, when both have the same average power.
- Can the biological effect of a broadband signal be evaluated by the sum of narrow-band components?
- Is the effect of local exposure to radiofrequency fields varying with the detailed localisation of such exposure, e.g. within different structures in the head?

It should be emphasised that the ability to generalise the answers to such questions largely rests on the knowledge about the underlying biophysical and biological mechanisms. Thus, further scientific hypotheses, experimental results and discussions about mechanisms of interaction will be needed. As appropriate, the Action will devote review activity to this.

It is foreseen that one urgent issue is the providing of an improved scientific basis for discussing the 3rd generation mobile phone system. Because of this, the initial scientific activity of the Action should include the following:

- A workshop on the portability of results from recent biological studies on the 2nd generation (GSM) phones to 3rd generation (UMTS) phones. This will continue and further focus the discussion recently held in Bad Münstereifel, Germany (December 2000).
- Further activity, within a Short Term Mission, on characterising the exposure of the general public to radiofrequency fields. The exact aim of this STM should be subject to further discussions in the MC and between prospective participants, and will be influenced by the actual budget of the Action. If possible, it should address measurements, calculations and dosimetry in the vicinity of base stations, and should allow a comparison between base station derived exposure and exposure from other sources such radio- and television transmissions. An estimate of the likely change in public exposure due to the deployment of UMTS base stations may also prove valuable.

These activities could provide a basis for information dissemination activities by the relevant parts of the European Commission.

Accordingly, the Action will monitor emerging technologies in terms of electromagnetic field exposures and evaluate the scientific basis for health issues arising from these. Collaboration with other COST Actions devoted to such technological developments, particularly in mobile communications, will greatly enhance the viability of the Action. This Action will serve as a platform for collecting, exchanging and discussing information that may be used in risk communication and will also constitute an active information source to both policy makers and the general public.

Other relevant activities likely to occur during 2001, are the preparation, by ICNIRP, of advice on electromagnetic exposure to Electronic Article Surveillance Systems and similar devices, and a planned workshop on thermophysiology as related to radiofrequency exposure.

Several potential COST Action members participate in these activities, and the results should provide a background for further activities within the Action. Likewise, a combined Japanese-Korean-European (and possibly US) workshop is planned for late 2001, with active participation of several Action members.

It should be clearly recognised that the responsibility for further development of guidelines or standards rests with organisations such as ICNIRP or CENELEC, the European Commission and national authorities. Likewise, formal evaluations of compliance issues are the responsibilities of competent national bodies. The Action may however, as a result of its work, suggest the need for such activities to relevant organisations.

The scientific programme of this Action will draw from the experience developed under earlier COST Actions devoted to “Biomedical Effects of Electromagnetic Fields “ (COST 244 and OST 244bis).

D. Organisation and timetable

The organisation of this Action is based on the COST 400/94 document on Rules and Procedures. The substantial European expertise brought together by the co-ordination efforts of previous COST Actions in this field (COST 244 and COST 244bis) should provide a major source of expertise also for this Action. Due to the specified objective of this Action, further professional resources will be needed, especially in terms of detailed knowledge of ongoing technical developments. To meet this, invitations will be extended to a/ individuals of other relevant COST Actions, b/ representatives of other relevant organisations such as ICNIRP and CENELEC, and c/ representatives of industry organisations such as the MMF and the GSM Association to participate, with observer status, in the meetings of this Action. Such invitations will be issued both for the duration of the Action and for specific meetings, as appropriate.

The various tasks of this Action can be met by the following overall structural elements:

- Vertical co-ordinators with a mission to extend liaison with industry or industry organisations relevant to specific technologies. The details of this should be left to the MCM, but it can be initially foreseen that such vertical co-ordinators should be appointed for mobile telephony and for electronic article surveillance systems.
- Working groups (WG) with primarily scientific orientation, e.g. for dosimetry and biophysical mechanisms, for non-human experimental studies and for human studies.
- Short Term Missions (STM) as appointed by the MC on the basis of a need for further studies or evaluations. As already indicated, one such STM could be devoted to various exposure issues around base stations.
- Task Groups (TG) as the need arise for summarising the available knowledge on a specific topic, e.g. due to an external request for such a summary.
- A Steering Group (SG) formed by the MC Chairs and Secretary, the Vertical co-ordinators and the Chairs of the WG, STMs and TGs.

The experience from the previous COST 244 and COST 244bis Actions will be used to develop an appropriate organisational form.

A graph of the structure of the Action is given in figure 1.

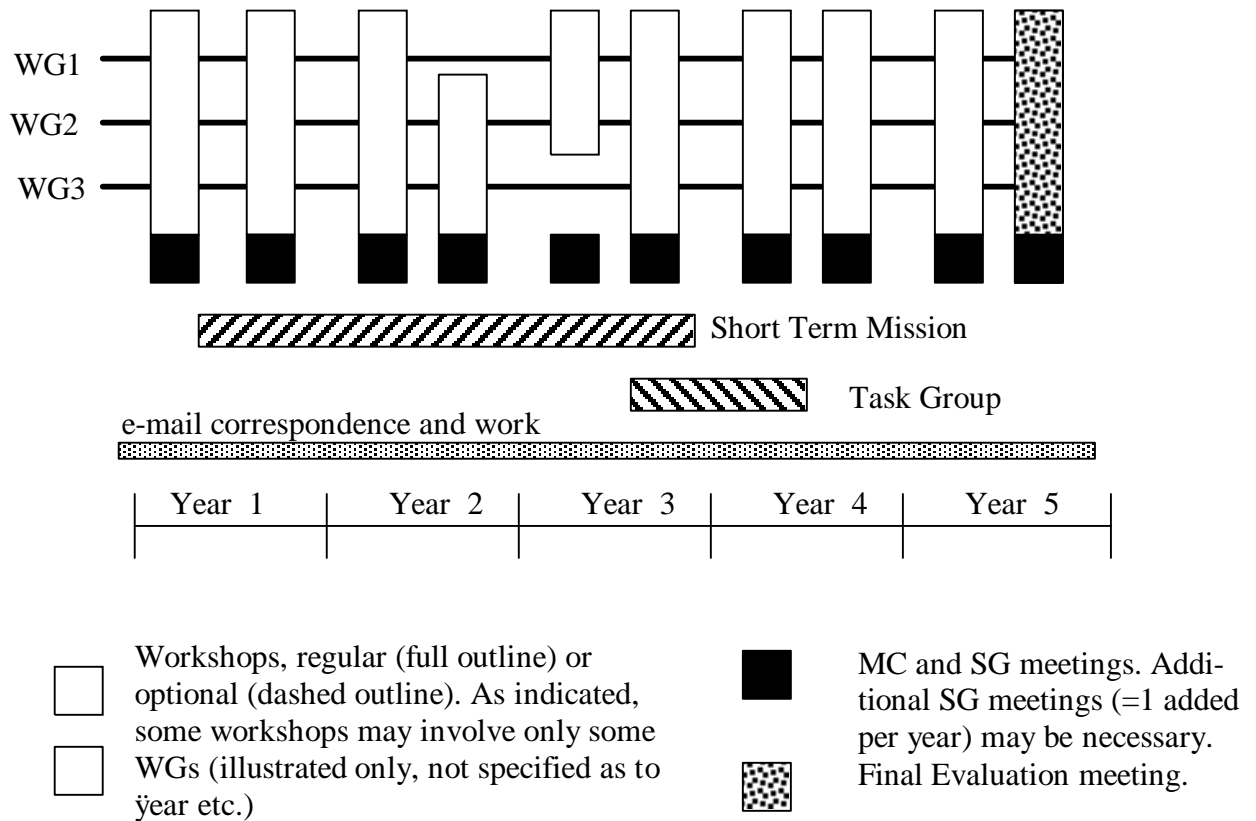


Figure 1. Graph of the proposed organisation and timetable of the Action.

As indicated in Figure 1, workshops will be held 1-2 times per year. The actual decision on the number of workshops will be left to the decision of the MC, and based on the need for discussion on specific topics, the budget, as well as the balance between resources (time and personnel) spent on workshops and STMs/TGs. There will be 2 MC per year, at which time the Steering Group will also meet. As the need arise, there may be additional SG meetings. The placement and duration of the STMs and the TGs are decided in consultation between the SG and the participants (the placements in Figure 1 are for illustration purposes only).

The timetable of the Action is, as is suggested in Figure 1, flexible within the constraints of the need for regular meetings of the MC and the workshops. The SG is responsible for the continuing contact between various activities.

The nature of this Action is such, that good contact with industry is essential for the success of the work. As already indicated, this will be met both by appointing Vertical Co-ordinators for specific technology-oriented areas, and by invitation to outside organisations including industry to participate in the work. This could take the form of invitation to branch organisations to participate in the MC meetings. At the same time, the contentious nature of the topic (EMF and health) makes it important to discuss the extent and the limitation of industrial participation. The MC will, at its first meeting, address this issue. Presumed components of such a decision could include transparency (declaration of vested interest of participants in TGs or STMs) and limitation of participation in certain activities etc.

The duration of the Action is five years. It is based on the fact that while the technical development may be fast, the actual deployment of new systems will take time, and thus may sometimes delay the emerging of some issues. In addition, a number of new issues are foreseen. The time schedule also contains adequate margins for the onset of various activities.

E. Economic dimension

Scientists from the following COST countries have actively participated in the preparation of this Action: Austria, Finland, France, Germany, Italy, Sweden and the UK.

On the basis of national estimates provided by the representatives of these seven countries and taking into account the co-ordination costs covered by the COST budget of the European Commission, the overall cost of the research activities likely to be carried out under the Action has been estimated, in 2000 prices, at roughly 15 Million € per year or 75 Million € for a 5 year period.

This is derived from the following assumptions on cost:

- Cost for Senior Researcher, including social costs etc.: 80 000 ?/year
- Cost for Junior Researcher (PhD student): 60 000 ?/year
- Cost for Assistant: 50 000 ?/year
- Auxiliary cost, laboratory etc, adds 50% to personnel cost
- For each Senior Researcher, one Junior Researcher and one Assistant is assumed.

These estimates amount to about 285 000 ?/year for each Senior Researcher (with staff and auxiliary costs). These costs are summed in the following table:

Country	Assumed number of senior researchers	Total cost
Austria	3	855 000 ?/year
Finland	5	1 425 000 ?/year
France	8	2 280 000 ?/year
Germany	10	2 850 000 ?/year
Italy	10	2 850 000 ?/year
Sweden	8	2 280 000 ?/year
UK	8	2 280 000 ?/year
Total per year	52	14 820 000 ?/year

This estimate includes the total personnel and auxiliary cost for research into biological and health aspects of electromagnetic fields over the full frequency range of 0 Hz to 300 GHz, as this research activity and the (national) resources on which it relies forms the basis for the more specific activities and co-ordination efforts in this Action. (The estimate does not include the costs of industrial developments.)

The estimate is valid under the assumption that all the countries mentioned above will participate in the Action. Any departure from this will change the total cost accordingly.

F. Dissemination

The dissemination of the results of this Action will be obtained by:

- Workshops and seminars, where the target audience is expected to be primarily researchers (European and others).
- Newsletters and proceedings from these workshops, where the target audience is composed of researchers as well as representatives of national or local health authorities, industry representatives, consumer organisations etc.
- A web-site, with primarily similar target audiences as above, but where the possibility of additional audience should be encouraged.

- Summary reports and publications to policy makers, which should be made available also to the general public. In these summary reports, main scientific publications that has arisen from the Action will be listed and briefly described.

After consultation with other organisations on the European level, scientific summaries will be provided as a basis for more widely disseminated information activities, e.g. to the general public. Thus, the Action should be seen as a resource on the biological impact of EMF to appropriate bodies at community and national level.

Plans for the dissemination of the results of this Action include workshops and seminars, proceedings from these as well as reports from STMs and TGs. Short summaries of these will be found in newsletters with a wide circulation to both scientists and other organisations. Reports on ongoing work as well as the results of the activities will be posted on the web, for maximum dissemination. Regular reports on relevant issues within this field, and containing a listing of relevant publications arising within the Action, will be provided for policy makers.

Results of the Action will also form a basis for public communication efforts. The actual production of such leaflets etc. falls outside of the direct responsibility of the Action. Members of the Action could, however, participate in such efforts, as agreed upon.