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Project acronym: SAFE EMF

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Instrument: Specific Support Action

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1 Publishable executive summary

1.1 Summary of the project

The main objective of the SAFE EMF project is to upgrade the research capacity of the Centre for Electromagnetic Compatibility at the Faculty of Electrical Engineering, Ss. Cyril and Methodius University, Skopje, in terms of equipment, methodologies, and human potential, to approach the standards of high quality EU research centres for health effects of human exposure to electromagnetic fields (EMF).

Numerous EMF sources have become the focus of health concerns, including power lines, and most recently mobile phones and base stations of existing and emerging wireless technologies. The project's general aim is to support safe integration of mobile and wireless technology in FYROM and wider in Western Balkan Countries and to enable highest EU quality level research on possible adverse effects on brain functions due to exposure to radiofrequency EMF.

The objectives of the project are aimed to:

- Assessment of the existing EMF especially in cases of radiation from multiple sources typical for rural and urban areas.
- Initiate and support legislative process (the regulations that control EMF exposure in FYROM and wider in the region are obsolete and incomplete). The project will provide: documents for implementation of required EU and national standards and regulations, and equipment and procedures for control of the conformance to safety limits.
- Enable possibilities to reach the high level research standard comparable with EU Member States, in order to participate in existing (FP6 EMF-NET, EC COST281 Action) and forthcoming (FP7) international joint research projects and networking, in close cooperation with the Pediatric Clinic in Skopje on possible health effects, especially changes in brain functions in children due to EMF exposure by complementing existing specialized experimental equipment and expertise.
- Establish a regional expertise centre enabling use of the measuring equipment in the region of Western Balkan Countries.
- Training and recruiting young researchers.

To reach the objectives of the SAFE EMF project the activities are distributed in a set of 7 Work Packages (WP):

- The objective of the WP1 is to employ three young researchers (pre and post graduating positions) in order to reach the critical mass of human resources of the Centre for Electromagnetic Compatibility and to ensure the sustainable development of CEMC planned research activities. Their work will be closely connected with the project objectives and needs of CEMC to approach standards of highest quality EMC EU research centers.



- Upgrading of the S&T equipment is the objective of WP2. This will include: acquiring knowledge for choice of equipment based on advice from experienced laboratories of EU NP, precise specification, purchase and setup of the required S&T equipment for different planned tasks.
- WP 3 deals with the initiation and support of the legislative process. This will provide a detailed study of EU standards in the area, an advisory document and roadmap for implementation of the harmonization of national regulations with EU.
- WP 4 is devoted to training of young researchers at CEMC and at laboratories of EU NP. This will also include visits of CEMC Senior researchers to EU NP to get acquainted with the state-of-the-art methodologies and prepare for training of young researchers and also to prepare cooperative research with EU NP, the latter will continue during visits on EU NP experts to CEMC.
- In WP 5 preparation for experimental studies of EMF health effects and especially influence on brain functions at the premises of the Local NP 5 will be done. This will include preparation for experimental setup with a help of experts from EU NP, and will prepare highest level interdisciplinary research.
- Dissemination of project results is the objective of WP 6. This will include dissemination of results on local, regional, EU level, with goals to attract young researcher to future research activities, to enable networking with centres of similar or interdisciplinary interest on local, regional and EU level and also to raise awareness of general public).
- The last workpackage WP 7 are the overall management activities of the project.

In that respect, SAFE-EMF coordinated actions will provide smooth achievement of its objectives:

- The main objective is to upgrade S&T equipment for measurements of RF EMF. The upgraded S&T equipment will complement existing specialized modern experimental equipment at the Centre for Psychophysiology and Metabolic Diseases at the Pediatric Clinic of the Faculty of Medicine. Such inter-institutional networking by complementing equipment and expertise will enable interdisciplinary research of highest priority: studies of cognition and changes in electroencephalograms in children exposed to EMF.
- Transfer of knowledge from highest level centres in EU Member States is necessary for the following tasks: choice of equipment; implementation of advanced methodologies; and study of the EU legislative documents.
- Training and recruiting of young researchers. Training and recruiting of three young researchers (pre- and postdoctoral positions) will be of crucial importance for the Project implementation, which will provide sustainable development of the CEMC research activities.
- SAFE-EMF will provide documents describing the necessary EU standards, and supportive regulations at the national level with practical implementation and roadmap that will help Ministry of environment and physical planning to initiate and support the legislative



process. Due to the similar situation in the region (Kosovo and Serbia and Montenegro) the support of the legislative process will have a regional impact.

- The Project will promote networking and cooperation on regional and global level: firstly, networking between Western Balkan Countries institutions who share the similar general situation; and secondly, with highly competent EU institutions. This will increase the potential of the scientists of the Centre to participate in joint EU research projects (EMF-NET, COST281) and next European Framework Program. The services and resources of the Centre will provide a Centre of expertise in the region.

During the first twelve months of the project, the following work has been performed:

WP1: Three free positions for young researchers at CEMC for PhD students graduated and under graduated students **were announced**. The **selection of the best of the applicants** was according to their: graduation level, overall exam marks, their experience in research projects and other related activities. The 3 most successful applicants (out of 11 eligible) were selected and temporally job contracts were signed with them. A **detailed plan of implementation and control of training process** of the recruited young researchers was prepared. The detailed training plan for the recruited young researchers is deliverable D1, and the summary report for requiring the young researchers makes deliverable D2. These reports are part of this annual report.

WP2: In order to acquire knowledge about the **choice of generic equipment** and technical characteristics for measurements, two visits to two EU networking partner laboratories were performed. Also consultations with experts were done. Upon the gained knowledge, the best available **supplier for the chosen equipment was selected**. The purchasing of the selected equipments is in its final stage. As soon as this process will be over, the installation of the equipment will follow together with the adaptation of the existing and the new equipment for the needs of the project. The development of supportive information materials in national language (guides for using the equipment and guide for implementation of new measurement methodologies suitable for various environments with single and multiple EMF sources) is done in draft form.

WP3: The **EU standards and supportive regulations** (IEC and CENELEC) have been carefully studied. As result of this activity **advisory documents for initiation and support of legislative process** have been prepared. These will help Ministry of environment and physical planning to initiate and realize the legislative process in FYROM. Advisory document on harmonization of standards and legislation in FYROM with EU in the field of EMF exposure limitations has been prepared and this document makes deliverable D6.

WP4: The **training program has been prepared**. This includes definition of number of participants, provision of a plan of training, place and duration of visit. However, the training activities in advanced methodologies and measurement procedures will start right after the purchase of the equipment will be completed. This activity will be followed by a summary report to the participants with the results of each training program.



WP5 and WP6 are planned for the second year of the project.

WP7: To establish the SAFE EMF partner's network a **start-up meeting** was performed mainly by e-mail correspondence. The visits to the EU partners were used also for the purpose of this task. **Project planning and monitoring is done** by the respective WP-managers on regular (weekly) basis. **Workshop management and moderation** is planned for the second year of the project. Concerning the **administrative coordination**, the coordinator provided templates and forms for a simplified administrative coordination of the project. The **internal and external reporting** is done regularly. The **final plan for using and disseminating knowledge** gained during the project life, as well as obtaining an **audit certificate** is planned for the second year of the project.

During the second fifteen months of the project, the following work has been performed:

WP1: Finished during the first project year.

WP2: Upon the gained knowledge, the best available equipment was selected during the first project year. The chosen **equipment was purchase** and delivered during the second project year. The development of supportive information materials in national language (guides for using the equipment and guide for implementation of new measurement methodologies suitable for various environments with single and multiple EMF sources) was finished during the first project year.

WP3: Finished during the first project year.

WP4: The **training program has been prepared**. This includes definition of number of participants, provision of a plan of training, place and duration of visit. However, the training activities in advanced methodologies and measurement procedures started right after the selection of the equipment was completed. Three senior researchers and three young researchers from CEMC **realized visits** to project Networking partners, specialized summer schools and seminars. During the project second year, especially during 2009 year, the intensive training in measurement procedures with new equipment was realized for young and senior researchers at facilities of CEMC. This activity was followed by a summary report to the participants with the results of each training program.

WP5: **Training in advanced methodologies for experimental studies of EMF health effects** for young and senior researchers from CEMC was guided and supervised by Prof. Leonid Grcev and Prof. Dr. Nada Pop-Jordanova from Department of Psychophysiology at Faculty of Medicine in Skopje.

WP6: In the frame of the **dissemination activities** of the project the **web site** of the Centre for Electromagnetic Compatibility was established to present the new research capabilities of CEMC as a regional expertise centre for health effects of EMF on humans, especially describing services and resources that can be used in the region. The web site will be the media for permanent dissemination of the project results even after project completion. The **flyers and other marketing materials** were prepared for **presenting CEMC** and SAFE EMF project



at national, regional and EU Conferences and Seminars in relevant area and **during workshops** organised in Skopje and three neighbouring countries Albania, Serbia and Kosovo. WP7: To establish the SAFE EMF partner's network a **start-up meeting** was performed mainly by e-mail correspondence. The visits to the EU partners were used also for the purpose of this task. **Project planning and monitoring is done** by the respective WP-managers on regular (weekly) basis. Concerning the **administrative coordination**, the coordinator provided templates and forms for a simplified administrative coordination of the project realized with participation of Administrative department of the Faculty of Electrical Engineering and Information technologies in Skopje. Unfortunately, as the Start-up meeting, and the final meeting for evaluation of project results and deliverables was performed mainly by e-mail with EU networking partners and thorough two individual visits from EU partners professors at the end of 2008. The **internal and external reporting** was done regularly. The **final plan for using and disseminating knowledge** gained during the project life, as well as obtaining an **audit certificate** was finished during the second year of the project.

In conclusion, in the opinion of the SAFE EMF team (the Project Coordinator and the WP managers), the work in the project runs smoothly, according to plan and most of the objectives are successfully met in time.



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2 Project objectives and major achievements during the reporting period

The main objective of the SAFE EMF project is to upgrade the research capacity of the Centre for Electromagnetic Compatibility at the Faculty of Electrical Engineering, Ss. Cyril and Methodius University, Skopje, in terms of equipment, methodologies, and human potential, to approach the standards of high quality EU research centres for health effects of human exposure to electromagnetic fields (EMF).

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- Initiate and support legislative process (the regulations that control EMF exposure in FYROM and wider in the region are obsolete and incomplete). The project will provide: documents for implementation of required EU and national standards and regulations, and equipment and procedures for control of the conformance to safety limits.
- Enable possibilities to reach the high level research standard comparable with EU Member States, in order to participate in existing (FP6 EMF-NET, EC COST281 Action) and forthcoming (FP7) international joint research projects and networking, in close cooperation with the Pediatric Clinic in Skopje on possible health effects, especially changes in brain functions in children due to EMF exposure by complementing existing specialized experimental equipment and expertise.



- Establish a regional expertise centre enabling use of the measuring equipment in the region of Western Balkan Countries.
- Training and recruiting young researchers.

To reach the objectives of the SAFE EMF project the activities are distributed in a set of 7 Work Packages (WP):

- The objective of the **WP1** is to employ three young researchers (pre and post graduating positions) in order to reach the critical mass of human resources of the Centre for Electromagnetic Compatibility and to ensure the sustainable development of CEMC planned research activities. Their work will be closely connected with the project objectives and needs of CEMC to approach standards of highest quality EMC EU research centres.
- Upgrading of the S&T equipment is the objective of **WP2**. This will include: acquiring knowledge for choice of equipment based on advice from experienced laboratories of EU NP, precise specification, purchase and setup of the required S&T equipment for different planned tasks.
- **WP 3** deals with the initiation and support of the legislative process. This will provide a detailed study of EU standards in the area, an advisory document and roadmap for implementation of the harmonization of national regulations with EU.
- **WP 4** is devoted to training of young researchers at CEMC and at laboratories of EU NP. This will also include visits of CEMC Senior researchers to EU NP to get acquainted with the state-of-the-art methodologies and prepare for training of young researchers and also to prepare cooperative research with EU NP, the latter will continue during visits on EU NP experts to CEMC.
- In **WP 5** preparation for experimental studies of EMF health effects and especially influence on brain functions at the premises of the Local NP 5 will be done. This will include preparation for experimental setup with a help of experts from EU NP, and will prepare highest level interdisciplinary research.
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- The main objective is to upgrade S&T equipment for measurements of RF EMF. The upgraded S&T equipment will complement existing specialized modern experimental equipment at the Centre for Psychophysiology and Metabolic Diseases at the Pediatric Clinic of the Faculty of Medicine. Such inter-institutional networking by complementing



equipment and expertise will enable interdisciplinary research of highest priority: studies of cognition and changes in electroencephalograms in children exposed to EMF.

- Transfer of knowledge from highest level centres in EU Member States is necessary for the following tasks: choice of equipment; implementation of advanced methodologies; and study of the EU legislative documents.
- Training and recruiting of young researchers. Training and recruiting of three young researchers (pre- and postdoctoral positions) will be of crucial importance for the Project implementation, which will provide sustainable development of the CEMC research activities.
- SAFE-EMF will provide documents describing the necessary EU standards, and supportive regulations at the national level with practical implementation and roadmap that will help Ministry of environment and physical planning to initiate and support the legislative process. Due to the similar situation in the region (Kosovo and Serbia and Montenegro) the support of the legislative process will have a regional impact.
- The Project will promote networking and cooperation on regional and global level: firstly, networking between Western Balkan Countries institutions who share the similar general situation; and secondly, with highly competent EU institutions. This will increase the potential of the scientists of the Centre to participate in joint EU research projects (EMF-NET, COST281) and next European Framework Program. The services and resources of the Centre will provide a Centre of expertise in the region.

There are no recommendations from previous review periods in the project and the work in the project runs smoothly, according to plan and most of the objectives are successfully met in time. Major achievements during the second project year were: purchase of the planned equipment; realization of planned trainings of senior and young researchers of CEMC; finished dissemination activities of promoting SAFE EMF project and CEMC as a regional centre of expertise in the area of health effects of human exposure to electromagnetic fields; delivered all documents planned in the project.

The work and the actions that have been performed during the second reporting period will be briefly explained in terms of fulfilled activities for different work packages.



3 Workpackage progress of the period

3.1 WP 1: Recruiting of young researchers

Work package number	WP 1	Start date or starting event:	M1
Activity type	Activities specific for the Support Action		
Participant ID	1		
Start date	1 June 2007		
Completion date	1 November 2007		
Current status	Completed		
Person-months per participant	1		

3.1.1 Objectives

The objective of the first WP is to employ three young researchers (pre and post graduating positions) in order to reach the critical mass of human resources of the Centre for Electromagnetic Compatibility and to ensure the sustainable development of CEMC planned research activities. Their work will be closely connected with the project objectives and needs of CEMC to approach standards of highest quality EMC EU research centres.

3.1.2 Description of Work Scheduled for the First Year of the Project

T1.1 Announcement of three free positions for young researchers at CEMC for PhD students, graduated and under graduated students.

T1.2 Selection of the best of applicants according to their: graduation level, overall exam marks, their experience in research projects and other related activities.

T1.3 Signing temporally contracts with the young researchers.

T1.4 Preparation of the detailed plan of implementation and control of training process of recruited young researchers.

Detailed description (on task level) of progress achieved during first reporting period with reference to planed objectives:

In order to reinforce the research capacities in terms of human potential of the Centre for Electromagnetic Compatibility three free positions for young researchers at CEMC for PhD students graduated and under graduated students **were announced**. The **selection of the best of the applicants** was according to their: graduation level, overall exam marks, their experience in research projects and other related activities. The 3 most successful applicants (out of 11 eligible)



were selected and temporally job contracts were signed with them. The young researchers are chosen to be specialized in three complementary disciplines to enable multidisciplinary research:

- 1) Biljana Gjonevska, specialization in medicine,
- 2) Spase Petkoski, specialization in electrical engineering and ICT
- 3) Milivoj Simeonovski, specialization in informatics and computer software.

A **detailed plan of implementation and control of training process** of the recruited young researchers was prepared. The detailed training plan for the recruited young researchers is deliverable D1, and the summary report for requiring the young researchers makes deliverable D2. These reports are part of this annual report.

Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any): Small deviations from the planed project activities occurred due to the summer vacations and some administrative barriers. Corrective actions have been already performed and the procedure for recruiting the young researchers was speed up. The expectation is that despite the small time delay at the beginning of the Project, the planed follow up activities will be completed in time.

3.1.3 Milestones and Deliverables

Milestones

Milestone No.	Milestone name	Date due	Actual delivery date
1	Three young researchers are employed and already have assignments in the project.	31.09.2007	01.11.2007

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
1	Detailed training plan for recruited young researchers	31.09.2007	30.01.2008
2	Summary report for requiring the young researchers	31.09.2007	30.01.2008



3.2 WP 2: Upgrading S&T equipment

Work package number	WP 2	Start date or starting event:	M1
Activity type	Activities specific for the Support Action		
Participant ID	1		
Start date	1 April 2007		
Completion date	31 January 2009		
Current status	Completed		
Person-months per participant	6		

3.2.1 Objectives

The main objective of the project is to upgrade existing equipment for measuring power frequency EMF and to extend the capacities of CEMC with equipment for measurement of radio frequency EMF in various environments (residential, occupational) with a comprehensive analysis of the characteristics and levels of the EMF of different sources and frequencies. This will also provide equipment for control of the compliance with security limits of already installed EMF radiating systems in accordance with regulations, which will support the legislative process.

The equipment for measurements in two frequency ranges (LF and RF) is for four distinct activities:

ACTIVITY 1: Fields tests of conformance to safety limits (according to international ICNIRP Recommendations) near base stations of mobile phones and terminal stations of other wireless technologies (choice of the equipment should also take into account the emerging technologies);

ACTIVITY 2: Fields tests of conformance to safety limits (according to international ICNIRP Recommendations) near power lines and power frequency home and office appliances;

ACTIVITY 3: Broadband analysis of “electrosmog” from different sources in residential and occupational environment (especially in children’s and other sensitive environment: schools, kindergartens, playgrounds, hospitals, public parks, etc.); including spot and long-term assessment.

ACTIVITY 4: Laboratory measurements of near fields at power frequency and from mobile phones (and their base stations) for analysis of possible effects on brain functions (cognition and effects on electroencephalograms).

Required equipment will consist of 5 sets for all required measurement:

SET 1: Selective radiation meter with demodulation of UMTS P-CPICH pilot channels, and triaxial probe and optical interface for probes (ACTIVITY 1)

SET 2: Magnetic and electric field meter and triaxial probe (5 Hz – 100 kHz) with B-field and H-field sensors (ACTIVITY 2)

SET 3: Spectrum analyzer, log-periodic antenna and biconic antenna (ACTIVITY 3)

SET 4: Area monitor station with E- field probes (ACTIVITY 3)

SET 5: Probes for near electric and magnetic fields (ACTIVITY 4)



3.2.2 Description of Work Scheduled for the First Year of the Project

T2.1 Choice of equipment. Visits to two of EU networking partner laboratories and consultations with experts are planned to acquire knowledge about the choice of generic equipment and technical characteristics for measurements in two distinct ranges, power and radio frequencies.

T2.1.1 Preparation of visits to networking partner's laboratories, making agenda of the visit with detailed plan of meetings with pre identified experts and technical arrangements of the visits.

T2.1.2 One week visit to each EU partner laboratory.

T2.2 Launching the tender for chosen equipment.

T2.2.1 Production of tender documentation.

T2.2.2 Announcement of the tender.

T2.2.3 Choice of supplier.

T2.3 Purchasing and installation of the equipment.

T2.4 Adapting of existing and new equipment for the needs of the project.

T2.5 Development of supportive information materials in national language, guides for using the equipment and guide for implementation of new measurement methodologies suitable for various environments with single and multiple EMF sources.

Detailed description (on task level) of progress achieved during first and second reporting period with reference to planned objectives:

In order to acquire knowledge about the choice of generic equipment and technical characteristics for measurements, four visits to four EU networking partner laboratories were performed during the first project year. Professor Grcev visited NP1 in The Netherlands, NP3 in Slovenia and NP4 in Switzerland, while Professor Kacarska visited NP2 in France. The reports from the visits to the EU partners were given in Annex 1 of final activity report.

Concerning the choice of the equipment consultations with experts were done during the first project year. Upon the gained knowledge, the best available supplier for the chosen equipment was selected. The report concerning the chosen equipment was given in Annex 2 of final activity report.

The purchasing of the selected equipments was finished in the second project year. The installation of the equipment, together with the adaptation of the existing and the new equipment for the needs of the project was finished in the period January - May 2009. The development of supportive information materials in national language (guides for using the equipment and guide for implementation of new measurement methodologies suitable for various environments with single and multiple EMF sources) in the final version was completed in January 2009. These guides prepared in report forms make the deliverables D3 (Specification of technical characteristics of chosen measuring equipment), D4 (Guide for implementing the new measurement methodologies in national language) and D5 (Guides for using the equipment in national language).



Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any): The planned purchase of the equipment was not completed in the first project year and consequently the deliverable D5 (Guides for using the equipment in national language) was completed in draft form. The equipment was purchased and installed during the second year of the project and deliverable D5 was finished in final version with a delay.

3.2.3 Milestones and Deliverables

Milestones

MS No.	Milestone name	Date due	Actual delivery date
2	The upgrade of the equipment for measurement of power and radio frequencies in various environments will soon be finished. The guides for using the equipment and guide for implementation of new measurement methodologies suitable for various environments with single and multiple EMF sources are prepared in draft form.	31.05.2008	31.12.2008

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
5	Guides for using the equipment in national language (final version)	31.03.2008	31.12.2008



3.3 WP 3: Initiation and support of the legislative process

Work package number	WP 3	Start date or starting event:	M3
Activity type	Activities specific for the Support Action		
Participant ID	1		
Start date	1 September 2007		
Completion date	30 November 2007		
Current status	Completed		
Person-months per participant	6		

3.3.1 Objectives

The objective of this WP is to initiate and support the legislative process in FYROM of harmonization with EU in the field of limitations of exposure of the general public to electromagnetic fields from 0 Hz to 300 GHz.

3.3.2 Description of Work Scheduled for the First Year of the Project

T3.1 Study of the EU standards and supportive regulations. As a first step the EU accepted (IEC and CENELEC) standards will be carefully studied. The expertise and scientific help of EU NP will be invaluable in studying regulations that regulate practical conformance to safety limits of exposure to EMF from 0 to 300 GHz in their countries and regulations that sets procedures and requirements for field measurements and control of installations. The role of NP 4 from Slovenia will be crucial at this point because Slovenia as an ex-Yugoslavia country has effectively harmonized their legislative with EU starting from the same position as FYROM.

T3.2 Advisory document for initiation and support of legislative process. Preparation of an advisory document and roadmap for practical implementation that will help Ministry of environment and physical planning to initiate and realize the legislative process in FYROM.

T3.3 Specialized workshop for governmental bodies. The advisory document will be presented to all governmental bodies involved in the process: Ministry of environment and physical planning, Ministry of transport and communications, Ministry of health, Agency for electronic communications, Standardization institute.

Detailed description (on task level) of progress achieved during first reporting period with reference to planed objectives

The EU standards and supportive regulations (IEC and CENELEC) have been carefully studied. The young researchers were responsible for this task (this task is part of their training plan, please see D1 report). As result of this activity advisory documents for initiation and support of legislative



process have been prepared. The presentation of these documents is planned for the end of June 2008. These documents will help Ministry of environment and physical planning to initiate and realize the legislative process in FYROM. Advisory document on harmonization of standards and legislation in FYROM with EU in the field of EMF exposure limitations has been prepared and this document makes deliverable D6.

Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any): There are no deviations from the project work program.

3.3.3 Milestones and Deliverables

Milestones

MS No.	Milestone name	Date due	Actual delivery date
	Advisory document is produced and presented to involved Governmental bodies.	30.11.2008	30.06.2008

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
6	Advisory document on harmonization of standards and legislation in FYROM with EU in the field of EMF exposure limitations.	30.11.2008	15.05.2008



3.4 WP 4: Training of researchers

Work package number	WP 4	Start date or starting event:	M5
Activity type	Activities specific for the Support Action		
Participant ID	1		
Start date	1 November 2007		
Completion date	1 April 2009		
Current status	Completed		
Person-months per participant	15		

3.4.1 Objectives

Transfer of knowledge from a high level partner centres in an EU countries is necessary for training of senior and young researchers in new methodologies and measurement procedures suitable for new upgraded S&T equipment which includes several sets of highest specialized instruments directly connected with planned enhancement of research capacities of CEMC. The following research topics are priorities of the centre:

Statistically relevant assessment of the characteristics of the EMF in wide frequency ranges (from power to radio frequencies) in the residential and occupational environment, especially of children's environment, such as: schools, kindergartens, playgrounds, etc., and other sensitive areas, such as: hospitals, public parks, etc., in urban and rural areas.

Assessment of conformance of safety limits in regulations of existing installations.

3.4.2 Description of Work Scheduled for the First and Second Year of the Project

The whole training process of researchers from CEMC (senior and young) is represented as transfer of knowledge from SAFE EMF networking partner centres through a set of training programs realized as visits of CEMC researchers to each of partner centres and a short workshops held in Skopje during visits of partner centres representatives. Each training program is realized during three phases: preparation, realization and reporting.

T4.1 Preparation of training program. Definition of number of participants, provision of a plan of training, place and duration of visit.

T4.2 Training in advanced methodologies and measurement procedures. During the training period each young researcher will be hosted by EU NP for 2 two-week visits. Three senior researchers will make 2 two-week visits to the EU NP labs for transfer and implementation of methodologies related to the following topics:

- statistically relevant measurements of the EMF in wide frequency ranges (LF to RF) in the various environments from single and multiple sources,
- assessment of conformance of safety limits in regulations of existing installations,
- study of the EU legislative documents in EMC area.



T4.3 Summary report to the participants with the results of each training program.

Detailed description (on task level) of progress achieved during first and second reporting period with reference to planned objectives:

According to the detailed training program prepared in the first project year the researchers (senior and young) underwent a preparatory training at the home institution. This includes definition of number of participants, provision of a plan of training, place and duration of visit. The **training activities** in advanced methodologies and measurement procedures in EU partners' centres started in June 2008 with the visit of Prof. Grcev to project partner in Switzerland. In July 2008 Prof. Grcev visited Upsala University in Sweden for starting a new partnership and presented the CEMC and SAFE EMF project during ICLP2008 Conference. Assis. Prof. Vesna Arnautovski-Toseva visited the partner in France in July 2008 for acquiring new knowledge about implementation of methodologies related to the measurements in two distinct ranges, power and radio frequencies. The team from CEMC (Prof. Marija Kacarska, Assis. Prof. Vesna Arnautovski-Toseva and a young researcher Spase Petkoski) in February 2009 visited the partner in France in the frame of training program of senior and young researchers in new methodologies and measurement procedures suitable for new upgraded S&T equipment which includes several sets of highest specialised instruments directly connected with planned enhancement of research capacities of CEMC.

Three **young researchers** attend several summer schools and seminars, and made visits to project partners as follows:

1. **Spase Petkoski** has several trainings: 4th International Summer School on Emerging Technologies in Biomedicine in Patras, Greece for 1 week in July 2008; Second International Measurement Comparison in Dubrovnik, Croatia for 1 week in November 2008; LASMEA, University Blaise Pascal in Clermont-Ferrand, France for 1 week in February 2009;
2. **Biljana Gjoneska** attended 15th International Summer School of Cognitive Science in Sofia - Bulgaria for 3 weeks in July 2008 and International workshop "Open Questions in the Research on Biological and health Effects of Low-Intensity RF-EMF" in Stuttgart-Germany for 1 week in November 2008;
3. **Milivoj Simeonovski** for 2 weeks in March 2009 visited the Faculty of Information Technology, mathematics and electrical engineering; Department of telematics; The Norwegian University of Science and Technology, Trondheim, Norway.

This activity was followed by a summary report to the participants with the results of each training program.

Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any): After the small deviations from the planned start of some project activities occurred in the first project year, the planned follow up activities were completed in time.



3.4.3 Milestones and Deliverables

Milestones

MS No.	Milestone name	Date due	Actual delivery date
	The essential knowledge in implementation new measuring methodologies and procedures is gained.	30.09.2008	01.03.2009

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
7	Summary report for WP4.	30.09.2008	30.03.2009



3.5 WP 5: Preparation for experimental studies of EMF health effects

Work package number	WP 5	Start date or starting event:	M12
Activity type	Activities specific for the Support Action		
Participant ID	1		
Start date	01 March 2008		
Completion date	1 April 2009		
Current status	Completed		
Person-months per participant	12		

3.5.1 Objectives

This WP will prepare highest level research in line with high priority EU research agendas related to possible EMF health effects and influence on brain functions, especially in children. Activities in the WP are of special importance for sustainable development of CEMC since it will increase the potential of the scientists of the Centre to successful competition for research funds at EU level. Such activities are planned with close cooperation with the Centre for Psychophysiology and Metabolic Diseases at the Pediatric Clinic of the Faculty of Medicine. They already have equipment and expertise for analysis of encephalograms in children and this Project will complement equipment and expertise to enable planned research. In this Project only EMC compliant experimental setup for analysis of encephalographs functioning under EMF influence prepared. It has to be emphasized that in this Project encephalographs will be applied only on **phantom heads, but not involving human beings**, in order to analyze and mitigate effects of EMF coupling to the wiring and electrodes of the electroencephalographs, which was identified as missing in the present state-of-the-art EU studies. This is expected to be an added value in the research at the European level.

3.5.2 Description of Work Scheduled for the Second Year of the Project

The transfer and implementation of advance methodologies in laboratory measurements and experiments for analysis and mitigation of EMF coupling effects to the wiring and electrodes of the electroencephalographs is planed to be realized through two one week workshops held in Skopje in Centre for Psychophysiology and Metabolic Diseases at the Pediatric Clinic of the Faculty of Medicine with participants from CEMC and the Pediatric Clinic. Trainers will be representatives from EU NP 1 from the EMC Group from Eindhoven University of Technology, Netherlands and senior researchers from CEMC trained at EU NP 1 through two-week courses. The workshops are realized in three phases: preparation, realization and reporting.

T5.1 Preparation of training workshops. Definition of number of participants, provision of an agenda and technical arrangements.

T5.2 Training in advanced methodologies for measurement and analyzing the effects of the



coupled EMF to the wiring and electrodes of the electroencephalographs of children.

T5.3 Report to the participants with the results of each training workshop.

Detailed description (on task level) of progress achieved during second reporting period with reference to planned objectives:

The work on preparation for experimental studies of EMF health effects started earlier than it was planned with studying the available literature in the field of EMF influence on humans in all environments (home, work, medicine...). The main objectives of this WP are planned for the second year of the Project. Biljana will write this report!

Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any): There are no deviations from the project work program.

3.5.3 Milestones and Deliverables

Milestones

MS No.	Milestone name	Date due	Actual delivery date
	Synthesis report on accepted measuring methodology with new EMC compliant experimental setup.	30.09.2008	30.03.2009

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
8	Summary report for WP5	30.09.2008	30.03.2009



3.6 WP 6: Dissemination of the project results

Work package number	WP 6	Start date or starting event:	M13
Activity type	Activities specific for the Support Action		
Participant ID	1		
Start date	01.06.2008		
Completion date	30.06.2009		
Current status	Completed		
Person-months per participant	9		

3.6.1 Objectives

The objectives of this WP are to summarize the project activities and present the results and deliverables to the target public (Governmental bodies, Universities, Scientific and professional community, and general public) in FYROM and in the region (Serbia and Montenegro, Albania and Kosovo). The process cover three different ways of dissemination, (1) workshops for target public, (2) presentations at national, regional and EU Conferences and Seminars in relevant area and (3) creation of web-site. The web site of the Centre for Electromagnetic Compatibility will be the media for permanent dissemination of the project results even after project completion.

3.6.2 Description of Work Scheduled for the Second Year of the Project

T6.1 Preparing the web site and CD for the CEMC. The web site and the CD will present the new research capabilities of CEMC as a regional expertise centre for health effects of EMF on humans, especially describing services and resources that can be used in the region.

T6.2 Preparation of workshops. Invitation of participants, provision of agenda and technical arrangements of the meeting.

T6.3 The agenda for the workshop content. Presentation of ongoing results of the project (new equipment for measurement EMF of power and radio frequencies in various and complex environments, implementation of advanced measurement methodologies, contribution to national standardization and legislation process, highest quality of the researcher capacity of the centre and areas of research interests).

T6.4 Two workshops held in Skopje. Target group will be representatives from all Universities in FYROM, Ministry for environment and physical planning, Ministry of transport and communications, Ministry of health, Ministry for education and science, Ministry for economy, Agency for electronic communications, Standardization institute, and other with interest in this field.

T6.5 Three workshops held in the region. Target group will be researchers from Universities and compatible Centres in the WBC region. One workshop is planned to be held in each WBC, more



particularly: at the Faculty for electronics in Nis, Serbia and Montenegro, Faculty for Electrical Engineering in Tirana, Albania and Faculty for Electrical Engineering in Pristina, Kosovo, with main goal to establish regional networking.

T6.6 Development of the report for each workshop to the SAFE EMF networking partners.

T6.7 Promoting CEMC enhanced research capabilities in EU direct contact with possible partners in existing EU research networks (EMF-NET, COST281), with EU NP help (through: Internet services, e-mail list, inclusion of links to CEMC web site, etc.)

Detailed description (on task level) of progress achieved during second reporting period with reference to planned objectives:

The activities of this WP were planned for the second year of the Project and are successfully completed in time.

In the frame of the dissemination activities T6.1 of the project the web site of the Centre for Electromagnetic Compatibility was established to present the new research capabilities of CEMC as a regional expertise centre for health effects of EMF on humans, especially describing services and resources that can be used in the region. The web site will be the media for permanent dissemination of the project results even after project completion. The leaflets and other marketing materials were prepared for presenting CEMC and SAFE EMF project at national, regional and EU Conferences and Seminars in relevant area and during workshops organised in Skopje and three neighbouring countries Albania, Serbia and Kosovo.

In the frame of T6.5 three workshops were planned to be held in the region for the dissemination of the project results and promotion of CEMC as a regional centre of expertise centre for health effects of EMF on humans. The workshops were realised during the visits of CEMC team (Prof. Marija Kacarska, Assis. Prof. Vesna Arnautovski-Toseva and a young researcher Spase Petkoski) to the Polytechnic University of Tirana in Albania on 04.03.2009; Faculty of Electronic Engineering at University of Niš in Serbia on 11.03.2009 and Faculty of Electrical & Computer Engineering, University of Prishtina in Kosovo on 23.03.2009. The participants at the workshops were mainly researchers from visited Universities.

Unfortunately, due to their former obligations, the professors from SAFE EMF project Networking partners were not available to fulfil their planned visits to CEMC in Skopje in the frame of this WP.

Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any): There are no deviations from the project work program.



3.6.3 Milestones and Deliverables

Milestones

MS No.	Milestone name	Date due	Actual delivery date
	The web site of the Centre for Electromagnetic Compatibility is finished.	30.11.2008	31.01.2009
	The summary report of entire dissemination process of project results carried out in WP6 is delivered.	31.03.2009	30.06.2009
	The national and regional presentation of new research capacities of CEMC is delivered.	31.03.2009	30.06.2009

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
9	Project presentation (web site, CD and leaflets).	30.11.2008	31.01.2009
10	Summary report for WP6.	31.03.2009	30.06.2009



3.7 WP 7: Management of the project

Work package number	WP 7	Start date or starting event:	M1
Activity type	Management activities		
Participant ID	1		
Start date	01.04.2007		
Completion date	30.06.2009		
Current status	Completed		
Person-months per participant	5		

3.7.1 Objectives

A central system of e-mail and web-based communication and project management tools will be set up to minimize operative project management effort for the partners. CEMC will provide strong management resources to ensure the success of the project. The Coordinator will lead overall project management and communication with the European Commission. The Coordinator assistant will be responsible for the efficient administration of the project and overall coordination of the work according to the pre-defined timetable. Each work package will have an individual WP-manager assigned from CEMC senior researchers. The Management Committee (MC) consisting of Coordinator assistant and WP managers will control and review the technical progress and financial resources of the project.

3.7.2 Description of Work Scheduled for the First and Second Year of the Project

T7.1 Start-up meeting. At the beginning of the project the start-up meeting will be held to establish the SAFE EMF partner's network and to set the basis and feedback for WP1, WP2 and WP4.

T7.2 Project planning and monitoring. Technical coordination and project status will be monitored and reported for the agreed periods by the respective WP-managers, which will be on the task level detail. Some tasks may require breaking down to an "activity" (sub-task) level.

T7.3 Workshop management and moderation. The coordinator will take responsibility for the scheduling, agenda definition, moderation and documentation of workshops and meetings. The possibility for delegation of some activities is however possible e.g. for local organizational activities in the respective location. In total 4 training workshops for senior and young researchers will be held at EU networking partner centres and 2 dissemination workshops will be held in Skopje. Each workshop will be used for monitoring of the success of the project, too.

T7.4 Administrative coordination. The coordinator will provide templates and forms for a simplified administrative coordination of the project. Theses will be available for both financial and progress reporting. These must be strictly adhered to in length and detail.



T7.5 Internal and external reporting. Based on the management system deployed and relevant procedures agreed, reporting on all project levels will be performed on request or on a periodic basis. Cost statements and progress reports from the respective WP managers will be collected by the co-coordinator and consolidated for submission to the commission at mid-term (12 months) and for the final report. Coordinator is responsible for the verification of project cost statements by an authorized and approved body in his country.

T7.6 Final Plan for using and disseminating knowledge gained during the project life.

T7.7 Audit certificate obtaining.

Detailed description (on task level) of progress achieved during first and second reporting period with reference to planed objectives:

To establish the SAFE EMF partner's network a start-up meeting was performed mainly by e-mail conference correspondence. Different circumstances and the lack of mutually agreed timing between the SAFE EMF partners is the reason for this plan modification. The visits of the Project Coordinator and the WP manager to the EU partners were used also for the purpose of this task.

Project planning and monitoring during the project was done by the respective WP-managers on regular (weekly) basis. All training and dissemination workshop planed for the second year of the project were finished successfully and were used for monitoring of the success of the project, too. Concerning the administrative coordination, the coordinator provided templates and forms for a simplified administrative coordination of the project in the first project year. The internal and external reporting was done regularly. The final plan for using and disseminating knowledge gained during the project life, as well as obtaining an audit certificate were finished during the second year of the project.

Unfortunately, due to their former scheduled obligations, the professors from SAFE EMF project Networking partners were not available to visit CEMC in Skopje and to have one joint final meeting for evaluation of project activities and achieved project results. The final meeting was performed mainly by e-mail with EU networking partners and thorough two individual visits from EU partners professors to CEMC at the end of 2008. We have Prof. Dr. Michel Ianoz from Department of Electrical and Electronics Engineering at Swiss Federal Institute of Technology in Lausanne, Switzerland for one week in October 2008 and Prof. Dr. Khalil El Khamlichi Drissi from LASMEA at the Polytechnic University Blaise Pascal in Clermont Ferrand, France for one week in December 2008. During the stay at CEMC they have several meetings with CEMC staff when project activities and deliverables were presented and a new measurement techniques and methodologies were discussed.

Deviations from the project work program, reason for the problem and corrective actions taken/suggested (if any):

Small deviations from the planed start of the Project occurred due to the summer vacations and



some administrative barriers in the first project year. Another deviation is the way the SAFE EMF partner's network has been established – the start up meeting was performed by e-mail and individual visits to the EU partners.

As a result of restructuring of the Ss. Cyril and Methodius University in Skopje as an integrated University, mainly because of the administrative barriers during the second reporting period, the modification of the project duration was made. With 3 months plus each task of the project planned for the second year has been completed successfully. Unfortunately, as the Start-up meeting, and the final meeting for evaluation of project results and deliverables was performed mainly by e-mail with EU networking partners and thorough two individual visits from EU partners professors at the end of 2008.

3.7.3 Milestones and Deliverables

Milestones

MS No.	Milestone name	Date due	Actual delivery date
M4	Project is finished with Final report of the project delivered.	31.03.2009	15.07.2009

Deliverables

Del. No	Deliverable name	Date due	Actual delivery date
11	Periodical progress reports, technical and financial	31.03.2009	30.06.2009
12	SAFE EMF final report with key project results and policy recommendations.	31.03.2009	15.07.2009
13	Final Plan for using and disseminating of knowledge	31.03.2009	15.07.2009



4 List of deliverables

Del. no.	Deliverable name	WP no.	Date due	Actual/ Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
D1	Detailed training plan for recruited young researchers	1	Sep. 2007	Jan. 2008	0,5	0,5	1
D2	Summary report for requiring the young researchers	1	Sep. 2007	Jan. 2008	0,5	0,5	1
D3	Specification of technical characteristics of chosen measuring equipment	2	Mar. 2008	May 2008	2	2	1
D4	Guide for implementing the new measurement methodologies in national language	2	Mar. 2008	May 2008	2	2	1
D5	Guides for using the equipment in national language	2	Mar. 2008	Jan. 2009	2	2	1
D6	Advisory document on harmonization of standards and legislation in FYROM with EU in the field of EMF exposure limitations	3	Mar. 2008	May 2008	6	6	1
D7	Summary report for WP4	4	Oct. 2008	April 2009	15	15	1
D8	Summary report for WP5	5	Oct. 2008	April 2009	12	12	1
D9	Project presentation (web site, CD and leaflets)	6	Feb. 2009	Feb. 2009	3	3	1
D10	Summary report for WP6	6	July 2009	July 2009	6	6	1
D11	Periodical progress reports, technical and financial	7	recurring	recurring	2	2	1
D12	SAFE EMF final report with key project results and policy recommendations	7	June 2009	July 2009	2	2	1
D13	Final Plan for using and disseminating knowledge	7	June 2009	July 2009	1	1	1
TOTAL					54	54	

*) if available



5 Plan for using and disseminating the knowledge

5.1 Section 1 - Exploitable Knowledge and its Use

The SAFE EMF project as a specific support action is primarily geared towards strengthen the research capacity of the Centre for Electromagnetic Compatibility at the Faculty of Electrical Engineering, Ss. Cyril and Methodius University, Skopje, in terms of equipment, methodologies, and human potential, to approach the standards of high quality EU research centres for health effects of human exposure to electromagnetic fields (EMF). It achieves these objectives through networking and cooperation on regional and global level: firstly, networking between Western Balkan Countries institutions who share the similar general situation; and secondly, with highly competent EU institutions and other knowledge gathering and dissemination activities.

The knowledge gathered at the activities is organized in such a way to provide for a lasting impact as a reference for future research, cooperation and implementation activities of the project partners as well as of the target public in the Western Balkans region – decision makers on all levels (governments, academia, industry, non-governmental organizations) and higher education participants. Since the level of dissemination of most of the deliverables is Public, this is considered as the knowledge generated at the project.

Tab. 5.1 Exploitable results overview table

Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
<i>Specification of technical characteristics of chosen measuring equipment</i>	<i>Deliverable 3</i>	<i>1. Energy 2. Electronics 3. Medicine</i>	<i>2008-</i>	<i>public dissemination</i>	<i>SAFE EMF partners</i>
<i>Guide for implementing the new measurement methodologies in national language</i>	<i>Deliverable 4</i>	<i>1. Energy 2. Electronics 3. Medicine</i>	<i>2008-</i>	<i>public dissemination</i>	<i>SAFE EMF partners</i>
<i>Guides for using the equipment in national language</i>	<i>Deliverable 5 Final version</i>	<i>1. Energy 2. Electronics 3. Medicine</i>	<i>2009-</i>	<i>public dissemination</i>	<i>SAFE EMF partners</i>



Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
<i>Advisory document on harmonization of standards and legislation in FYROM with EU in the field of EMF exposure limitations</i>	<i>Deliverable 6</i>	<i>Policy makers</i>	<i>2008-</i>	<i>Restricted to governmental bodies and project partners</i>	<i>SAFE EMF partners</i>
<i>Project presentation (web site, CD and leaflets)</i>	<i>Deliverable 9</i>	<i>1. Energy 2. Electronics 3. Medicine</i>	<i>2009-</i>	<i>public dissemination</i>	<i>SAFE EMF partners</i>
<i>SAFE EMF final report with key project results and policy recommendations</i>	<i>Deliverable 12</i>	<i>1. Energy 2. Electronics 3. Medicine</i>	<i>2009-</i>	<i>public dissemination</i>	<i>SAFE EMF partners</i>
<i>Final Plan for using and disseminating knowledge</i>	<i>Deliverable 13</i>	<i>Project partners</i>	<i>2009-</i>	<i>Restricted to project partners</i>	<i>SAFE EMF partners</i>

The results will serve as the basis for development of new and improved policies for support documents describing the necessary EU standards, and supportive regulations at the national level with practical implementation and roadmap that will help Ministry of environment and physical planning to initiate and support the legislative process. Due to the similar situation in the region (Albania, Kosovo and Serbia) the support of the legislative process will have a regional impact. The project results will form the basis for further research within targeted NP centres as the SAFE EMF project partners from EU region and regional WBC research community build on newly acquired and improve knowledge, connections and experience.

5.2 Section 2 – Dissemination of knowledge

An important part of the project is geared towards dissemination of knowledge. The entire Workpackage 6 is devoted to dissemination activities. This will include dissemination of results on local, regional, EU level, with goals to attract young researcher to future research activities, to enable networking with centres of similar or interdisciplinary interest on local, regional and EU level and also to raise awareness of general public).



The Dissemination Activities Overview table for the second project year is shown in Tab. 5.2. In addition to the regular project milestones, additional opportunities are presented that provide for good dissemination of knowledge gathered within the project.

Tab. 5.2 Dissemination Activities Overview table

Event No.	Actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
1	22.05.2007	Presentation	Higher education Research	Macedonia	23	CEMC
2	24.09.2007	Presentation	Higher education Research	Macedonia	26	CEMC
3	3. 12. 2007	Presentation	Higher education Research	EU and Western Balkans	80	CEMC
4	5. 12. 2007	Presentation	Higher education Research	EU and Western Balkans	80	CEMC
5	16.07.2008	Presentation	Higher education Research	Macedonia	10	CEMC
6	24. 06.2008	Presentation	Higher education Research	EU and Western Balkans	12	CEMC
7	December 2008	Project web-site	Higher education Research Policy Makers	EU countries, Western Balkans (SR, MK, AL, Kosovo)	European and Western Balkans researchers	CEMC
8	February 2009	Dissemination materials (CDs, posters, leaflets)	Higher education Research Policy Makers	EU countries, Western Balkans (SR, MK, AL, Kosovo)	European and Western Balkans researchers	CEMC
9	04. 03.2009	Workshop for Decision Makers, Higher education, Researchers in Al	Higher education Research Policy Makers	Albania	24	CEMC
10	11. 03.2009	Workshop for Decision Makers, Higher education, Researchers in RS	Higher education Research Policy Makers	Serbia	26	CEMC



Event No.	Actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
11	23. 03.2009	Workshop for Decision Makers, Higher education, Researchers in Kosovo	Higher education Research Policy Makers	Kosovo	26	CEMC
12	27.03.2009	Workshop for researchers and Decision Makers, Skopje, MK	Higher education Research and Policy Makers	Macedonia	50	CEMC

Dissemination activities during the project

1. On May 22, 2007, Prof. Leonid Grcev was invited to give the presentation “Current research results on radiofrequency EMF influence on humans” in the Macedonian Academy of Science and Arts in Skopje. The 23 academics and researchers from higher education institutions in Macedonia attend the presentation and had fruitful discussions after that.
2. Professor Dr. Leonid Grcev, as a project Coordinator, on 24.09.2007 at the Conference room of the Faculty of Electrical Engineering and Information Technologies in Skopje, made a presentation on the main objectives of the SAFE EMF project as well as the responsibilities of the young researchers to be employed. At the event 26 students from high education and researchers were present and almost everyone has shown interest to participate in a project like this.
3. On December 3, 2007, Dr. Med. Sci. Biljana Gjonevska made a presentation of Centre for Electromagnetic Compatibility, Faculty of Electrical Engineering and Information Technology, University of Skopje, Macedonia and the main objectives of SAFE EMF project during the COST action BM0601: ADVANCED METHODS FOR THE ESTIMATION OF HUMAN BRAIN ACTIVITY AND CONNECTIVITY (NEUROMATH) held in Rome, Italy from 2 to 5 December 2007 (www.neuromath.eu).
4. During the COST action BM0601 Workshop “Advanced Methods for the Estimation of Human Brain Activity and Connectivity” held in Rome, Italy from 2 to 5 December 2007 (www.neuromath.eu), on December 5, 2007, Dr. Med. Sci. Biljana Gjonevska made an oral and poster presentation of the theme “Comparative analysis of studies investigating the influence of low frequency electromagnetic field on human EEG patterns”.
5. On July 16, 2008, after he attended the 4th International Summer School on Emerging Technologies in Biomedicine in Patras, Greece from 29th June to 4th July 2008, the young researcher Spase Petkoski gives the presentation “Advanced Methods for the Estimation of Human Brain Activity and Connectivity, Applications to Rehabilitation Engineering” at the Macedonian Academy of Science and Arts in Skopje. The 10



academics and researchers from higher education institutions in Macedonia attend the presentation and had fruitful discussions after that.

6. On June 24, 2008, Prof. Leonid Grcev made a presentation of Centre for Electromagnetic Compatibility, Faculty of Electrical Engineering and Information Technology, Ss Cyril and Methodius University of Skopje, Macedonia and the main objectives of SAFE EMF project during the 28th International Conference on Lightning Protection (ICLP2008) held in Upsala, Sweden from 23 to 26 June 2008 (www.iclp-centre.org).
7. The web site design finished in December 2008 presents the new research capabilities of CEMC as a regional expertise centre for health effects of EMF on humans, especially describing services and resources that can be used in the region.
8. The dissemination materials, like CDs, posters, leaflets etc. were finished in February 2009, just on time for workshops planed in MK, AL, SR and Kosovo.
9. The CEMC team (Prof. Marija Kacarska, Assis. Prof. Vesna Arnautovski-Toseva and a youn geseacher Spase Petkoski) presented the SAFE EMF project and CEMC capabilities on workshop held on 04.03.2009 at the Polytechnic University of Tirana in Albania. The main goal of the presentation was establishing regional networking. The 24 academics and researchers from higher education institutions and utilities in Tirana attend the presentation and had fruitful discussions after that.
10. The CEMC team (Prof. Marija Kacarska, Assis. Prof. Vesna Arnautovski-Toseva and a youn geseacher Spase Petkoski) presented the SAFE EMF project and CEMC capabilities on workshop held on 11.03.2009 at the Faculty of Electronic Engineering at University of Niš in Serbia. The main goal of the presentation was establishing regional networking. The 26 academics and researchers from the faculty attend the presentation and had fruitful discussions after that.
11. The CEMC team (Prof. Marija Kacarska, Assis. Prof. Vesna Arnautovski-Toseva and a youn geseacher Spase Petkoski) presented the SAFE EMF project and CEMC capabilities on workshop held on 23.03.2009 at the Faculty of Electrical & Computer Engineering, University of Prishtina in Kosovo. The main goal of the presentation was establishing regional networking. The 26 academics and researchers from the faculty attend the presentation and had fruitful discussions after that.
12. Professor Dr. Leonid Grcev, as a project Coordinator, on 27.03.2009 at the Conference room of the Faculty of Electrical Engineering and Information Technologies in Skopje, made a presentation on the main objectives of the SAFE EMF project as well as the achievements gained in the project. Young researcher Spase Petkoski presented the new equipment of CEMC purchased in the frame of the project. Target group were 50 participants at the event, representatives from all Universities and Research centres in Maceonia as well as Ministry for environment and physical planning, Ministry of transport and communications, Ministry of health, Ministry for education and science, Ministry for economy, Agency for electronic communications, , and other with interest in this field. After the presentation very fruitful discussions were made especially about



the lack of supporting legal documents in this area. Special Workshop for Decision Makers was not realised during the second project year because Prof. Leonid Grcev was a member of the Committee for preparing the Law for non-ionizing radiation in the frame of Ministry of health of RM which is in charge for all non-ionizing radiation including EMF. The Law is in waiting query in the Assembly of RM and is expected to be voted in September 2009. In that way the government institutions were introduced to main achievements and conclusions of SAFE EMF project in the area of support legislative process for EMF (the regulations that control EMF exposure in FYROM and wider in the region are obsolete and incomplete).

Promoting CEMC enhanced research capabilities in EU direct contact with possible partners in existing EU research networks (EMF-NET, COST281), with EU NP help (through: Internet services, e-mail list, inclusion of links to CEMC web site, etc.) will remain the constant goal of project team.



Annex 1 – Reports and main conclusions from the visits in WP2



SAFE EMF project, INCO-CT-2007-043638

DESCRIPTION OF ACTIVITY PERFORMED

**WP 2 Upgrading S&T equipment
T2.1 Choice of equipment**

**Visit to the Institute for Non-Ionizing Radiation
Ljubljana, Slovenia
19.04.2007 – 22.04.2007**

Professor Dr. Leonid Grcev
Center for EMC (CEMC)
Faculty of Electrical Engineering
and Information Technologies
Ss. Cyril and Methodius University of Skopje
Skopje, R Macedonia



In the framework of Work package 2 (Upgrading S&T equipment) of the SAFE EMF project, in Task 2.1 the visits to the EU networking partner laboratories and consultations with experts are planned to acquire knowledge about the choice of generic equipment and technical characteristics for measurements in two distinct ranges, power and radio frequencies. One of the visits is the visit to the Institute of Non-Ionizing Radiation (INIS), Ljubljana, Slovenia, one of the networking partners in the project.

I have arrived in Ljubljana on 19 April 2007. According to the plan the next day was devoted to meetings with Dr. Peter Gajsek, who is a widely renowned expert in the field of EMF security and health effects from radio radiation.

According to previous agreement the itinerary for the meetings was mainly related to the WP 2 “Upgrading S&T equipment” activities, especially tasks within T2.1 “Choice of equipment”, however, it was also related to other WPs:

1. Choice of equipment (WP2);
2. Future research needs in the field of EMF exposure effects (WP4);
3. Experience with legislative process in Slovenia (WP3).

In relation to the first topic of discussion the following have been concluded.

- 1.1 Equipment SET 1: Selective RF meter up to 3 GHz with demodulation of UMTS P-CPICH pilot channels, for RF safety limits conformance tests, for example, near base stations, etc. The following instrument has been recommended as appropriate: Narda SRM-3000, basic unit 100 KHz-3 GHz with three axis antenna 75 MHz – 3 GHz, with option for UMTS demodulation.
- 1.2 Equipment SET 2: ELF magnetic and electric field analyzer up to 35 kHz, for ELF measurements of electric power system fields. The following instrument has been recommended as appropriate: Narda EFA-300/FFT, with electric and magnetic field analyzer 5 Hz – 32 kHz.
- 1.3 Equipment SET 3: Test receiver for broadband field measurements for assessment of characteristics of EMF from multiple sources in residential and occupational environment. The following instrument has been recommended as appropriate: Narda NBM-550 broadband measurement and analyzes device for magnetic and electric fields. It has been concluded that measurement of electric fields practically covers also the magnetic field since far fields are of interest where both fields are coupled. To take into account new technologies, which will use higher frequencies, wide frequency range probes are recommended such as for E-field in the range of 3 MHz – 18 GHz (isotropic) and shaped for ICNIRP recommendations in the range 300 kHz – 50GHz.
- 1.4 Equipment SET 4: Area monitor station with E- field probes and software, for long-term EMF assessment. The following instrument has been recommended as appropriate: Narda station 2600.



1.5 Equipment SET 5: Probes for near electric and magnetic fields, for laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions. Considering this set of instruments, it has been concluded that substantial change in the choice of the equipment can be recommended. It has been concluded:

- 1.5.1 Laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions need much greater set of instruments than only probes for near electric and magnetic fields.
- 1.5.2 It is necessary to provide standardized exposure set up, consisting of specialized signal generators and modified mobile phones or special antennas, which is above the budget of this project.
- 1.5.3 Furthermore, dosimetry is a critical part of any such experimental work. Since this requires specialized laboratory that also adds to the charge, which is also above the budget of this project.
- 1.5.4 As a conclusion, it is recommended that another important line of research should be prepared (which is also discussed in topic 2 of the meeting), that is, risk assessment of the long term effects of radio radiation exposure. For such purpose the new SET 5 is recommended with the following instrument that has been recommended as appropriate: Antenna EME SPY 121 – personal RF broadband and selective dosimeter.

In relation to the second topic of discussion the following have been concluded:

- 2.1 One important line of future research will concern EMF exposure characterization using personal exposimeters. The main goal of such research could be to find a proper measure of exposure characterizing radiofrequency exposure, for usage in epidemiological studies to define high vs low exposed persons or in human experimental studies to use realistic every (whole) day exposure values. Exposure occurs at different spatial and temporal levels. In order to compare exposure at these levels a measure of exposure should be defined at each level.
- 2.2 Exposure characterization is an essential part of research into the possible health effects due to exposure of radiofrequency electromagnetic fields. Because the mechanism which describes the steps from exposure to possible health effect is unknown, the relevant measure of exposure is also unknown. Such research could contribute to the development of tools and models that allow a better characterization of exposure in epidemiological studies and in specific work situations. It also could give a better insight into what characteristics of exposure are important and how they are represented in the populations studied. The possible intent of such research could be to develop methods to produce valid estimates of exposure due to sources in the living environment, like mobile phone base stations (GSM, DCS and UMTS) and sources used close to individuals (mobile phone, DECT and Wifi) and due to several sources in the workplace.
- 2.3 These conclusions give the basis for the change of the equipment in the SET 5, to include personal RF broadband and selective dosimeters.

In relation to the third topic of discussion the following have been concluded.



- 3.1 Republic of Macedonia intends to develop framework law as a legislative basis for the control of EMF exposure, while Republic of Slovenia does not have such framework law. The legislative basis is in the Environment protection law.
- 3.2 It has been pointed out that Republic of Croatia already has such framework law, which can be used as a basis for Macedonian law. Prof. Dr. Dina Simunic in the Faculty of Electrical Engineering with the University of Zagreb is pointed as a suitable contact person for consultations related to the legislative process in Macedonia.

During this visit the topics for further consultations are identified and draft plan is made for the future activities.

Prof. Dr. Leonid Grcev

Center for EMC, Faculty for EE and IT, SCM University of Skopje, Macedonia



SAFE EMF project, INCO-CT-2007-043638

DESCRIPTION OF ACTIVITY PERFORMED

WP 2, T2.1

11.06.2007 – 18.06.2007

Clermont Ferrand and Paris, France

Associate Professor Dr. Marija Kacarska
University “Ss Cyril and Methodius”
Faculty of Electrical Engineering
and Information technologies
Skopje, R Macedonia



In the framework of Work package number 2 of the SAFE EMF project, in Task 2.1 the visits to the EU networking partner laboratories and consultations with experts are planned to acquire knowledge about the choice of generic equipment and technical characteristics for measurements in two distinct ranges, power and radio frequencies. One of the visits is the visit to the Laboratory of Sciences and Materials for Electronics and of Automatic (LASMEA) at the Polytechnic University Blaise Pascal in Clermont Ferrand, France, one of the networking partners in the project.

According to the previous arrangements I arrive in the Clermont Ferrand on 11 June 2007. For the next day several meetings with experts were planned. Prof. Dr. Khalil El Khamlichi Drissi and Dr. Vesna Arnautovski-Toseva were my hosts and they introduced me to the Department of electrical engineering and laboratories at the Polytechnic University Blaise Pascal (Figure 1).



Figure 1

After that I had the meeting with Prof. Drissi about the equipment planned to be purchased in the project. We discussed all the sets of equipment:

- SET 1: Selective RF meter up to 3 GHz with demodulation of UMTS P-CPICH pilot channels, antenna and software (RF safety limits conformance tests, for example, near base stations, etc. (according to ICNIRP recommendations).
- SET 2: ELF magnetic and electric field analyzer up to 35 kHz, with E-field, B-field and H-field sensors, and software (For ELF measurements of electric power system fields).
- SET 3: Test receiver for broadband field measurements and analysis and antennas (For broadband measurements for assessment of characteristics of electrosmog from multiple sources in residential and occupational environment).



- SET 4: Area monitor station with E- field probes and software (For long-term EMF assessment).
- SET 5: Probes for near electric and magnetic fields (For laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions).

Prof. Drissi agreed with me that companies NARDA and Rohde-Schwarz have good choice of qualitative measurement equipment, but he suggests to consider the offer of measurement equipment of the ANRITSU company for SETs 1 to 4. The LASMEA EMC laboratory has purchased the measurement equipment from the ANRITSU company and according their experience with using it, the equipment is reliable, compatible, with good quality and excellent performance/price ratio. Than Dr. Cristophe Pasquier joins the meeting especially to discuss the possibilities of finding suitable equipment for SET 5 (Figure 2).



Figure 2

Unfortunately Prof. Drissi's team does not have enough experience with measurements of near RF fields from mobile phones and they do not have suggestions about the company and type of probes that need to be purchased.

At the afternoon I have the meeting with Dr. Sebastien Girard who works with the MSRC (Mode Stirred Reverberation Chamber) at LASMEA, the second largest chamber in France. Prof. Drissi and Dr. Arnautovski-Toseva were present (Figure 3). It is possible to make the homogeneous field in the cube volume of the chamber and than make various analysis of different test devices. The measurement equipment (frequency generator, amplifier, spectrum analyzer, RF bidirectional power coupler, power meter) is produced from ANRITSU company



(Figure 4). But the software needed for coupling and analyzing the special devices measurement was developed by Dr. Girard (Figure 5).

The next days I have further consultations with Dr. Girard about their EMC measurement equipment characteristics.

I find my visit very successful because the first knowledge about the EMC measurement equipment and techniques that LASMEA networking partner is using is gained. During this visit the topics for further consultations are identified and draft plan is make for the future activities.

On 15 June 2007 I visited Prof. Georgi Stojanov at The American University of Paris, Department of Computer science and Mathematics, for further consultations especially on SET 5 equipment. While Prof. Stojanov was a member of Faculty of Electrical Engineering in Skopje, Macedonia, he research a lot in the area of bioinformatics, especially brain waves measurements. Unfortunately, when two tears ago he transfer to The American University of Paris he did not continue his research in the same area and he was not able to advice me about available equipment for laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions.



Figure 3



Figure 4



Figure 5

Prof. Dr. Marija Kacarska
Center for EMC, Faculty for EE and IT, SCM University of Skopje, Macedonia



SAFE EMF project, INCO-CT-2007-043638

DESCRIPTION OF ACTIVITY PERFORMED

WP 2 Upgrading S&T equipment

T2.1 Choice of equipment

Visit to the Eindhoven University of Technology

Eindhoven, The Netherlands

01.10.2007 – 09.10.2007

Professor Dr. Leonid Grcev

Center for EMC (CEMC)

Faculty of Electrical Engineering
and Information Technologies

Ss. Cyril and Methodius University of Skopje
Skopje, R Macedonia



In the framework of Work package 2 (Upgrading S&T equipment) of the SAFE EMF project, in Task 2.1 the visits to the EU networking partner laboratories and consultations with experts are planned to acquire knowledge about the choice of generic equipment and technical characteristics for measurements in two distinct ranges, power and radio frequencies. One of the visits is the visit to the Eindhoven University of Technology (TUE), Eindhoven, The Netherlands, one of the networking partners in the project.

I have arrived in Eindhoven on 10 October 2007. According to the plan the next days were devoted to meetings with Dr. A. P. J. van Deursen, who is a widely renowned expert in the field of electromagnetic compatibility (EMC) and EMF security effects, Fig. 1.

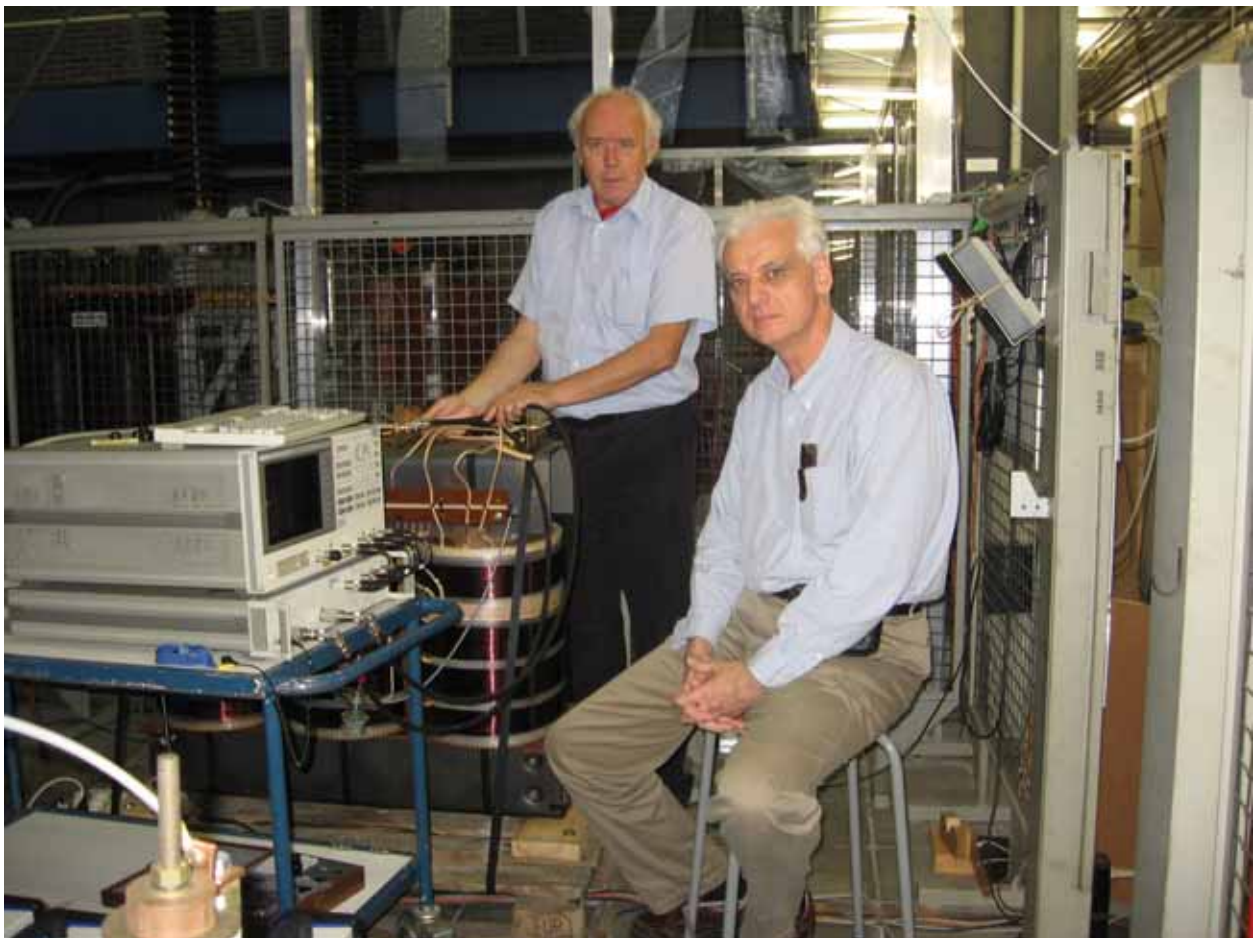


Fig. 1. Dr. A. P. J. van Deursen and Prof. Dr. Leonid Grcev in the laboratory of the Eindhoven University of Technology during the visit.

According to previous agreement the itinerary for the visit was mainly related to the WP 2 “Upgrading S&T equipment” activities, especially tasks within T2.1 “Choice of equipment”,



however, it was also related to WP 5 “Preparation for experimental studies of EMF health effects”.

1. Choice of equipment (WP2);
2. Preparation for experimental studies of EMF health effects (WP5);

In relation to the first topic of the itinerary, the discussion has followed the previously led consultations in the Institute for Non-Ionizing Radiation (INIS) in Ljubljana, Slovenia, in order to try to reach consensus for the choice of the equipment. The conclusions of the consultations really confirmed the recommendations given after meeting in INIS in Ljubljana, Slovenia. The following have been concluded.

- 1.1 Equipment SET 1: Selective RF meter up to 3 GHz with demodulation of UMTS P-CPICH pilot channels, for RF safety limits conformance tests, for example, near base stations, etc. In conformance with the recommendations after visit to INIS, Ljubljana, the following instrument has been recommended as appropriate: Narda SRM-3000, basic unit 100 KHz-3 GHz with three axis antenna 75 MHz – 3 GHz, with option for UMTS demodulation.
- 1.2 Equipment SET 2: ELF magnetic and electric field analyzer up to 35 kHz, for ELF measurements of electric power system fields. In conformance with the recommendations after visit to INIS, Ljubljana, the following instrument has been recommended as appropriate: Narda EFA-300/FFT, with electric and magnetic field analyzer 5 Hz – 32 kHz.
- 1.3 Equipment SET 3: Test receiver for broadband field measurements for assessment of characteristics of EMF from multiple sources in residential and occupational environment. In conformance with the recommendations after visit to INIS, Ljubljana, the following instrument has been recommended as appropriate: Narda NBM-550 broadband measurement and analyzes device for magnetic and electric fields. It has been concluded that measurement of electric fields practically covers also the magnetic field since far fields are of interest where both fields are coupled. To take into account new technologies, which will use higher frequencies, wide frequency range probes are recommended such as for E-field in the range of 3 MHz – 18 GHz (isotropic) and shaped for ICNIRP recommendations in the range 300 kHz – 50GHz.
- 1.4 Equipment SET 4: Area monitor station with E- field probes and software, for long-term EMF assessment. In conformance with the recommendations after visit to INIS, Ljubljana, the following instrument has been recommended as appropriate: Narda station 2600.
- 1.5 Equipment SET 5: Probes for near electric and magnetic fields, for laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions. Considering this set of instruments, it has been concluded that substantial change in the choice of the equipment can be recommended. It has been concluded:
 - 1.5.1 Laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions need much greater set of instruments than only probes for near electric and magnetic fields.



- 1.5.2 It is necessary to provide standardized exposure set up, consisting of specialized signal generators and modified mobile phones or special antennas, which is above the budget of this project.
- 1.5.3 Furthermore, dosimetry is a critical part of any such experimental work. Since this requires specialized laboratory that also adds to the charge, which is also above the budget of this project.
- 1.5.4 As a conclusion, in conformance with the recommendations after visit to INIS, Ljubljana, it is recommended that another important line of research should be prepared (which is also discussed in topic 2 of the meeting), that is, risk assessment of the long term effects of radio radiation exposure. For such purpose the new SET 5 is recommended with the following instrument that has been recommended as appropriate: Antenna EME SPY 121 – personal RF broadband and selective dosimeter.

In relation to the second topic of discussion the following have been concluded:

- 2.1 One of the important issues in the future research on health effects of EMF exposure is possibility of the influence on brain functions. This can be measured by looking for changes in electroencephalogram (EEG) signals during EMF exposure, especially by mobile phone handset.
- 2.2 The possibility of contamination of EEG signals with pickup from mobile phone handset emissions has often been discussed as a possible artifact in studies designed to test human electrophysiological responses to mobile telephony. Since the leads from each electrode are usually bundled at the back of the head to form a ribbon cable, and since the skin/metal and metal/metal interfaces could represent non-linear resistances, it is easy to envisage this pick-up occurring.
- 2.3 The traditional electrode montage for the EEG is the 19-electrode. These electrodes are conveniently sewn into a 'bathing cap' arrangement, which makes their application to the scalp. The following situation has been discussed and plans for future action have been discussed. The experiments can be carried out using phantom head, for example constructed from a conducting foam mat to form a layer under EEG cap closely approximating the electrical properties of a human scalp. The mat could be placed over a polystyrene manikin head to preserve a correct anatomical arrangement, Fig. 2.

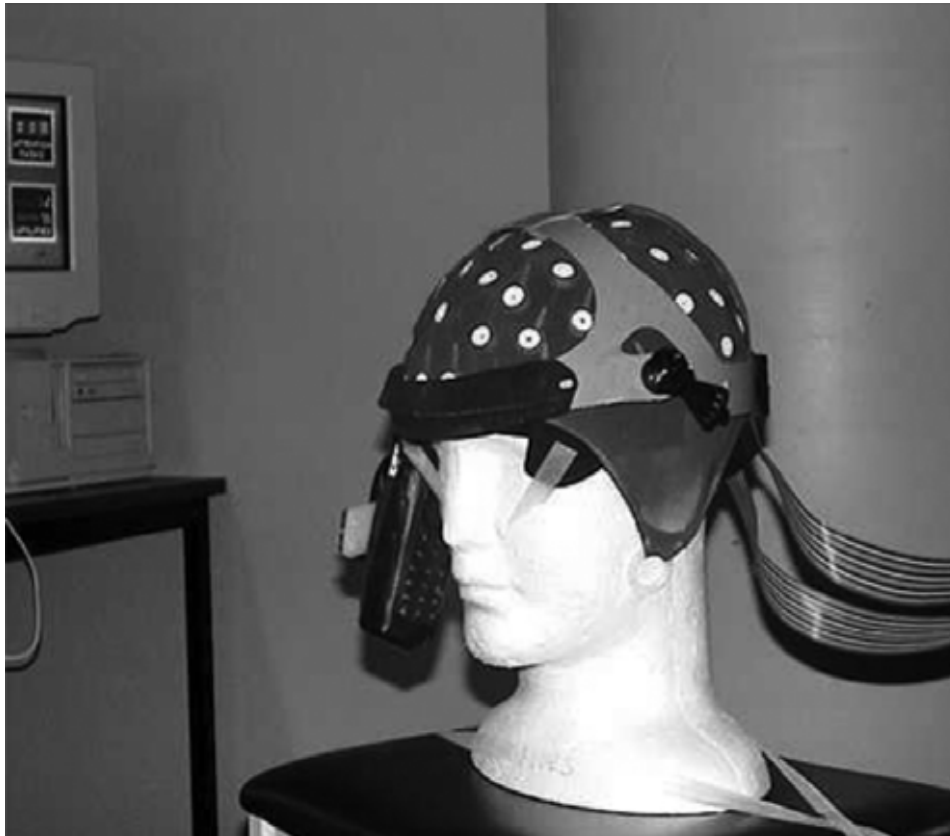


Fig. 2. The EEG cap in place over the phantom head, with a mobile phone attached.

2.4 The problems related to the EMC of the EEG cap wiring and the mobile phone have been studied and plan for further studies have been set.

During this visit the topics for further consultations are identified and draft plan is made for the future activities.

Prof. Dr. Leonid Grcev

Center for EMC, Faculty for EE and IT, SCM University of Skopje, Macedonia



SAFE EMF project, INCO-CT-2007-043638

DESCRIPTION OF ACTIVITY PERFORMED

**WP 2 Upgrading S&T equipment
T2.1 Choice of equipment**

**Visit to the Swiss Federal Institute of Technology
Lausanne, Switzerland
14.11.2007 – 23.11.2007**

Professor Dr. Leonid Grcev
Center for EMC (CEMC)
Faculty of Electrical Engineering
and Information Technologies
Ss. Cyril and Methodius University of Skopje
Skopje, R Macedonia



In the framework of Work package 2 (Upgrading S&T equipment) of the SAFE EMF project, in Task 2.1 the visits to the EU networking partner laboratories and consultations with experts are planned to acquire knowledge about the choice of generic equipment and technical characteristics for measurements in two distinct ranges, power and radio frequencies. One of the visits is the visit to the Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland, one of the networking partners in the project.

I have arrived in Lausanne on 14 November 2007. According to the plan the next days were devoted to meetings with Prof. Dr. Farhad Rachidi, who is a widely renowned expert in the field of electromagnetic compatibility (EMC) and EMF security effects, Fig. 1.

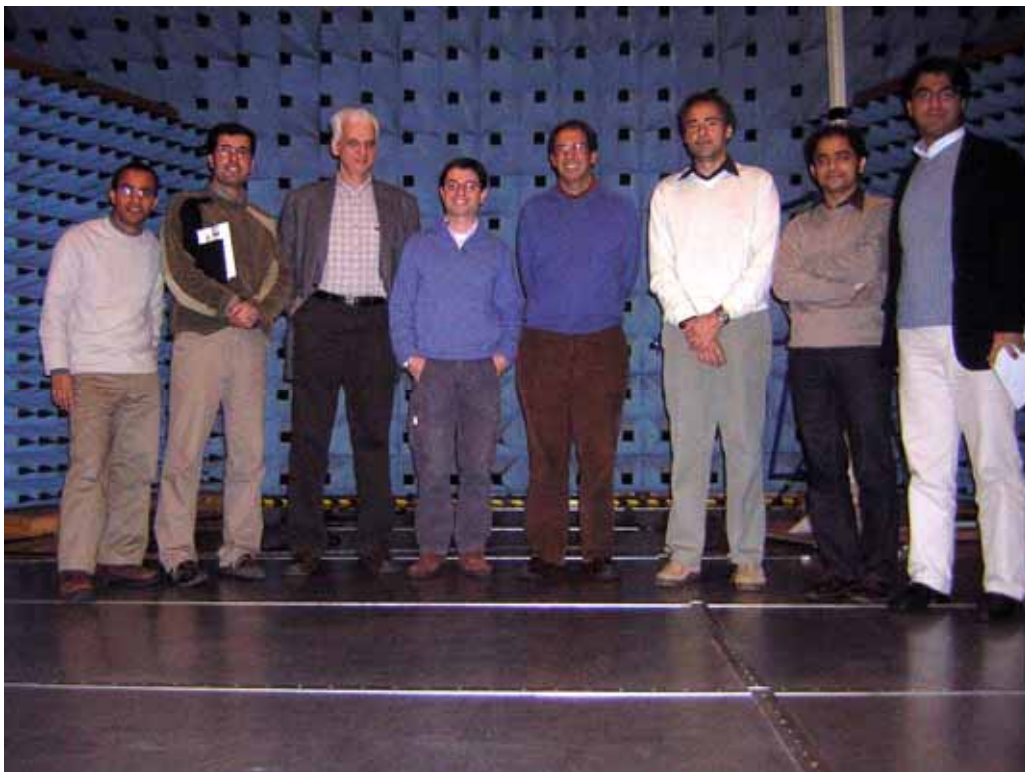


Fig. 1. Prof. Dr. Leonid Grcev (third from left) and Prof. Dr. Farhad Rachidi (fifth from left) with PhD students in the EPFL EMC laboratory during the visit.

According to previous agreement the itinerary for the visit was mainly related to the WP 2 “Upgrading S&T equipment” activities, especially tasks within T2.1 “Choice of equipment”, however, it was also related to WP 5 “Preparation for experimental studies of EMF health effects”.

1. Choice of equipment (WP2);
2. Preparation for experimental studies of EMF health effects (WP5);



In relation to the first topic of the itinerary, the discussion has followed the previously led consultations in the Institute for Non-Ionizing Radiation (INIS) in Ljubljana, Slovenia, and in the Eindhoven University of Technology (TUE), The Netherlands, in order to try to reach consensus for the choice of the equipment. The conclusions of the consultations really confirmed the recommendations given after meeting in INIS in Ljubljana, Slovenia, and TUE in Eindhoven, The Netherlands. The following have been concluded.

- 1.1 Equipment SET 1: Selective RF meter up to 3 GHz with demodulation of UMTS P-CPICH pilot channels, for RF safety limits conformance tests, for example, near base stations, etc. In conformance with the recommendations after visit to INIS, Ljubljana, and TUE, Eindhoven, the following instrument has been recommended as appropriate: Narda SRM-3000, basic unit 100 KHz-3 GHz with three axis antenna 75 MHz – 3 GHz, with option for UMTS demodulation.
- 1.2 Equipment SET 2: ELF magnetic and electric field analyzer up to 35 kHz, for ELF measurements of electric power system fields. In conformance with the recommendations after visit to INIS, Ljubljana, and TUE, Eindhoven, the following instrument has been recommended as appropriate: Narda EFA-300/FFT, with electric and magnetic field analyzer 5 Hz – 32 kHz.
- 1.3 Equipment SET 3: Test receiver for broadband field measurements for assessment of characteristics of EMF from multiple sources in residential and occupational environment. In conformance with the recommendations after visit to INIS, Ljubljana, and TUE, Eindhoven, the following instrument has been recommended as appropriate: Narda NBM-550 broadband measurement and analyzes device for magnetic and electric fields. It has been concluded that measurement of electric fields practically covers also the magnetic field since far fields are of interest where both fields are coupled. To take into account new technologies, which will use higher frequencies, wide frequency range probes are recommended such as for E-field in the range of 3 MHz – 18 GHz (isotropic) and shaped for ICNIRP recommendations in the range 300 kHz – 50GHz.
- 1.4 Equipment SET 4: Area monitor station with E- field probes and software, for long-term EMF assessment. In conformance with the recommendations after visit to INIS, Ljubljana, and TUE, Eindhoven, the following instrument has been recommended as appropriate: Narda station 2600.
- 1.5 Equipment SET 5: Probes for near electric and magnetic fields, for laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions. Considering this set of instruments, it has been concluded that substantial change in the choice of the equipment can be recommended. It has been concluded:
 - 1.5.1 Laboratory measurements of near RF fields from mobile phones for analysis of influence to brain functions need much greater set of instruments than only probes for near electric and magnetic fields.
 - 1.5.2 It is necessary to provide standardized exposure set up, consisting of specialized signal generators and modified mobile phones or special antennas, which is above the budget of this project.



1.5.3 Furthermore, dosimetry is a critical part of any such experimental work. Since this requires specialized laboratory that also adds to the charge, which is also above the budget of this project.

1.5.4 As a conclusion, in conformance with the recommendations after visit to INIS, Ljubljana, and TUE, Eindhoven, it is recommended that another important line of research should be prepared (which is also discussed in topic 2 of the meeting), that is, risk assessment of the long term effects of radio radiation exposure. For such purpose the new SET 5 is recommended with the following instrument that has been recommended as appropriate: Antenna EME SPY 121 – personal RF broadband and selective dosimeter.

In relation to the second topic of discussion the following have been concluded:

2.1 One of the important issues in the future research on health effects of EMF exposure is possibility of the influence on brain functions. This can be measured by looking for changes in electroencephalogram (EEG) signals during EMF exposure, however beside by mobile phone handset, as considered during the visit to and TUE, Eindhoven, but also by low frequency EMF due to the electric power installations.

2.2 The following exposure setup has been discussed: with magnetic fields generated using circular Helmholtz pair of coils, Fig. 1. This setup can be used to investigate hypothesis that low frequency magnetic field in the range up to 30 Hz (which are the frequencies of the EEG signals) have any measurable influence on the brain activity determined by change in the EEG signals. Fig. 1 illustrates possible setup, which will be prepared for future studies, since experiments with humans is not planned in this project.



Fig. 2. The EEG signals recorded from the subject lying down between the Helmholtz coils during the ELF magnetic field exposure.



2.3 The problems related to the EMC of the EEG cap wiring and the installations of the Helmholtz coils have been studied and plan for further studies have been set.

During this visit the topics for further consultations are identified and draft plan is made for the future activities.

Prof. Dr. Leonid Grcev

Center for EMC, Faculty for EE and IT, SCM University of Skopje, Macedonia



Annex 2 – Report on choice of the equipment

According to the discussions during the visits to the Networking partners reported in Annex 1 of this report the following have been concluded:

- One important line of future research will concern EMF exposure characterization using personal exposimeters. The main goal of such research could be to find a proper measure of exposure characterizing radiofrequency exposure, for usage in epidemiological studies to define high vs low exposed persons or in human experimental studies to use realistic every (whole) day exposure values. Exposure occurs at different spatial and temporal levels. In order to compare exposure at these levels a measure of exposure should be defined at each level.
- Exposure characterization is an essential part of research into the possible health effects due to exposure of radiofrequency electromagnetic fields. Because the mechanism which describes the steps from exposure to possible health effect is unknown, the relevant measure of exposure is also unknown. Such research could contribute to the development of tools and models that allow a better characterization of exposure in epidemiological studies and in specific work situations. It also could give a better insight into what characteristics of exposure are important and how they are represented in the populations studied. The possible intent of such research could be to develop methods to produce valid estimates of exposure due to sources in the living environment, like mobile phone base stations (GSM, DCS and UMTS) and sources used close to individuals (mobile phone, DECT and Wi-Fi) and due to several sources in the workplace.

These conclusions give the basis for the change of the equipment in the SET 5, to include personal RF broadband and selective dosimeters. Finally the chosen equipment is as in the following Table:

Manufacturer and device	Purpose	Price in €
NARDA (USA), SRM-3000, Selective Radiation Meter Set 1 BASIC UNIT 100KHZ-3GHZ WITH THREE AXIS ANTENNA 75MHZ-3GHZ, SRM-TS PC EVALUATION AND REMOTE CONTROL SOFTWARE – UMTS P-CPICH Demodulation – RF-Cable SRM, 100kHz-3GHz, N 50 Ohm, 5m – Tripod, Non-Conductive, 1.65m & Carrying Bag – Antenna Holder for Tri-axial Antenna – Tripod Adapter for SRM Basic Unit	Selective RF Meter up to 3 GHz with Demodulator of UMTS P-CPICH	30140



<p>NARDA (USA), EFA-300/FFT 32 kHz, EM Field Analyzer Set, 5Hz-32kHz, With E-Field Probe</p> <p>– EFA-TS REMOTE CONTROL AND DATA ANALYSIS SOFTWARE FOR EFA-200/300 – PROBE, A=100 CM² MAGNETIC FIELD PROBE – TRIPOD EXT. 0.5M NON-CONDUCTIVE – PROBE, D=30 MM, B-FIELD SENSOR, CABLE 1.2M</p>	<p>Extremely Low Frequencies Magnetic and Electric Field Analyzer</p>	<p>20290</p>
<p>NARDA (USA), NBM-500, Broadband Field Meter, Set 1</p> <p>– EF 0391 PROBE E-FIELD, 3MHz-18GHz, ISOTROPIC – ED 5091 PROBE, SHAPED E-FIELD, 300KHz–50GHz</p>	<p>Broadband Measurement and Analyzer Device for Magnetic and Electric fields</p>	<p>14940</p>
<p>NARDA (USA), BROADBAND AREA MONITORING STATION, AMB-8957-03</p> <p>– 8057-MAST, FIBERGLASS POLE, HEIGHT 2M – EP-4B-01 PROBE E-FIELD, FOUR-BAND 1KHz – 3GHz</p>	<p>Area Monitoring Station</p>	<p>14900</p>
<p>SATIMO (FRANCE), EME SPY 121</p> <p>SELECTIVE AND ISOTROPIC MULTIFUNTCIONAL DOSIMETER FOR EPIDEMIOLOGICAL STUDIES AND RF MONITORING x 5 devices</p>	<p>Personal RF Broadband and Selective Dosimeters</p>	<p>20500</p>
<p>Total</p>		<p>100770</p>