



**UNITED NATIONS OFFICE AT VIENNA
OFFICE FOR OUTER SPACE AFFAIRS**

**JOINT MEETING OF ACTION TEAM ON GNSS AND
GNSS EXPERTS OF UN/USA REGIONAL
WORKSHOPS AND
INTERNATIONAL MEETING 2001-2002**
8-12 December 2003, Vienna, Austria



**PROGRESS ACHIEVED IN THE PREPARATION
OF EUPOS**

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1. Objectives and aims of the project

- **The project European Positioning Determination System (*EUPOS*®) is an initiative with the aim to establish a uniform multifunctional DGNSS basis infrastructure in Central and Eastern Europe (CEE) on the base of the common reference frame ETRS89, unified data formats and international standards.**
- ***EUPOS* is a regional extension compatible to the running “German National Survey Satellite Positioning Service” *SAPOS*®.**
- ***EUPOS* will provide DGNSS correction data based on a network of permanent GNSS reference stations for real time positioning and navigation as well as GNSS observation data for post processing positioning**

- ***EUPOS*** will be able to support precise positioning and navigation with high accuracy (metre, decimetre, centimetre in real time and centimetre and sub-centimetre in post processing) as well as with guaranteed availability and quality.
- ***EUPOS*** is a system and service for realisation of GNSS applications to meet requirements of a wide spectrum of users.
- As a regional GNSS realization ***EUPOS***® would be able to support **GALILEO** and **EGNOS**.

2. Recommendations of UN/USA Expert Meeting on the Use and Application of Global Navigation Satellite Systems, Vienna, Austria, 11 - 15 November 2002 for the *EUPOS*® project

2.1. Working Group "Surveying, Mapping and Earth Science"

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Recommendation 2: To Establish the European Position Determination System's active reference stations to allow the large variety of users to determine their position with required accuracy.

Objectives

...

The development of integrated DGNSS "full scale accuracy" infrastructure with well-defined unified standards on regional levels (e.g. in Europe – EUPOS) is recommended.

2.2. Recommendations of the COPOUS Action

Team on "Surveying, Mapping and Earth Science"

...

Expand the development of integrated Differential GNSS "full scale accuracy" infrastructure with well-defined unified standards on regional levels (i.e. in Europe: EUPOS).

A subject of further discussions within the framework of UN/USA regional workshops would be the problems on the multi-functional DGNSS applications in Central and Eastern Europe like EUPOS, its development for entire Europe and eventually as an element of GALILEO and EGNOS. Similar DGNSS systems can be developed for other regions in the world.

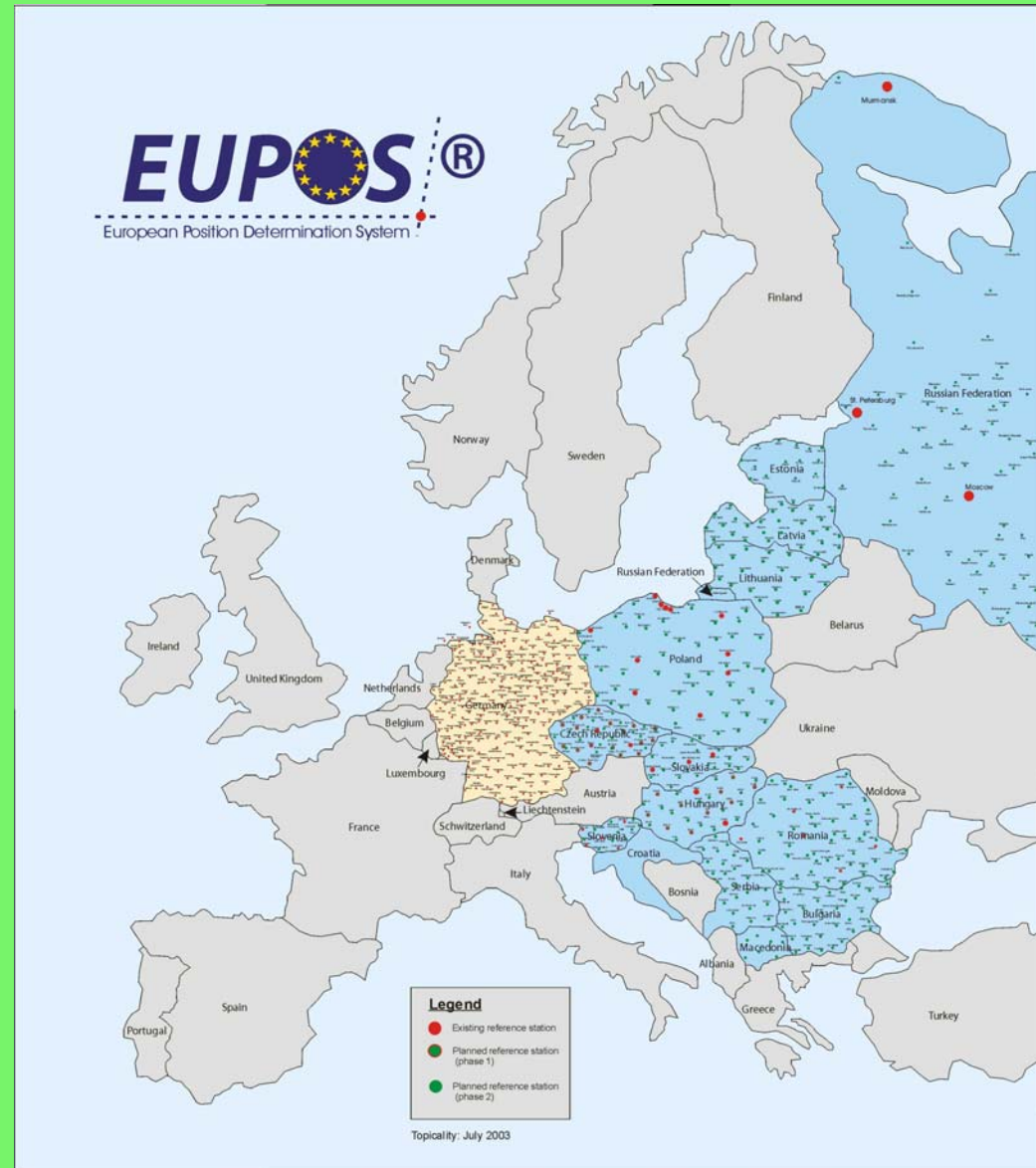
3. Preparation state of the project

3.1. Scope of the project

- **Institutions from 14 European countries and advisory the states Berlin and Hamburg of the Federal Republic of Germany work together to build up uniform DGNSS reference station systems, which will cover an area of more than 10 million km² in Republic of Bulgaria, Republic of Croatia, Czech Republic, Republic of Estonia, Republic of Hungary, Republic of Latvia, Republic of Lithuania, Republic of Macedonia, Republic of Poland, Romania, Serbia and Montenegro, Slovak Republic, Republic of Slovenia and Russian Federation (figure 1, table 1).**

➤ The locations of the active permanent reference stations are selected in the particular countries (figure 1). The distance between reference stations could not be greater than about 70 km at maximum for complete *EUPOS*® functionality.

Fig. 1: Planned and available *EUPOS*® reference stations (only 260 reference stations)



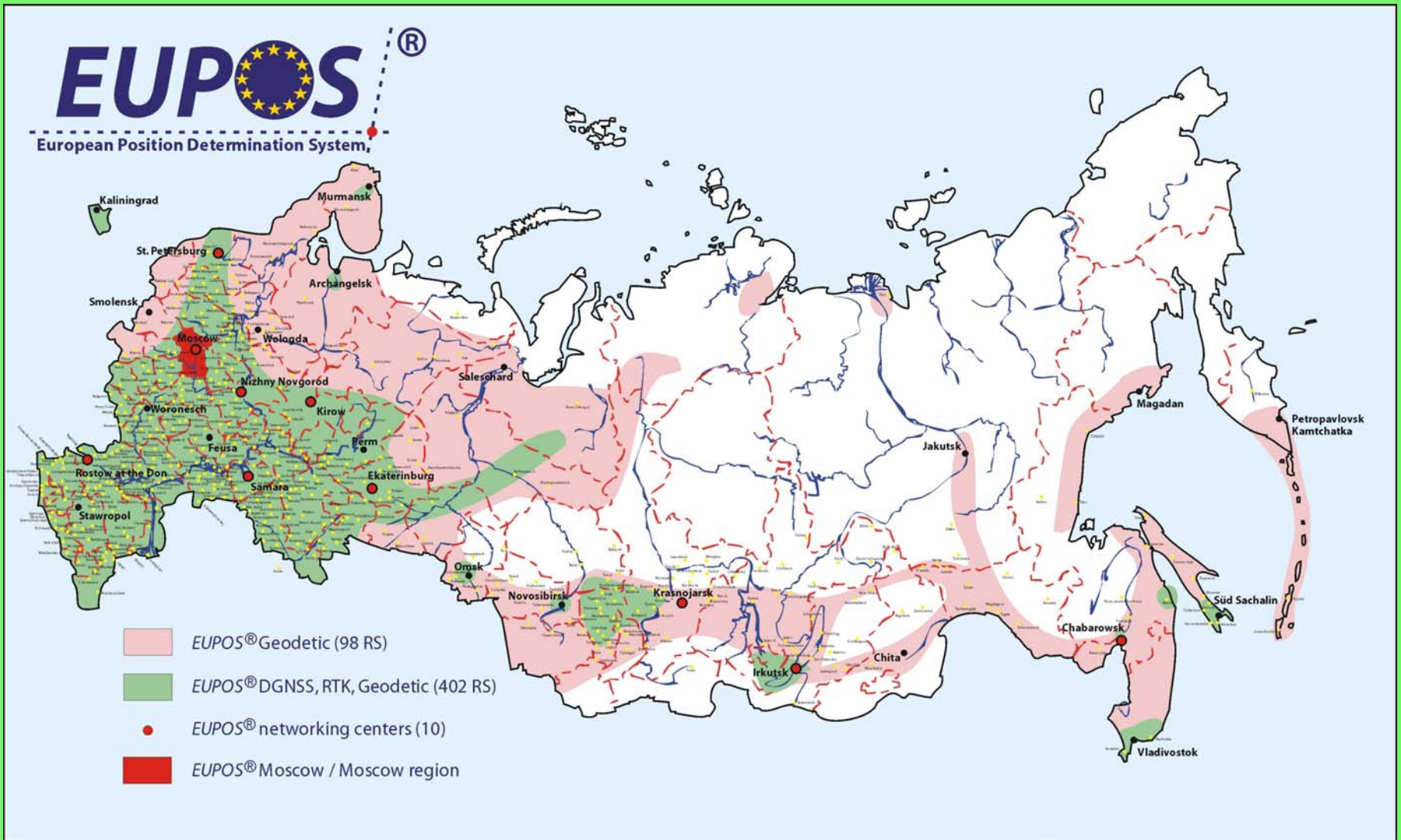


Fig. 2: Planned and available *EUPOS*® reference stations in the Russian Federation (500/150 reference stations)

Country	Area [km²]	Number of reference stations
Bulgaria	110,950	23
Croatia	55,540	11
Czech Republic	78,870	16
Estonia	45,220	10
Hungary	93,030	19
Latvia	64,600	13
Lithuania	65,300	13
Macedonia	25,330	8
Poland	323,520	66
Romania	237,500	48
Russia	9,286,500 (from 17,075,000)	500 (150) ¹⁾
Serbia and Montenegro	88,360	18
Slovak Republic	49,035	10
Slovenia	20,270	4
Sum	10,550,000	760 (410) ¹⁾

¹⁾ It is planned to finance 150 reference stations by the *EUPOS* project and 350 only by the Russian Federation

Table 1: Number of planned and available reference stations

3.2. Organisational structure

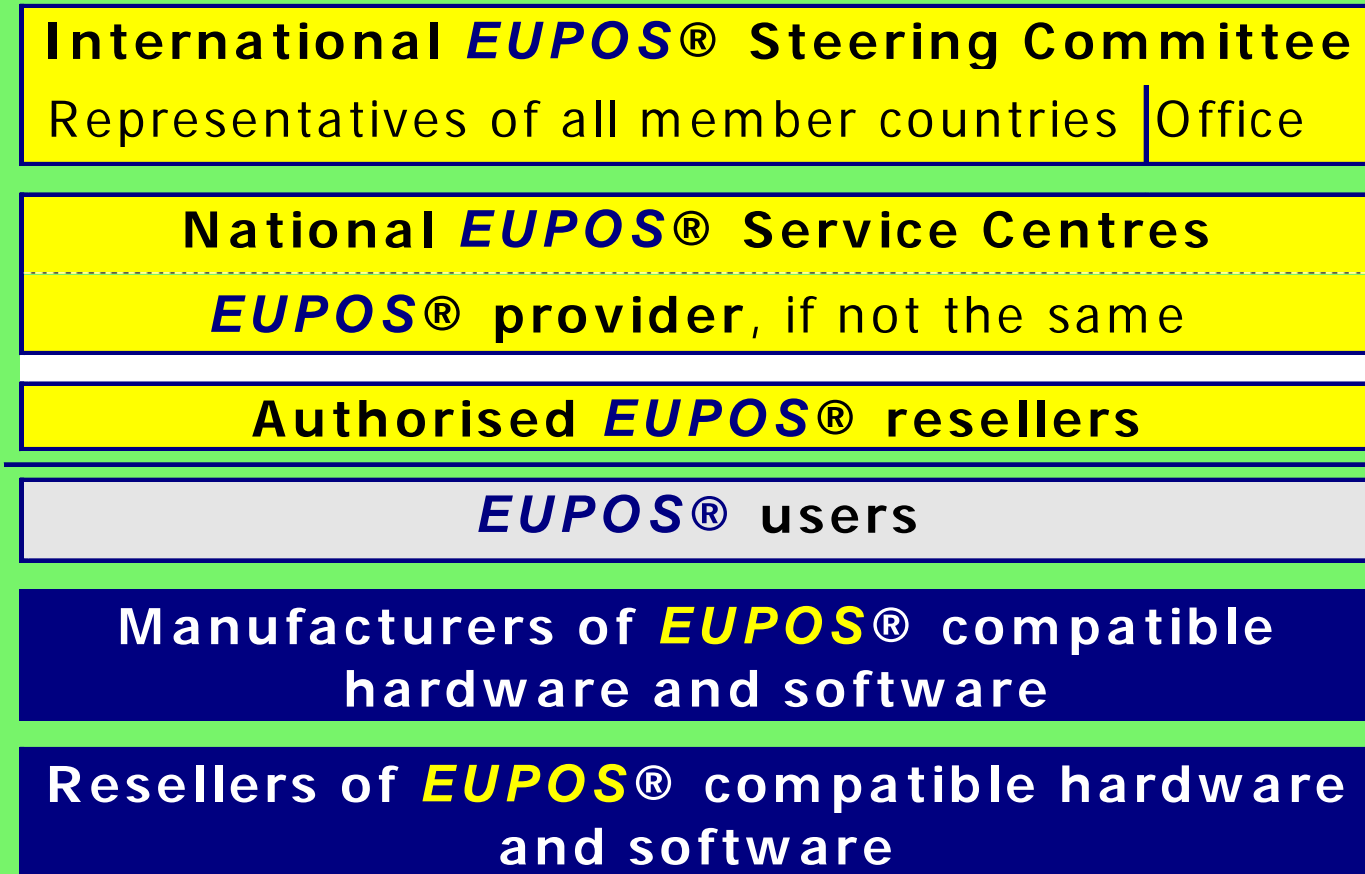


Table 2: *EUPOS*® organisational structure

3.3. Technical specifications

- **Uniform world-wide unlimited usable standards, guaranteed downward compatibility in cases of further development give equal opportunities and investment security to industry, users and provider**
- **Galileo (duty), NAVSTAR-GPS (option), GLONASS (option)**
- ***EUPOS* DGNSS correction data obtained to the European Terrestrial Reference System 1989 (ETRS89)**
- **Strive for availability of at least 99 % per annum**
- **One standard medium for all sub-services: Internet**
- **Optional medium radio for *EUPOS* real time sub-services**
- **Individual absolute calibrated GNSS antennas at *EUPOS* reference stations only**
- **One data format to provide *EUPOS* correction data: RTCM-EU**
- **Cross-border networking reference stations to provide area correction parameters (FKP)**

***EUPOS®* sub-services:**

➤ **Sub-service *EUPOS®* DGNSS**

DGNSS correction data for real time or post processing applications by code and code-phase measurements with an accuracy of 3 m up to 0.5 m and better.

➤ **Sub-service *EUPOS®* Network RTK**

DGNSS correction data for precise real time position determination by carrier phase measurements with an accuracy of about two centimetres.

➤ **Sub-service *EUPOS®* Geodetic**

DGNSS post processing applications by phase measurements in static or kinematic with centimetre up to sub-centimetre accuracy.

3.4. Evaluation of the project and funding

On the base of estimated calculations from the different participating countries including investments, personal etc. the total costs of the project amount to 50 million EURO.

Possible sources of the project funding are for example different programmes of EC:

- ERDF – for all countries which become members of EU from 01.01.2004**
- ISPA – for EU candidate countries Bulgaria and Rumania**
- PHARE – for West-Balkan countries**
- TACIS – for the Russian Federation**
- OOSA – for project preparation phase (including conferences, ISC meetings etc.)**

3.5. Deadlines

- **Project preparation - 1,5 years**
- **2,5 up to 3 years are foreseen from the start of the project to its final realisation.**

4. State and approaches of project development

- **The work on the project preparation is based on regular workshops and ISC meetings, and adoption of respective resolutions and their implementation.**

4.1. Workshops and resolutions

1st Workshop on Multifunctional GNSS Reference Station systems for Europe, Berlin, 4-5 March 2002

- **Founding Committee established**

1st *EUPOS* ISC conference held in Warsaw, Poland, 2-3 July 2002

- **The establishment of a multifunctional system of DGNSS reference station will be pushed in one unified project called EUROPEAN POSITION DETERMINATION SYSTEM (*EUPOS*). *EUPOS* name and logo shall be registered Europe-wide**
- **It will be tried to realise the project *EUPOS* as an EU programme Instrument for Structural Policies for Pre-Accession (ISPA) for the EU pre-accession countries**
- **For countries which are not the EU pre-accession ones other possibilities of funding will be searched**
- **Existing infrastructures, e.g. EUREF, should be integrated**
- **The founding committee has been renamed as the *EUPOS* International Steering Committee (ISC)**
- **Establishment of the *EUPOS* ISCO, headed by Gerd Rosenthal, Berlin, Germany**
- **Countries that will join this project are obliged to observe the defined and uniform *EUPOS* standards**

2nd *EUPOS* ISC conference held in Sofia, Bulgaria, 5-6 November 2002

- **Wording a generalised project description, individualisation for each *EUPOS* member country**
- **Fixing of the *EUPOS* web pages contents (www.eupos.org). Webmaster is**

Prof. Janusz Sledzinski, Warsaw, Poland.

- **The *EUPOS* ISC decline the suggestion to enlarge the *EUPOS* ISC because the ISC shall remain a small effective group.**
- ***EUPOS* ISCO will contact the European Commission.**
- **An officially *EUPOS* report will be given by Prof. Milev, Sofia, Bulgaria, to the UN/USA International Meeting of Experts in the Use and Application of Global Navigation Satellite Systems, Vienna, Austria, 11-15 November 2002.**

3rd *EUPOS* ISC conference held in Riga, Latvia, 10-11 June 2003

- **The *EUPOS* ISC offered Montenegro to join the *EUPOS* project.**
- **The *EUPOS* ISC decided the generalised *EUPOS* project description.**
- **The *EUPOS* ISC decided the *EUPOS* Standard Summary.**
- **It will be tried to realise the project *EUPOS* as an EU programme Community Assistance for Reconstruction, Democratization and Stabilization (CARDS) for the non-EU pre-accession countries Croatia, Macedonia, Serbia and Montenegro and Technical Assistance to the Commonwealth of Independent States (TACIS) for the Russian Federation.**
- **For countries which are not the EU pre-accession ones other possibilities of founding will be searched**
- **The contact to further companies has to take place not integrated in the *EUPOS* ISC but in a different way, e.g. on workshops or special *EUPOS* ISC meetings.**

2nd EUPOS® Workshop, Berlin, Germany, 20-21 November 2003

- **The participants in the Workshop on EUPOS Multifunctional GNSS Reference Station Systems for Europe would like to express their heartfelt thanks for the work carried out so far by the International EUPOS Steering Committee, the member states and, in particular, the states of Berlin and Hamburg. In order to ensure that the efforts to set up EUPOS can continue, the institutions mentioned above are requested to continue their efforts in a systematic manner.**
- **The Workshop calls for the setting up of the National EUPOS Service Centers (NSCs) to be completed as an urgent priority. It is important for the NSCs to begin their work as national, state-authorized bodies for EUPOS. This is a precondition for the acceptance of the project at the national and international level as well as for the start of negotiations on the acquisition of EU funding.**
- **The EUPOS ISCO report is accepted. The Workshop adopts the EUPOS Standard Summary in the version of 8 September 2003 and the EUPOS Project Description.**
- **To put the EUPOS project into effect, applications are to be submitted for an umbrella project and, as soon as possible, for implementation-related projects.**

4.2. Approaches and activities for EUPOS development

- **Implementation of the resolutions of the workshops and ISC**
- **Preparation of a project for *EUPOS* development,**
- **Realisation of Pilot projects,**
- **Establishment of an organisational structure,**
- **Finding of sources and funds, realisation of contacts, popularisation of *EUPOS***
- **Part of the mentioned activities is in progress.**

OOSA could deliver a support in the following aspects:

- **Direct support by own funds or other funds supplied by it (for project preparation, including workshops, ISC meetings etc.)**
- **Indirect support**
 - **specifying the financial sources**
 - **letters of recommendation to different institutions financing *EUPOS* similar activities and projects.**

Along with that *EUPOS* ISCO recommends reducing the *EUPOS* project costs in some aspects.

Contacts :

- **Warsaw - EC, ESA representatives have been established at the Conference “Galileo for an enlarge Europe” this year.**
- **Brussels :**
 - **1st meeting with GALILEO Joint Undertaking (GJU), Brussels, Belgium, November 12th, 2003**
 - **1st meeting with European Commission, EuropeAid Co-operation Office, Brussels, Belgium, November 12th, 2003**

Results

- **EuropeAid recommended to make contact with DG TREN and DG Enlargement**
- **Topically TACIS priorities for Russia are reformation of public administration and security, privatisation of state-owned real estate, planned priority in 2004 would be environment**
- **The planned *EUPOS* Russian Federation budgeted is topically too big (e.g. complete TACIS budgeted for Russia is about 100 million EURO in 2004), reducing of project costs is needed**
- **EuropeAid recommended also reducing of *EUPOS* project costs altogether**
- **EuropeAid attract *EUPOS* attention to White Russia and particularly to Ukraine**
- **EuropeAid attract *EUPOS* attention to Stability pact for Balkan-countries (transport of energy, electricity, gas, oil)**
- **EuropeAid offers further meeting**

Popularization of the Recommendations

Except the already done up-to-now for popularisation of the EUPOS project by reports at different international events it is relevant to be accomplish the following:

- Informing a large scope of specialists by respective publications and reports,**
- Proposals for implementation of the OOSA recommendations from different international and other organisations by their accepting in the topics and recommendations of the organised symposia and other scientific events.**

4.3. Approaches and activities for realisation of Pilot projects

- **Important background for the entire project realisation**
- **3-5 pilot projects (Sofia, Budapest, Riga, Moscow) have been foreseen for realisation as some of them are in progress**
- **Provisional number of the reference stations is 4-5 stations per pilot project.**
- **Funding**
 - **governmental, municipal and private sources,**
 - **industry (equipment, software and technologies),**
 - **other non-participating in the project countries,**
 - **public institutions and other resources.**

4.4. Preparation of a project for EUPOS **development**

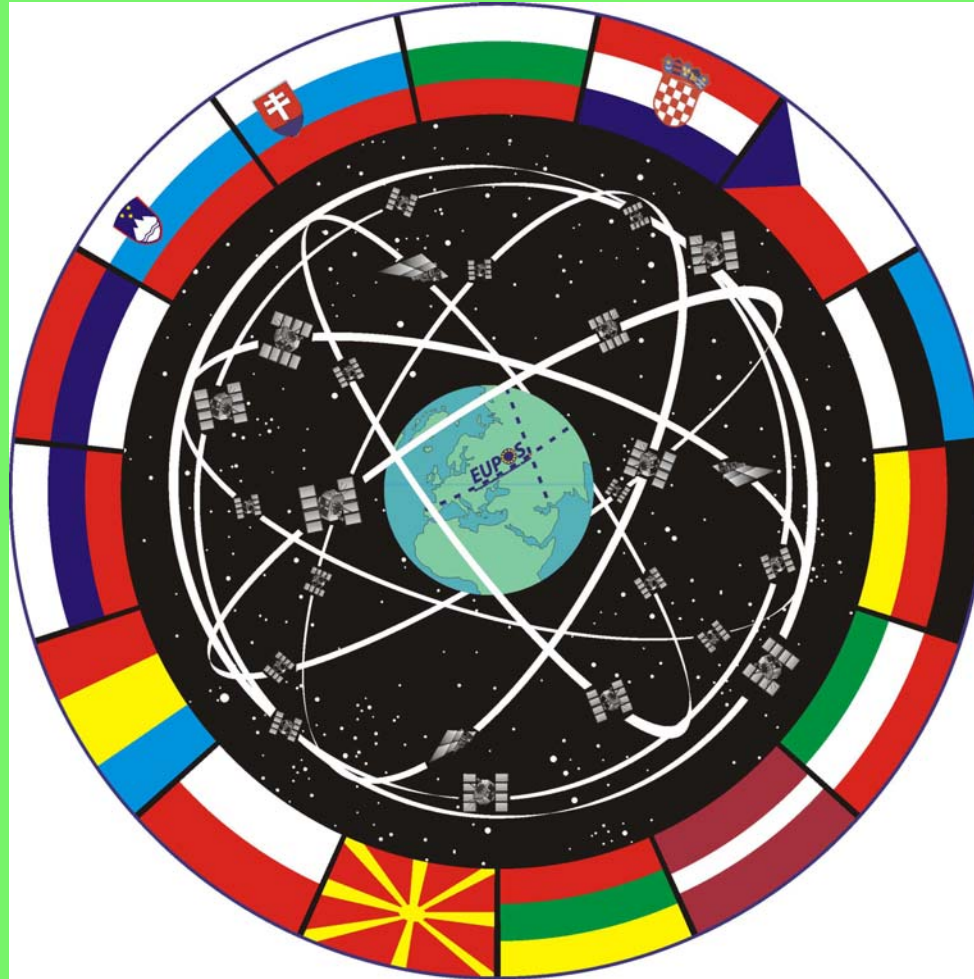
Resolution of the 2nd *EUPOS*® Workshop, Berlin, Germany, 20-21 November 2003 recommends:

- To put the *EUPOS* project into effect, applications are to be submitted for an umbrella project and, as soon as possible, for implementation-related projects.**

5. Suggestions and conclusion

- **Substantial progress in the preparation phase of *EUPOS* and as a whole**
- **For further preparation of EUPOS it should be accomplished the proposals given in this report**
- **Further development and realisation of *EUPOS* is of a great many-side importance.**

Thank you for your attention !



<http://www.eupos.org>

