DELIVERABLE 1.2:
PLAN FOR THE USE AND DISSEMINATION OF THE FOREGROUND

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RE	**Restricted to a group specified by the consortium (including the Commission Services)**	
CO	**Confidential, only for members of the consortium (including the Commission Services)**	

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Plan for the use and dissemination of foreground

The dissemination of the results of the work conducted by the SOTERIA consortium is a key aspect of the program. To this end, we have created an entire work package devoted to this activity, WP6, as described above. Below we describe the guiding principles and practical implementations of our plans for the use and dissemination of the project results.

1. Detailed aspects of the Dissemination Plan

The SOTERIA dissemination plan is organised around the following activities:

Publications

A key aspect of SOTERIA is the publication of research results and technological advances in peer-reviewed scientific journals. The SOTERIA teams, collectively and individually, have a track record of far exceeding four published scientific papers on international peer-reviewed journals. It is expected that the requirement of four papers will also be largely exceeded. Two types of publications are envisioned. The first type will be on the data available in the SOTERIA consortium and the methods used to analyze it. For this type, the target journals will include the four primary space physics journals: Journal of Geophysical Research (USA based), Astrophysical Journal (USA based), Astronomy and Astrophysics (EU based) and Annales Geophysicae (EU based). The second type of publications will be on the software architecture and management of the databases. The target journals for this will be software journals such as Concurrency and Computation, or Computing in Science and Engineering. We keep records of SOTERIA related papers published or submitted for publication. Every member of SOTERIA can directly put their publications on the wiki of SOTERIA.

All works sponsored by SOTERIA should have the following acknowledgement: The research leading to these results has received funding from the European Commission's Seventh Framework Programme (FP7/2007-2013) under the grant agreement n° 218816 (SOTERIA project, www.SOTERIA-space.eu).

Conferences

A key aspect of SOTERIA is the presentations at conferences (in the form of posters or oral communications).

We keep records of SOTERIA related conference presentations. Every member of SOTERIA can directly put their publications and presentations on the wiki of SOTERIA.

All talks and poster funded by SOTERIA must show the flag of the EU, the logo of the FP7 and the SOTERIA logo. These are provided on the main SOTERIA web page.

Organisation of Conferences

SOTERIA provides organisational support for conferences and special sessions related to SOTERIA activities and more generally related to space physics and space weather. SOTERIA helps disseminating the information for such conferences and provides its beneficiaries with the financial tools to attend and present the work or contribute to the organisation.

We plan *annual meetings* to promote exchange, to reduce travel costs and to increase the collaborative spirit in European space research.

On occasion of *international scientific meetings* (e.g. the European Space Weather Week (ESWW), the Annual Convention of the European Geophysical Union - EGU, the Fall Meeting of the American Geophysical Union - AGU, the Annual Meeting of the UNION RADIO-SCIENTIFIQUE INTERNATIONALE - URSI), special sessions will be organized, devoted to the progress of the present collaborative project. The SOTERIA teams will host *specialized workshop* and will organize *special sessions at large international conferences* such as the annual meetings of the largest international space and geophysics organizations (the European Space Weather Week, the European Geophysical Union and the American Geophysical Union). The link with the European Space Weather Week (ESWW) will be pursued with particular focus, thanks also to the presence of members of SOTERIA in the local organizing committee (D. Berghmans of ROB) and in the program committee (T. Dudok De Wit of CNRS, co-chair of the ESWW). These venues will allow us to reach a large public. As an example the last AGU meeting gathered over 13,000 people, attracting major media events such as a public lecture on global warming by the former USA Vice President Albert Gore. These venues will be a perfect host to reach the maximum exposure for the results produced by the SOTERIA project. The workshops organized by SOTERIA at these large meetings will have approximately 20 speakers and 100 poster presenters, the target audience being the whole space-physics community attending these meetings, estimated to be around 1000 people.
We plan to organize in detail the following workshops:

- o at the ESWW for each year of the project.
- o at the AGU fall meeting.
- o at the EGU annual meeting.
- o at the COSPAR general assembly.

Several SOTERIANs (e.g. V. Bothmer, J. Lilensten and T. Dudok De Wit) will be involved in the *Sun festival*, a yearly event in June to promote the interest in the Sun.

One *capacity building workshop* will be organized at the Royal Observatory in Brussels (Belgium) to create a larger team expert on the use of of the SOTERIA databases and facilities. The event is primarily designed for the consortium but it is open to the European society. The workshop will include technical presentations and outreach events better suited to the wider public. The main audience of the workshop will be potential users, focusing primarily on SOTERIA beneficiaries but open to all.

Dissemination of the Foreground

A further crucial aim of the SOTERA collaborative project is the dissemination of the foreground and especially the databases and of the analysis tools developed to study the forecasting of space weather events. Specific activities will include:

In-person Outreach

- One summer school will be organized during the summer of the second year of the funding cycle, on the topics that are addressed in the SOTERIA project. The motivation for taking such a step is that several leading experts are close to retirement while we now have a new generation of excellent young scientists. The summer school will be a good opportunity to provide the younger scientist with intensive training in solar-terrestrial physics, with an emphasis on data access and delivery. The format will be based on current similar efforts conducted by COSPAR on capacity building workshops, (see for details http://www.faculty.jacobs-university.de/jvogt/cospar/cbw6/). COSPAR will indeed be interested in supporting such a school on the topics proposed by SOTERIA. The expected total budget for inviting 25 students is about 50k€. This budget is added to "other expenses" in the coordinator budget.
- Exchanges on a one-to-one basis between the scientists and representatives of different European entities, such as ESA officials, and representatives of industries with interests in space weather threats (e.g. airline companies, IT companies). The target audience will be scientists, engineers and managers of academic institutions and companies with interest in activities affected by space weather and potential end users of the databases produced by SOTERIA. These exchanges will take please every year at the general meeting, by organizing a user's workshop after the general meeting. Furthermore, two more events will be organized at the end of the second and third year to disseminate the information regarding the SOTERIA databases.
- E-mail helpdesk linked to the Soteria web page and providing a link for the public with the experts within SOTERIA with attantion to in-house technologies among researchers but also toward participating and future collaborating companies. This will be crucial for truly making our databases available to the public.

Web-based Outreach (http://SOTERIA-space.eu)

The web page (Deliverable 1.6) is maintained in-house by the coordinating team of KU Leuven and its address is http://SOTERIA-space.eu. The web page is cross-linked with the European Space Weather Portal, with ESA's SWENET and with NASA's Community Coordinated Modelling Center.

We remark that while desirable the use directly of simply "SOTERIA" as the name for the web site turned out impossible because "SOTERIA" is a widely used term in psychiatry (referring to a cure for schizophrenia), so all names using simply SOTERIA were all unavailable. SOTERIA-space was selected after a informal all-hands vote at the kick-off meeting. The web page provides a simple introduction of SOTERIA for the general public and lists all activities of SOTERIA, focusing especially on: conferences and meetings, pictures and movies, positions available within SOTERIA, publications, news on recent developments relative to SOTERIA (with the most recent and important listed in the very centre of the web page in the most visible location). The web page also provides links to the web pages of all the beneficiaries and has a google map of Europe with the indication of the location of each members. The web page also links to several useful tools designed not just for SOTERIA but also for the general public: a code repository on source-forge.org, a document repository created as part of the activities of WP6, and the link to useful web sites and services related to space studies.

The wiki has an address at http://SOTERIA-space.eu/wiki/ and provides a forum for SOTERIA beneficiaries to exchanges views and information. The wiki is a key tool for interactive online writing. Each registered user can read and modify the text written by all others. This facility proves

especially essential in putting together the present report, by allowing all people to enter their contribution in a organised and structured form. The wiki allow also peer review of the text written by all members. The wiki was originally designed to be open to the public so that anybody could contribute to it, in the same way as the famous wikipedia. However, two hacker attacks forced us to introduce a more restrictive policy and to block some I.P. addresses. At this moment users need to register and use their password to enter information on the wiki, but still the general public can read (but not modify) the content.

Three additional steps were taken to facilitate the exchange of information with SOTERIA and with the general public (not only the scientists):

1. The creation of a *SOTERIA account on SourceForge.org* to exchange open source codes. This facility is particularly useful for the data assimilation effort within WP4 but can be used by all. The SourceForge account has its own web access and its own wiki dedicated especially to the code development effort. All codes generated in this repository are open source and anybody can download and use them. Instructions are being constantly updated. This effort is managed by the Coordinator. The address is: http://sourceforge.net/projects/SOTERIA/ and can be accessed directly from the SOTERIA web page.

2. A *YouTube channel* has been created to host movies of observations, simulations and outreach activities. The address is http://www.youtube.com/user/SOTERIAspace and can be accessed directly from the SOTERIA web page.

3. A *image repository* to store scientific images generated by the SOTERIA investigations, the logo of SOTERIA and pictures commemorating important events. The address is http://picasaweb.google.com/SOTERIAspace and can be accessed directly from the SOTERIA web page.

These three tools besides being of value to the SOTERIA collaboration constitute also a useful and meaningful outreach activity.

As part of WP6, a document repository has been created by the ROB beneficiary and its link is provided on the web page. The repository will include not only SOTERIA reports but also scinetific reports from space weather-related activities.

Finally we have made a concentrated effort on the awareness and wider societal implications (Deliverable 1.5). We have written a short flyer and article that was published by the European Parliament magazine (distributed to all EU MPs) and we participated with the flyers to the environment event organised in Prague by the Czech Presidency of the EU. Future plans for similar activities will also be discussed by the Steering Board, at the General Meeting and will be implemented.

2. Longer-term Legacy and Exploitation of project results

The guiding principle in forming the SOTERIA consortium is the goal to bring together groups that have expertise both as producers of observational data and as users of it. This aspect will maximize the potential for exploitation of the results and in particular of the databases and analysis tools produced by SOTERIA. Creating a database with great exploitation potential requires one to address the needs of the potential users. We have addressed this need by including users among the teams that will contribute to the design and implementation of the SOTERIA databases.

The core topic of the collaborative project SOTERIA (gathering the totality of the available data on space weather and providing access and analysis tools to treat it) has a great potential for exploitation in many aspects of the European society. Space weather storms affect negatively space activities and even affect infrastructures located on the Earth.

Space–based activities are at the highest risk as they are exposed directly to space storms. A Coronal Mass Ejection on January 7, 1997 hit the Earth's magnetosphere on January 10 and caused the loss of the AT&T Telstar 401 communication satellite (a $200 million value), resulting in a significant interruption of the television signal over north America for several hours. The further away a manufacture is from the Earth, the more exposed it becomes to space storms, because the Earth magnetic field provide a measure of protection. Japan's Nozomi Mars Probe was hit by a large Solar Energetic Particles event on April 21, 2002, which caused large-scale failure. The mission, which was already about 3 years behind schedule, was eventually abandoned in December 2003.

The best-known example of space weather events affecting directly ground installations is the collapse of the HydroQuebec power network on March 13, 1989 due to geomagnetically induced currents. This was started by a transformer failure, which led to a general blackout, which lasted more than 9 hours and affected 6 million people. The geomagnetic storm causing this event was itself the result of a Coronal Mass Ejection, ejected from the Sun on March 9, 1989.

But humans are directly affected by space storms as well. Luckily, no large Solar Energetic Particles event happened during a manned mission. However, such a large event happened on August 7, 1972, between Apollo 16 and Apollo 17. The dose of particles that would have hit an astronaut, if it had happened during a manned mission to the Moon, would have been deadly or at least life-threatening.

Even without leaving space, space storms pose risk to the aviation industry, especially with regards to flight over the poles where energetic particle from space storm can reach particularly close to the Earth. It is estimated that a cost of about 100,000 US dollars has to be incurred each time a flight has to be diverted from a polar route. Nine airlines are currently operating polar routes. As an example United Airline operated 1402 polar operations in 2005, and the number is rapidly increasing.

The grave impact and the serious implications to human life and to the economy render space weather a major priority in space research. We have identified four types of sectors that will receive our strongest attention in disseminating the results of the SOTERIA collaborative project and will constitute future beneficiary for the work conducted within SOTERIA:

- The European Space Agency, ESA, will be a constant source of input not only because many of the satellite missions that produce the observations that will form the SOTERIA databases are run by ESA. The teams collaborating in the SOTERIA project are in many cases already partly funded by ESA and have a strong relationship with ESA officials. Such relationships will be further cultivated to help direct the activities of SOTERIA towards goals that are relevant to ESA. To help further this goal, ESA officials will be invited to the General Meeting of SOTERIA. Further input will be solicited via the ESA Space Weather Working Team (SWWT) thanks also to the membership in it of several members of the SOTERIA consortium.

- Some of the major airlines, in Europe and beyond, are required by Aviation Authorities to be cognizant of space weather events and to redirect polar flights whenever needed to avoid risks to passengers and especially to the crew (who is on such flights recurrently and therefore more subject to radiation exposure). Airline operations officers will be also involved in the activities of SOTERIA to help design and implement the databases to ensure relevance of the final product to the European airline sector.

- The electricity companies and telecommunication companies are the owners of the infrastructure directly affected by space storms. They will be among the main beneficiaries of the end product of the SOTERIA effort and their input and interests will be considered in the implementation of the SOTERIA work packages.

- The insurance companies are the main financial sufferers of space storms, as satellite technology is ensured. In the five year period 1994-1999, half a billion dollars were distributed by insurance companies for claims related to space weather. Insurance companies were among the first to realize the importance of space weather research. Their receptiveness to such themes will be used to establish an outreach channel to increase the impact of the SOTERIA project.

While space weather is a global problems, Europe and Asia are much more susceptible to it than North America or countries in the Southern Hemisphere. The North Atlantic circulation pattern, at least while global climate changes do not disrupt it, brings warmer temperature to the British Isles and Northern Europe, but bring cold polar waters to North America. The end result is that in Europe populated and intensely industrial areas are present at much higher latitudes than in America. It is worth remembering that the main inhabited areas of Canada, the furthest North in North America lay at the same latitude as northern Italy or Southern France. Very few humans live in North America at the latitudes were large cities such as Edinburgh or Stockholm are located. These simple geographical facts makes ground based installations in Europe, such as power grids, more susceptible to space storms than their equivalent in North America. Therefore for its own interest, Europe should lead and not lag in space weather research. This is a task that SOTERIA intends to reach by collaborating with the space weather efforts in North America and Japan.

The results of the SOTERIA effort are public and will be made available to any public or private entity without any claim to copyrights. The management of the intellectual property will ensure that the potential contributions of the small and medium size private enterprises involved (IEEA, Noveltis) can be successfully included for the continuation and completion of the activities related to the project.

Specifically in the SOTERIA work-plan, NOVELTIS provides the partners with data from the NOVELTIS SPECTRE service developped previously: NOVELTIS keeps the property rights on these data, these data are delivered for a use by and during the SOTERIA project only.. It is possible that during SOTERIA project Noveltis may transmit to the partners software, either with or without modifications. In any case, this software will rely on existing tools already distributed by labs or research institutes, and this software may have its own IP conditions (e.g. License for non commercial exploitation). Within the SOTERIA deliverables, NOVELTIS do not have to provide items that would not be public. Similarly, during the SOTERIA project plans the delivery only of the data which will be collected during the contract and therefore made publicly available. IEEA will also use their existing Global Ionospheric Scintillation Model (GISM) and take the opportunity of new observational data to improve it. This model has been developed previously and it is a commercial tool. However IEEA has no objection to make it available for SOTERIA, while retaining the property and SOTERIA members would have, if needed, only the right to use it.

The efforts of the SOTERIA collaborative project are intended for the benefit of mankind, focusing primarily on the interest of Europe.