

**A European Approach to
Global Monitoring
for
Environment and Security
(GMES):
Towards Meeting Users' Needs**

Joint Working Document by Staff
of the European Commission
and the European Space Agency

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Executive Summary

Dans la lignée de la stratégie européenne pour l'espace élaborée par la Commission et l'Agence spatiale européenne (ESA), les Conseils de l'Union et de l'ESA ont souligné le caractère stratégique pour l'Europe d'un accès global, indépendant, fiable et pérenne aux informations relatives au suivi et à la gestion de l'environnement, à la surveillance des risques et au renforcement de la sûreté et de la sécurité civile (e.g. pour le changement global, le stress environnemental et les catastrophes).

Ces informations sont critiques pour une définition et une conduite avisée des politiques au sein de l'Union et pour leur mise en oeuvre effective. Elles constituent également un élément primordial à la contribution de l'Europe aux questions touchant l'environnement global et la sécurité de notre planète.

GMES est un concept ambitieux qui concilie les besoins politiques associés aux questions d'environnement et de sécurité avec les capacités scientifiques et technologiques offertes par les technologies de la société de l'information et de l'observation terrestre, grâce notamment aux satellites d'observation. A terme, il s'agit de mettre en place en Europe une entité reconnue à laquelle décideurs et utilisateurs de ce type d'information puissent s'adresser. La multiplicité des acteurs et des facteurs conditionnant le succès d'une telle entreprise rend nécessaire le lancement de l'initiative GMES.

Des développements et des systèmes précurseurs (issus notamment des travaux de recherche) peuvent être utilisés et adaptés pour répondre aux besoins de GMES. Pour assurer le passage à une phase pleinement opérationnelle au cours de la décennie, une coordination au niveau européen des acteurs de l'offre et de la demande et la mise en place d'un cadre institutionnel assurant la fourniture à long terme des services requis (qu'ils soient d'intérêt public ou à vocation commerciale) par les utilisateurs sont indispensables.

En pratique, GMES se déploie selon trois lignes d'action :

- la fourniture des informations et des services répondant aux besoins des utilisateurs ;
- l'évaluation permanente des besoins et des processus de production et l'animation du dialogue entre les acteurs de l'offre et les utilisateurs ;
- le développement des infrastructures requises et l'amélioration des services.

GMES associe la Commission européenne, l'Agence Spatiale Européenne, l'Agence Européenne de l'Environnement (EEA), les agences spatiales, l'industrie, les administrations nationales et les communautés scientifiques.

Dans le cadre d'une période initiale 2001-2003, neuf thèmes potentiels ont été identifiés qui peuvent donner lieu à une mise en œuvre immédiate et à une première démonstration de services opérationnels, en utilisant en particulier les instruments communautaires, de l'ESA et nationaux.

A l'issue de cette phase, une revue d'étape permettra de procéder à une évaluation et de proposer le cadre institutionnel définitif permettant d'assurer la qualité et la pérennité des services et les mécanismes de financement adaptés.

Durant cette période, la cohérence d'ensemble de l'initiative GMES sera garantie par l'intermédiaire de la présente stratégie de mise en oeuvre et la mise en place d'une structure légère composée :

?? d'un comité de pilotage (« GMES Steering Committee ») composé des acteurs principaux impliqués dans GMES. Le comité donnera les orientations stratégiques et élaborera des recommandations sur la coordination et les contributions des différents acteurs ;

?? d'une équipe de soutien (« Support Team»). Cette équipe sera ouverte aux différents contributeurs et constituée autour d'un noyau Commission/ESA, animant la relation avec les utilisateurs et les fournisseurs de service et coordonnant les trois lignes d'action identifiées.

“...We must aim to become a global civil power at the service of sustainable global development. Only by ensuring [this can] Europe ..guarantee its own strategic security...”

Romano PRODI, President of the European Commission

Introduction

At the European Summit in Göteborg, Europe will assert its determination to play a leading role in the field of environment and sustainable development¹. Be it at regional or global level, in the spirit of global governance, the Union is to respond to new international challenges concerning crisis management, peace-keeping operations and the provision of humanitarian and development aid.

Whilst Europe has indisputable scientific and technical capability, a serious risk exists that it could become reliant on other nations to meet information needs relating to key policy issues such as environment treaties, conflict prevention, and humanitarian actions.

As a result, the Union’s policy makers must ensure Europe has access in a continuous fashion to high-quality information services on critical issues relating to environment and security.

The Global Monitoring for Environment and Security (GMES) initiative is a unique opportunity to respond to this challenge. It is fully in line with the Communication on the European Strategy for Space². The present text provides a first answer to the EU and ESA Ministerial Councils who in their Resolution of November 2000 invited the Commission and ESA, together with Member States, *“to outline the*

¹ “A sustainable Europe for a better world. A European strategy for sustainable development” COM(2001)264

² « Europe and Space – turning to a new chapter” COM(2000)597 - ESA/C (2000) 67, rev.1

GMES initiative, starting from the needs of users and the civil society and to prepare implementing proposals”.

This document provides the common reference for the various projects, action plans and programmes that may stem from different GMES stakeholders. As such it presents a framework for co-ordinated action by all partners to develop further an initiative on GMES with the objective to prepare implementation proposals.

Part I : THE GMES CONCEPT

Background

GMES was launched in 1998 by the European Commission and a group of Space Agencies³. It is, technically speaking, a dedicated effort to put knowledge-supporting techniques (typically Earth observation and information society technologies) to the service of better environmental management and security.

1. Needs to be fulfilled and expected benefits

? *Building a tool to address global and European regional problems*
Environmental degradation and change is a global problem. The security of the citizen from environmental hazards and threats has global implications, from reconstruction after crises to the formulation of aid packages to ensure sustainable development. Both require global monitoring capabilities to assess the status and to form the basis for action. This needs to be done in the international context, sharing information with the global community. This must also be carried out at the

³ « The GMES partners : the Baveno Manifesto » (October 1998)

European regional level (including enlargement perspectives), allowing European policy to be properly developed and monitored.

? *Matching availability and demand – securing coherence and continuity*

Over the past 20 years, the combined advances in earth observation and information technologies have dramatically increased the amount and variety of data on natural phenomena and the ability to process these. This has been in parallel to a growing demand for information required for policy development and implementation.

However the operational availability of the right information, in the right form, at the right time, does not yet meet policy needs. In particular the requirement for long-term information supply must be secured. Too often data lack coherence between topics, compatibility between countries; there are gaps in coverage. Coordinating the entire information delivery chain, relevant observations, models and information systems and ensuring its consistence is required.

? *Ensuring independence in an international context*

The question of independence in the acquisition of information bears upon the GMES initiative in three ways :

- reliable information is required to shape and implement policies in an independent way : for example, bodies in charge of environmental management require independent assessments. The multiplicity of stakeholders is likely to reinforce the need for accountability and call for a more stringent validation of information;

- through obligation linked to international agreements or in view of strengthening links with foreign entities, the Community actively cooperates with international initiatives. GMES means that Europe intends to equip itself with the means to properly carry out such mission and that it will at the same time gain for itself and its partners the ability to “see first hand” and follow the evolution of the world’s resources and environment;
 - GMES will allow Europe to have its own strategic, independent capability for monitoring environment and security issues on a global basis. It will allow Europe to maintain a constant watch over global trends and events and to take the role of the champion of global environmental stewardship.
- ? *Developing the industrial base – reaping the benefit of research*
- GMES will support the development of a competitive high technology industry in the strategic fields of information technology and earth observation from space, as well as the promotion of innovative services. Europe’s strength in the research and development domain, which has built over many years, will be transferred to the operational domain.

2. The GMES objectives

GMES is an ambitious European initiative. The aim is to support Europe’s goals regarding sustainable development, global governance, by facilitating and fostering over the next decade the provision of enhanced quality data, information and knowledge. It will do so by paying particular attention to a better use of information technologies

and by stimulating partnership and cooperation across the whole variety of stakeholders and actors.

The components of the initiative are institutional (e.g. federating needs, securing long-term efforts) and technical (e.g. monitoring infrastructure, building information networks). Its added value besides in the relation of coherence and efficiency from the data acquisition to the production and use of information. The aim is to achieve a significant leap forward in the quality of information and services delivered.

It is also a goal of GMES to provide information in a transparent and user-friendly manner, allowing access to high quality services. This concept of open information architecture will provide means for a more democratic participation in policy-making.

2.1. Basic factors

GMES is based on the following points :

?? *User Driven Approach* : the information needs of policy in the fields of environment and security are the main drivers for GMES. Key organisations in the environment field (e.g. European Commission, European Environment Agency) are involved in developing this initiative. Their requirements, plus those of other environment and security organisations, will underpin all aspects of GMES;

?? *Partnership* : to achieve its objectives GMES has to be a partnership of all stakeholders from across Europe. Space agencies and industry will respond to users' demand by putting in place operational systems to meet their needs. Research

organisations will seek to fill the gaps between users' information needs and current capabilities. All this must be achieved following a coherent, planned approach.

?? *Role of Earth Observation* : Earth observation from space has a unique and valuable role to play in the production of data and information related to environment and security. Although the space segment represents only one source of the data needed and has to be considered in conjunction with other means of data acquisition and information gathering, it constitutes a critical component for building the type of information services which are needed.

?? *Operational Information Supply* : a transition from experimental to operational information systems is needed, the latter being missing in most cases. EU citizens and policy users require operational information systems geared to the generation of timely and precise information on environmental and security issues assured in the medium to long term. Existing capabilities from across Europe, including from the research domain, must be developed into operational systems and services capable of providing the demanded information.

?? *Use of existing capabilities and on-going initiatives* : Some elements that can contribute to GMES already exist, primarily for research purposes. The objective is to assemble these elements in a workable and coherent fashion. On that basis, missing elements (e.g. operational and sustainable services, space and ground infrastructures) will be identified and developed. Concretely, the 5th Research Framework Programme⁴ offers inputs to GMES. Existing European data

⁴ cf. The European component of the global observing system under key action "Global Change and biodiversity" in the Energy Environment and Sustainable Development Programme, and the

sources (i.e. ERS, Envisat, Meteosat, SPOT) will be used to the maximum extent possible. In the ESA context, the future EarthWatch Programme⁵ associated with the on-going Earth Observation Envelope Programme⁶ should also be a major contributor. Eumetsat already has operational capability in the field of meteorology that can contribute to GMES. Many other public efforts are underway from Member States. GMES will not substitute the existing arrangements, instead it will build on these.

?? *The pervasive Role of Research and Information technology :* European expertise is at the very core of the GMES initiative. The scientific community will have to actively contribute to the definition of the common framework, provide a continuous and explicit contribution to the foreseen activities and further clarify the need for knowledge. Research will also be a key customer for the functions and data sets generated by the GMES initiative. The challenge is to gain a better understanding of the users needs in relation to GMES and to offer solutions which are sufficiently cost-effective to be viable. It is also to exploit Europe's industrial and technological competences in information and communications technologies.

2.2. Policy Drivers

The environmental dimension

The European Union has repeatedly demonstrated its desire to preserve the environment and is a driving force for international environmental co-operation. Europe has aspired to the

Euroforeo thematic network (support to GMES through awareness building and user involvement), and the Tease thematic network (analysis of the GMES telematics infrastructure requirements)

⁵ ESA/PB-EO(2001)2 rev.1

development of Community systems for assessing environmental conditions for many years. The recent 6th Environment Action Plan highlights research, information, monitoring and use of indicators as being at the very heart of the political decision making process.

Of particular relevance is the effective management of our common territory. The establishment of the European Environment Agency (EEA) and European information observation network (EIONET) operated with Member States are expressions of this need. GMES will reinforce a Community perspective on the environment through the acquisition of coherent data sets and through ensuring the flow of information to all levels of society.

Improvements in the quality, timeliness and harmonisation of environmental information will promote environmental co-operation and will help in setting and implementing mutually beneficial policies. Increasing emphasis on environment in the Common Agricultural Policy and European Union enlargement will only add to the need for a co-ordinated Europe-wide approach.

The need to deal with worldwide environmental problems is explicit in Community policy. This is seen in participation to multilateral environmental agreements and in the EU's role as the world's largest donor of international aid. The Union recognises the importance of co-operation and combined efforts in tackling global environmental problems. It draws attention to the value of some of its positions compared with those of other major economic powers (cf the current debate surrounding the UN Framework Convention on Climate Change and its Kyoto Protocol). Policy positions must be backed up by the best science and the best information. GMES will provide Europe with global information and be a recognised

⁶ ESA/PB-EO(2001)50

European contribution to international efforts to provide long-term observations and measurements where needed.

The security dimension

The GMES concept reflects a significant relationship between global monitoring and security, not least as regards the environment. Negative trends in environmental quality and the depletion of vital resources carry a potential for conflict. Such issues play a significant role in determining strategies for conflict prevention, a key aspect of wider European security policy. The potential role of the GMES in this context has been confirmed in a recent Commission communication on conflict prevention⁷. The Union has also, in the context of developing a European space policy, recently stressed the importance of acquiring additional assets in this area. An awareness of this potential will be essential as GMES is developed. Security related applications will need to be developed in an inductive way as opportunities arise. Due account will have to be taken of the competencies of the Community on the one hand and the role of the second pillar in the Commission foreign and Security Policy context.

3. GMES partnership

The production and delivery of information for environmental and security policies is a process which involves a large number of public and private organisations. Many of these have specialised in specific functions:

- Data collection
- Production of policy-relevant information;

⁷ “Conflict prevention” COM(2001)211

- Development of knowledge and models to turn data into information);

In addition the users (e.g. administrations, interest groups, need to be associated to the production of the information. The success of the GMES initiative will rely on a correct articulation of contributions by all partners and stakeholders, to make the most possible efficient use of expertise, technologies and resources :

- *The European Commission* : is the initial promoter of GMES. It will continue to assess requirements emerging from new or evolving Community policies and to initiate the research and development actions, which are required. The Commission will stimulate the appropriate involvement of industry and will ensure, jointly with ESA, the co-ordination of the overall GMES initiative and its implementation. It will provide initial financial support to selected priorities included in this plan. It will foster the political process to ensure the implementation of GMES;
- *The European Space Agency* : ESA will act as an implementing agency for the development and procurement of the required space infrastructure and associated ground segment and will contribute to the development and demonstration of precursor services. With respect to GMES, ESA will coordinate the implementation of space-related activities among the concerned partners (i.e. European Commission, Eumetsat, national Space Agencies, industry and research organisations);
- *The European Environment Agency and Users organizations* : User organisations and in particular the EEA will act as a key driver for the development of GMES. In addition to the EC and the EEA, environmental and security organisations responsible for the development and implementation of policy and for the collection and collation of information to support it (e.g. national agencies) will set requirements for

information, and will provide feedback on information received;

- *Industry:* within the information production process, the various industrial actors play a role at several levels in particular for the provision of :
 - o the infrastructure (on the ground as well as in space) and its operation for the delivery of data services;
 - o operational information services to the public and private sectors;

In addition, as end user, industry will benefit of information services in the pursuit of commercial goals. Industry must be offered transparency in the whole GMES process in order to be able to maximise the potential for industrialization and exploitation;

- *National Space Agencies and Eumetsat:* will contribute to the development and procurement of the required space infrastructure and associated ground segment and to the development and demonstration of services;
- *Research Organisations:* at the European and national levels, these will undertake research and development to fill the technical gaps between what is possible today and what the user organisations actually require;
- *Science :* Science (e.g. global and environmental change science) will benefit from the information produced by GMES which will contribute to their scientific aims. These will be taken into account when establishing the GMES operational information production systems;
- *Civil Society:* NGOs and other representatives of Civil Society will be the recipients of the information produced, along with the policy user organisations.

Part II: IMPLEMENTATION STRATEGY

1. Goal

The implementation strategy is designed to provide a common reference for the various projects, action plans or programmes which may stem from the different stakeholders' activities. As such, this document sets the framework of co-operation and work-sharing for the establishment, by the end of the decade, of a European capacity for global monitoring of the environment and security. It describes in more detail the activities to be undertaken during an initial working period as well as the interim organisational arrangements for this period. The present document is a starting point for pursuing the concertation and consensus building process, which is inherent to the GMES initiative.

The aim of the implementation strategy is therefore

- to build the level of political support for user-led GMES activity;
- to organize the supply of information systems and services;
- to federate the demand for information.

A close collaboration between user and supplier communities will be needed to rapidly develop a coherent and common view of the information required by users and pre-operational services using and developing the European capacity.

2. Planning

While some institutions or bodies might have a good perception of their possible future role in GMES, depending on their mandate, expertise or on existing agreements, all potential actors will benefit from a clarified operational and sustainable structure.

2.1 Initial period (2001-2003)

The aim of this period is :

- to provide clarifications and answers on key questions of technical, socio-economic, scientific and institutional nature for the establishment of GMES;
- to build support and commitment for the GMES undertaking from the many actors involved in the production of information for environment and security policies ;
- to supply knowledge on priority environment and security topics.

2.2 Milestones

By the end of 2001 the EC will have produced a detailed Action Plan for implementing the initial period. On the ESA side, a GMES Action Plan will be put forward to the ESA Council in June 2001. Other stakeholders are invited to bring forward their plan within the same time frame.

At the end of 2003, the results will be drawn together and the objectives and plans for the next period will be set out. The review will focus on :

- the analysis of the lessons learned so far;
- the proposal to the relevant authorities and actors of a definite organisational/institutional set-up caring for GMES sustainability;

- an analysis of financial requirements;
- a long-term perspective to establish a fully-fledged GMES activity.

3. Actions

Three main strands

The actions presented below describe the dynamic model of GMES not only for the initial period, but for its entire implementation life.

The GMES dynamic model

GMES is an iterative process. A three-strand approach is pursued. GMES will :

- **deliver** specific information and information services on the basis of user driven applications and **learn** from these;
- **assess** the information production processes and **structure** the demand and supply sides;
- **develop** the required infrastructure and the knowledge base in order to secure and **improve** a sustainable approach to the delivery of information.

A long term commitment from public authorities will be required in order for the actors to support the listed actions by assuring a continuity and quality of data and information collection and delivery.

?? Strand 1 : Deliver to learn

Objectives :

- to deliver quality and synthesised information to users on priority topics to support Community environment and security policies;
- to contribute to the identification of obstacles and solutions to the production of this information.

Priority areas of activities :

Potential priority areas have been identified according to the following criteria : **(i)** relevance to EU policies; **(ii)** possibility to produce results rapidly; **(iii)** complementarity with and added value to on-going activities; **(iv)** known interested users.

They have been selected in conjunction with the EEA and on the basis of the stakeholders' inputs during the concertation process. A consultation has also been undertaken with Member State organisations to help to define these themes⁸. For each of the priorities (presented in the **annex**), the goal, relevance and their potential users have been identified.

Expected deliverables :

- Information, data bases and derived products;
- Operational support systems;
- Input to integrated information systems targeted at the generation of sustainable development indicators (global and regional scales);
- Identification of obstacles to information production problems (e.g. data standards, data policy, monitoring infrastructures, research needs).

⁸Cf: Reference : the requirements briefings defined by the GMES Partnership (see <http://gmes.jrc.it>); the Stockholm User Workshop, March 2001; the Baveno Consultation Meeting, Mars 2001.

?? **Strand 2 : Assess to structure**

Objectives :

Drawing upon the experience gained under Strand 1 and the awareness generated by implementing the priorities, the following objectives will be pursued :

- assessment and update of the GMES user needs;
- assessment of the obstacles to an efficient production and delivery of information for environment and security policies (e.g. the influence of data policies, the incorporation of monitoring requirements in legislation, the role of public and private funding, economic costs and social benefits);
- identification of solutions;
- establishment of a structured dialogue and collaboration between the actors and institutions involved in the process of production and delivery of information.

Expected deliverables:

- Assessment report on the obstacles to the production and delivery of information and identification of solutions; assessment of scientific and technological gaps and potentials; updated users requirements for environment and security topics;
- A GMES Forum and specialised networks (information users, information providers, data suppliers).

Deliverables should provide the technical evidence upon which to base the proposals for the next GMES period. The GMES Forum will rally the Community of actors concerned with environment and security information.

?? Strand 3 : Develop to improve

Objectives :

Strand 3 is concerned with political, technological and scientific developments for the production and delivery of better quality information for environment and security policies. The strengths, weaknesses, opportunities and specifications resulting from the assessment produced under Strands 1 and 2 will constitute the basis for the following actions:

- Data services : improving the quality and availability of basic data from monitoring programmes and infrastructures;
- Complementing and adjusting planned remote sensing and ground monitoring programmes and infrastructures and developing new ones to achieve coherent and complementary services;
- Implementing and developing information technologies for data transmission, access and processing and for information access;
- Research and development to produce knowledge and models on natural processes and their interactions with human activities, to transform data into information.

The Strand 3 activities will allow to lift, through co-ordinated decision-making on strategic orientations, the data collection and information making processes to higher levels of efficiency.

Expected deliverables:

- Specific improvements on above services, infrastructures, services and knowledge;
- Identification of adjustments needed to the current programmes of monitoring infrastructures, of data services, and of GMES related research and development.

4. Organizing the effort

Being by nature a coordination effort of distributed and heterogeneous undertakings, GMES needs a flexible organizational scheme. Various activities and instruments already exist in the Union, with ESA, national Space Agencies and elsewhere that can contribute to support the initiative in a concrete fashion. Ensuring coherence demands a close co-ordination amongst the relevant stakeholders, be they public or private, as well as the acknowledgement of the users' determinant role.

Definite organizational arrangements suitable for GMES' long-term implementation will be proposed at the end of the initial 2001-2003 period. They could take the form of an Agency, a Joint Undertaking (cf. article 171 of the EU Treaty) or any other appropriate scheme. In the short-term, an initial, reasonably lightweight, structure must be established promptly.

The main aim of the initial structure will be twofold: **(i)** to overview the GMES initial period; **(ii)** to identify the permanent organizational framework to follow this initial period.

It will comprise two elements: a GMES high level Steering Committee and its GMES Support Team, supported by a series of flexibly-organized activities.

4.1. GMES Steering Committee (GSC)

Mission : the Steering Committee is designed to turn the current patchwork of interests into an organized setting and helping to make GMES a practical reality. The GSC will bring together figures at

senior level from GMES stakeholders, ESA and the Commission to build consensus in favour of strategic actions.

The GSC primary outputs will be twofold. The first will be to guide and approve the objectives and plans to be delivered at the end of 2003. On that basis, the second output will be to establish GMES strategic requirements that influence all European stakeholders in the planning of their respective activities. As such, the participation in the work of the GSC would involve a commitment to plan one's own activities in the light of the priorities and recommendations. Overall monitoring of the activities and concertation at the GSC level should also help in the co-ordination of tasks and shaping relations between national, ESA and EU programmes as well as influencing the deployment of funds.

The GSC should in particular foster:

- the mobilization of Users and the capture of their requirements;
- the proper implementation of GMES;
- the development of the necessary RTD efforts;
- the association of public and private resources;
- the definition of a permanent structure to follow-up the initial period.

Besides that, the GSC should evaluate the outcome and benefits of the initiative's initial work, establish measures for optimizing the use of existing elements and achieving cost-effective investments. It should also develop and implement a communication strategy to promote awareness within the stakeholders' community as well as to larger public audiences.

Set-up: The GSC will be a light structure of 25-35 people, identified for their experience, commitment and vision. Direct representation of the major stakeholders will be essential for this process to succeed.

Potential participants will be: European Commission, ESA and Space Agencies, the European Environment Agency, Eumetsat, national government representing environment and security departments. Industry participants and other interest groups will be identified through relevant umbrella organizations. The representatives of the GSC will be appointed following a formal request from the European Commission in collaboration with ESA.

Reporting: Each GSC participant will report to its own constituency and authority. The GSC will meet at least every semester. The Commission will make periodic communication to the Council and Parliament.

4.2. GMES Support Team

The GSC will be supported in day to day work and executing its functions by a small team (the "Support Team") embodying, like itself, personnel from the Commission, ESA and from stakeholders. In order to prepare the GSC's orientations for implementation and development, the Support Team will have to organize, animate and interact with a series of working groups.

The Support team will ensure the coherence of the projects undertaken in the three strands of activity through the group of projects coordinators. This will enable the consolidation of the GSC's orientations according to their experience. In addition, it will also organise the groups mentioned in Strand 2.

In order to ensure a proper communication dynamics, a **GMES Virtual Forum** will be set-up where deliverables of the various groups and of the coordinators network will be accessible. This Virtual Forum will also be a place to debate issues linked to the overall GMES implementation.

Part III: Further issues to be worked out during the initial period

The initial period 2001-2003 will allow the Commission, ESA and the Member States to address a series of key issues relating to the establishment of a European capacity for global monitoring of environment and security and to prepare proposals for long-term plans. These will have to rely on in-depth analyses and consultations on the development of the necessary institutional relationships and the securing of the funding instruments for GMES. Political support will be needed to encourage user take-up and to decide on potential ownership of the elements of the GMES system(s). Last the strategic role of GMES in the support to Europe's will to play a broader role in global stewardship need to be further elaborated.

1. Institutional aspects

Key challenges to address concern the issue of how the EU should organize itself with respect to GMES in the long-term and how things could be organized within Europe to make best use of its existing capabilities within organization such as ESA, the Torrejon Satellite center, Eumetsat, the EEA, as well as the Member states.

This may mean an extension of roles, a change of responsibilities or broader sharing of tasks. A new operational organization could also be envisaged that takes maximum benefit from the existing structures in the public and private sectors.

Another aspect to be addressed is how a GMES operational system would work at the different levels of local, regional and global, recognizing the different roles of national agencies (across the different

policy lines, e.g. environment, security), EU agencies and globally. The dual-use dimension should also at the proper moment be addressed.

2. International aspects

The question is to what extent Europe in developing a system for GMES would collaborate with others (e.g. USA, Russia, Canada, etc..) and rely and share data and information from international systems to build operational information gathering and international operational observing capacity. The Russian Federation and Canada have already expressed interest.

A related point concerns what the EU could offer from GMES as a contribution to international efforts and to what extent such information services could be part of a portfolio for international dealing.

3. Funding

Although GMES is largely to be built from existing systems and applications, coordination and integration efforts, the development of new advanced infrastructures and services and operational costs will require investment and support, both from the public and private side.

In the initial period (2001 – 2003) funding will be allocated from the 5th and 6th Framework Programmes. The 5th Framework Programme provides a basis for a number of activities such as the production of operational information and improved knowledge or models. Accompanying measures (e.g. studies, workshops) are also supported.

A call in October 2001 (Environment research programme) will be the first opportunity to invite GMES targeted proposals, to be followed by

a co-ordinated call (Environment and Information society research programmes) in early 2002. In addition ESA has made a programme proposal to its Ministerial Council in November 2001. The feasibility of a joint call EU/ESA in early 2002 will be studied.

The main issue will be how to fund GMES beyond the initial period, primarily establishing and using non-research funds.

These contributions will depend on the nature of the risk to be taken and of the service to be provided, some being of a pure public interest, whilst others could become commercially viable. While during the initial period it is expected to draw mostly on public instrument resources, an orientation will have to be established as to the long-term, based on a full cost-benefit analysis and considering the potential for exploiting GMES products and services in non-public sectors. The analysis of a full funding request will be carried out during the initial period.

CONCLUSIONS

The approach to GMES presented in this document is shared between the Commission services and ESA executive. It benefits from the feedback process provided by Member states and other parties during a wide consultation process.

Both EC and ESA are now elaborating more detailed plans to be formally presented during the second semester of 2001.

The emphasis is on the definition of an initial period for GMES, aiming in particular at organizing the demand, federating the supply and

starting the development of key operational services around a limited number of priorities.

With the political support of the EU and ESA Councils, a high level GMES Steering Committee, together with its Support Team, must now be rapidly put in place in order to enter the operational stage of the GMES initiative and to give it the visibility it requires.

Annex :

GMES Priority areas

EUROPEAN REGIONAL MONITORING:

A. LAND COVER CHANGE IN EUROPE

Goal: A characterisation of land cover changes (1950-2000) in the European Union and accession countries (EU 15+) with particular attention to: nature protection sites, ecosystems and landscapes; urban areas; coastal zones.

Relevance: 6th Environment Action Programme; European Convention on the protection of landscapes; Common Agricultural Policy agri-environment measures; the European spatial development perspective; EU coastal zones recommendation.

Potentials Users: Natura 2000 Committee; European Commission; Eurostat, networks of European cities and regions; European spatial planning Observatory; NGOs.

B. ENVIRONMENTAL STRESS IN EUROPE

Goal: Identify, map and characterise current "hot spot" areas of EU 15+ environmental stress, with particular attention to : oil spills; organic pollution in European seas; coastal erosion; soil degradation and desertification.

Relevance: International Conventions on seas; 6th Environment Action Programme; Coastal zones Recommendation; Convention on desertification.

Potential Users: European Commission; Coastal protection agencies; national and international environment administrations; Research organisations.

GLOBAL MONITORING:

C. GLOBAL VEGETATION MONITORING

Goal: Monitoring the conditions of the world's vegetation in view of:

- detecting events and measuring changes in global forest cover with particular attention to the tropical and boreal forests;
- contributing to assessment of food security worldwide;
- assessing carbon fluxes and stocks in the biosphere.

Relevance: International Conventions; Development Aid; International Humanitarian Aid.

Potential Users: European Commission; G8; Administrations of international organisations and Conventions; EU associated states; NGOs.

D. GLOBAL OCEAN MONITORING

Goal: Expand European capacity to producing global ocean information based upon existing monitoring capabilities; in support to seasonal weather predictions, global change research, commercial oceanography and defence.

Relevance: Existing operational models, climate studies, economic interests, global security.

Potential Users: European Commission; climate research organizations; meteorological services

E. GLOBAL ATMOSPHERE MONITORING

Goal: Deliver regular assessments of state of the atmosphere with particular attention to aerosols, UV radiations and specific pollutants in close co-ordination with ground based networks.

Relevance: EU Air pollution policy and Conventions, Health policies.

Potential Users: European Commission; Research organisations; local authorities; public.

SECURITY-RELATED ASPECTS:

F. SUPPORT TO REGIONAL DEVELOPMENT AID

Goal : Contribute to the generation and transfer of know-how and technology in the context of the PUMA programme (Meteosat 2nd generation) focusing on land applications in Africa.

Relevance: Agricultural management; natural disaster assessment; regional approach; exploiting existing technological investments.

Potential Users: Regional and governmental organizations in ACP; United Nations; European Commission; NGOs.

G. SYSTEMS FOR RISK MANAGEMENT

Goal: To deliver operational systems of support to risk management (early warning, impact assessment and reaction) in European sensitive areas for: floods; forest fires; oil spills; stability of man made structures.

Relevance: Citizen's concerns; public security; pooling resources at EU level.

Potential Users: All level of government (national and regional civil protection agencies; water catchment authorities).

H. SYSTEM FOR CRISIS MANAGEMENT AND HUMANITARIAN AID

Goal : Develop an information system to deal with crises management and humanitarian aid with particular attention to : basic cartographic data with relevant information layers; diffusion, use and updating of information through interactive systems.

Relevance: Information critical for planning the delivery of aid and relief operations.

Potential Users : European Commission; Aid and relief agencies; field operators; NGOs; local authorities.

HORIZONTAL SUPPORT ACTION:

I. INFORMATION MANAGEMENT TOOLS and CONTRIBUTION TO THE DEVELOPMENT OF A EUROPEAN SPATIAL DATA « INFOSTRUCTURE »

This priority is in support to various Community actions.

Goal: A set of actions on information management (acquisition, accessing, sharing and using environmental and geo-referenced data) and the creation of harmonised info-structures with common portals that enable harmonised access to common information services throughout the user community. The actions relate to technology, policies, criteria, standards and qualification necessary to enhance common environmental info-structures and tools, geo-spatial data collection and sharing throughout government, the private and non-profit sectors and academia.

- Data acquisition; emphasis will be on topography (digital terrain models, hydrological network) and land cover at a scale appropriate to support decision

making from local to EU+15 scale.

- Infostructures and tools; developments will focus on advanced tools and systems, data fusion, data warehousing, data mining, and topic maps based on platform and domain independent information and meta-information systems with the emphasis on open standards.

Relevance: « Infostructure » and data layers are indispensable for spatial and thematic analyses and integration with data collected from ground based networks (air, water, meteorology, noise) and through space and airborne earth observation systems. Support to the standardisation of IT systems and tools, sustainable development strategy, the 6th Environment Action Programme and the EU environmental liability schemes.

Potential Users: All levels of government; the private and non-profit sectors; standardisation bodies; research organisations.