Meeting on
An Integrated EU Strategy on Prevention, Preparedness and Response to Natural, Man-Made and Other Risks
Brussels - 11 December 2002

Technological and Economic Risk Management
A.C. Lucia
Council Decision adopting a specific programme for research and training to be carried out by the Joint Research Centre (2003-2006) where, under "Natural and technological hazards, risk and emergencies", it is stated:

"JRC will continue to support efforts to develop a European framework for forecasting, assessing, managing and reducing risk in the Community. In the Framework Programme 2003-2006, the JRC will further develop a system approach to the management of natural and technological hazards".
JRC towards natural and technological disaster risk reduction

JRC efforts are focused on:

- **Accident reporting and analysis**, done at European scale, with the necessary independence from national and private interests and assuring that experience is shared among all Member States and data kept confidential when required;

- **Support** to conception, preparation and implementation of **European directives**;

- **Methodological developments**, validation and applications, also performed in the frame of large international projects (typically Shared Cost Actions) and of Third Party Works for national or regional authorities.

- **Collaboration with pre-accession countries** in fields reflecting accession process priority needs.
FP6 - Technological and natural risk activities of TERM Unit

- **MAHB:** Major Accident Hazards Bureau
- **NEDIES:** Natural and Environmental Disaster Information Exchange System
- **MAHB & NEDIES for CCs**
- **COMPASS:** Risk comparability and integrated risk assessment
- **ECCAIRS:** European Co-ordination Centre for Aviation Incidents Reporting Systems
- **ECCAIRS for CCs**
- **ISAMCA:** Integrated safety assessment and risk management in civil aviation
The Major Accident Hazards Bureau was established with the specific remit to give scientific and technical support to DG ENV in the formulation, implementation and monitoring of the "Seveso" Directives (82/501/EEC and 96/82/EC)
The Major Accident Hazards Bureau

Key functions:

- Major Accident Reporting System - MARS
- Seveso Plant Information retrieval System - SPIRS
- Community Documentation Centre on Industrial Risk - CDCIR
- Technical Working Groups
- Mutual Joint Visits Programme
- Information exchange with National, Regional and Local Authorities, Industry, Academia, General Public
Major-Accident Reporting System (MARS - Art. 19)

- is an open register and information system
- administered by the Major-Accident Hazards Bureau (MAHB) established within the JRC at Ispra, Italy
- containing
  - accident information supplied by Member States (Art. 15)
  - analyses of causes of accidents
  - lessons learned
  - information about preventive measures
Major-Accident Reporting System (MARS - Art. 19)

- Covers the 15 EU countries
- Extended to cover the Candidate Countries
- Used by OECD for their accident reporting
- Used by UN/ECE for their accident reporting for transboundary accidents
Major Accident Hazards Bureau

Seveso Plants Information Retrieval System (SPIRS)

Objective: visualise the geographical component of risk potentials of major hazardous chemical plants in the EU

Reporting of Major Hazardous Chemical Installations Under Directive 96/82/EC (Seveso II) to the EC

Status 08/2002: 6347 Seveso establishments reported
Natural and Environmental Disaster Information Exchange System (NEDIES)

- **Resolution of the Council** and the Representatives of the Governments of the MS’s, of 31st October 94, to strengthen **Community co-operation on Civil Protection** matters.

- Supports DGENV to cope with the **Community Action Progr. on Civil Protection** and EU policies aiming at risk reduction; tackles **natural disasters**, **technological disasters** not falling under Seveso Directive and not considered for its possible amendment, **natech disasters**.
NEDIES Objectives

• To constitute a common European repository of lessons learnt from disasters, with special focus on mitigation of disaster consequences.

• To make available to the Civil Protection Services of the EU Member Countries and Candidate Countries validated information on past disasters and main consequences, methods and techniques relevant for the prevention of disasters, preparedness and response.

• To provide an interdisciplinary platform for dialogue to facilitate the exchange of information between all the actors in natural and technological non-Seveso disaster management.

• To supply the EU Commission with updated information about the occurrence of natural and technological non-Seveso disasters and their management.

• To protect the citizens via the dissemination of targeted information on risk perception and awareness.
NEDIES Activities & Outputs

**Activities**
- Organisation and scientific coordination of meetings and workshops (specific and horizontal topics)
- Online collection and analyses of disaster forms
- Multi-risk (NATECH) and Socio-economic Analyses, Risk Communication
- Development of an Internet Portal to provide organised information on disasters and their management

**Outputs**
- Production of targeted documents (lessons learnt reports, recommendations, proceedings)
- User-friendly online repository of lessons learnt from disasters
- Production of targeted documents (guidelines)
- Automatic Disaster Data Internet Service (ADDIS)
Publications and Workshops

- Lessons Learnt from Avalanche Disasters (+)
- Lessons Learnt from Recent Train Disasters (+)
- Lessons Learnt from Tunnel Accidents (+)
- Lessons Learnt from Storm Disasters (+)
- Lessons Learnt from Earthquake Disasters that Occurred in Greece (+)
- Lessons Learnt from Flood Disasters (*) (+)
- Guidelines on Flash Floods Prevention and Mitigation
- Lessons Learnt from Maritime Disasters
- Guidelines to cope with Avalanche Disasters (+) (Dec)
- Proceedings: Learning our Lessons – Dissemination of Information on Lessons Learnt from Disasters (*) (+) (Dec 02)
- Lessons Learnt from Forest Fire Disasters (*) (+) (Dec 02)
- Lessons Learnt from Landslide Disasters (*) (+) (Jan 03)
- Lessons Learnt from Road Transport Accidents (*) (+) (Feb 03)
- State-of-the-Art in Flood Risk Management (*) (Apr-May 03)

(*) With contributions from Candidate Countries
(+ ) Workshop
NEDIES 2003

- WORKSHOPS (and resulting PROCEEDINGS)
  - NATECH (Natural hazards triggering technological disasters)
  - SOCIO-ECONOMIC IMPACT of disasters

- EXPERT MEETINGS (and LESSONS LEARNT REPORTS)
  - VOLCANIC Disasters
  - FIRE Accidents

- EUROPEAN STATE-OF-THE-ART
  - State-of-the-Art of Flood Management in Europe (Spring 2002)

- ADDIS

- INFORMATION TO THE PUBLIC

- SUPPORT TO CANDIDATE COUNTRIES
Key Lessons Learnt

Flood Risk Management

(outcome NEDIES Meeting with Civil Protection Authorities)

Most of the EU MS and also some Candidate Countries, have experienced similar key lessons learnt. In particular, it has been agreed that improvements are required in the following areas:

- Strategic co-ordination
- Role designation
- Task Prioritisation through Risk Assessment and Forward Planning
- Training and formation of all stakeholders
- Inter-disciplinary collaboration
- Inter-organisational collaboration
- Allocation of material and human resources
- Communication strategies
- Dissemination of information to the public
- International co-operation.
Objectives:

1. Data:
   - workshops with national authorities
   - creation of collaboration networks
   - collection and qualification

2. Information systems
   - extension of SPIRS to create inventory of risk sites
   - extension of MARS and NEDIES
   - transfer of ARIPAR software

3. Risk assessment for prioritizing interventions
Area Risk Analysis - ARIPAR

Aggregation of all risk sources associated with fixed installation and transportation of dangerous substances (by roads, railways, ships and pipelines)

- Calculation and display of
  - local point risks and iso-risk curves
  - individual area iso-risk curves
  - relative contribution of risk sources
  - F-N curves and I-N histograms

- Identification of major causes of risk in the area
COMPASS: Risk comparability and integrated risk assessment

⇒ To understand the relevance of a specific technological risk and the quality of its assessment and to compare and integrate risk figures from different sources

- **First objective:** characterization (identification of features) of the Risk Figure and whole process of Risk Analysis (methodology, procedure, data sets etc).

- **Second objective:** qualification (evaluation of the quality and confidence level) of the Risk Figure and of the whole process of Risk Analysis, including hazard identification.

- **Third objective:** development of a methodology for the assessment of the integrated risk (for individuals, society of region) and for risk informed/based strategic decision-making for effective risk management, risk reduction and priority setting.
European Co-ordination Centre for Aviation Incident Reporting Systems

“Contribute to aviation safety by bringing together the knowledge from reported aviation incidents from EU MS’s”
ECCAIRS

Objectives

• **Integrate data at EU level**
  – Push to EU wide standards for data collection
  – Assure confidentiality in the use of data

• **Provide harmonised tools to EU authorities**
  – Make available to EU authorities a tool for collecting and sharing occurrence information
  – Co-ordinate and assist analysis efforts.
  – Define, develop and validate in collaboration with EU authorities harmonised tools for analysis
  – Support DG TREN in preparation and implementation of the **EU Directive on aviation event national reporting systems.**
Integrated safety assessment and risk management in civil aviation

Objectives

• To develop a body of **guidelines** for integrating safety assessment and risk management methods throughout the whole aviation system.

• To contribute to the development of a coherent and **integrated approach** for all stakeholders of the aviation system to be applied for:
  – Operation and emergency management, in real dynamic condition;
  – Recurrent safety assessment of integrated systems and organisations.
  – Design evaluation;

• To support the conception and preparation of European **Directives** related to aviation safety.
Objectives:

- To develop methods and technologies (including EO & DSS) for:
  - environmental/socio-economic impact and risk assessment,
  - risk management and disaster preparedness,
  - hazard forecasting and monitoring,
  - prevention, evaluation & mitigation,
  - risk perception, communication and awareness

- To promote strategies with a view of providing input to EU policies and relevant legislation (i.e. civil protection, water framework, climate change, SEVESO);

- Particular attention should be paid to aspects of end-user/stakeholder-driven, problem-solving and policy-relevant research!

- To integrate e-science techniques.
Development of new & improved methodologies to forecast, mitigate and prevent floods through:

- increased **understanding** of mechanisms & processes;
- integrated **studies** of the occurrence of **extreme flood events**;
- **linkage** of meteorological and hydrological events with **climatic forcing**;
- **assessment, management and mitigation of risks** resulting from floods, landslides, avalanches and large storms;
- examination of **relations** of floods with **landuse and landcover changes**.
The development of improved methodologies and tools for:

- improved fire fighting safety and efficiency
- fire spread and suppression modelling
- assessing wildland fires and fires at the interface with urban and industrial areas
- characterising socio-economic aspects of forest fires
- assessing forest silviculture and pasture management as fuel management tools.
"Technological Risks" - accidents resulting from natural and/or man-made causes related to major hazardous facilities, i.e.:

✦ industrial plants
✦ transport systems & interfaces
✦ maritime disasters

leading to large scale consequences for people & environment

• Understanding of processes
• Risk assessment and forecasting
• Risk management and mitigation
**Key word:** Sustainability - Integrated environmental and socio-economic systems

**Objective:**
Promote European research towards:

- **Assessment of natural disasters** (Floods, Fire, Earthquakes, Landslides, Volcanic Eruptions, Storms);

- Their **prevention and mitigation**, through improved technologies, intervention methods, pre-disaster planning and preparedness.
Research Tasks (IP/NoE as well as Trad.):

• Natural hazard assessment and forecasting;

• Consideration of climate variability and climate change impacts;

• Methods and technologies for vulnerability, risk and damage assessments;

• Risk management and mitigation.
Global Monitoring for Environment and Security

- Climate Change
- Noise
- Industrial Risks
- Urban
- Agro-environment
- Coastal Zones
- Nature & Biodiversity
- Soils
- Air
- Water
- Health
- Flooding
- Fires
- Forests
- Agriculture
- Monitoring

Data

- GMES
- User

Hanging Words
- Air
- Soil
- Water
- Habitats
- Socio-Economic
- Land-Use
- Hazards/Risks
- Meteorological and climatological
- Topography
Global Monitoring for Environment and Security

1.2: Information society technologies (IST)

1.4: Aeronautics & Space

1.6: Sustainable development & global change

Support the development of observing and forecasting systems
Support the development of data & information exchange networks
Support the development of Space and Ground services elements

Contributions to priorities of FP6

FP6

DG-RTD/I

DG-INFSO
Natural Hazards - Forest Fires

Burnt Area Mapping

Objective: Mapping burnt areas at regional (pan-European) scale.

Procedure: Burnt areas are identified and mapped on satellite imagery of medium spatial resolution (e.g. 180 m resolution WiFS images) by change detection techniques.

Mosaic of year 2000

Mosaic of year 2001

Geometric and atmospheric correction

Multitemporal Change Detection (e.g. Centro Region of Portugal)

Centro Region (P) 2000

Centro Region (P) 2001

Burned Area in 2001

Points of contact: Dr. Guido Schmuck
Tel: +39 0332 785313
Fax: +39 0332 785500
e-mail: guido.schmuck@jrc.it
Joint Research Centre Ispra
Institute for Environment and Sustainability
I- 21020 Ispra (VA)

Dr. J. San-Miguel & Dr. Paulo Barbosa
Tel: +39 0332 786138
Fax: +39 0332 785500
e-mail: jesus.san-miguel@jrc.it
e-mail: paulo.barbosa@jrc.it

http://natural-hazards.jrc.it
Objective: To develop European Forest Fire Risk indices based on structural, meteorological and vegetation stress parameters

**Structural Risks**

- **A: Probability of fire**
  - Variables in the model:
    - fuel types (*)
    - elevation
    - aspect
    - slope
    - fire history
    - population density
    - degree of urbanization
    - density of roads
    - degree of environmental protection

- **B: Vulnerability to fire**
  - Variables in the model:
    - vegetation cover
    - soils
    - elevation
    - aspect
    - slope
    - environmental value
    - distance to settlements

**Dynamic Risks**

- **C: Meteorological**
  - Variables in the model:
    - evapotranspiration
    - wind speed
    - wind direction
    - solar radiation
    - temperature (*)
    - relative humidity (*)
    - rainfall(*)
    - cloud cover (*)

- **E: Fire Potential Index**
  - Variables in the model (*):
    - cumulative slope of the NDVI (normalized difference vegetation index) computed from NOAA AVHRR satellite data

- **D: Vegetation Stress**
  - Variables in the model (*): Cumulative slope of the NDVI (normalized difference vegetation index) computed from NOAA AVHRR satellite data
The LISFLOOD-FP flood inundation simulation model

**Usage:**
- Flood extent simulation and forecasting

**Model input:**
- High resolution Digital Elevation Models
- Additional data:
  - channel geometry
  - bankfull channel depth
  - Manning’s n for channel bed
  - Manning’s n for floodplain

**Model outputs:**
- Flood Extent
- Flood Extent and Depth Maps

**Points of contact:**
- Dr. Guido Schmuck
  - Institute for Environment and Sustainability
  - I - 21020 Ispra (VA)
  - Tel: +39 0332 785313
  - Fax: +39 0332 785500
  - e-mail: guido.schmuck@jrc.it
- Dr. Ad de Roo & Dr. Jutta Thielen
  - Institute for Environment and Sustainability
  - I - 21020 Ispra (VA)
  - Tel: +39 0332 786240
  - Fax: +39 0332 785500
  - e-mail: ad.de-roo@jrc.it

http://ies.jrc.cec.eu.int/
JRC has developed a flood modeling system that can assist in evaluating flood control measures in medium and large-size catchments. JRC focus is on trans-boundary catchments, such as Oder, Meuse, Elbe and Danube.

Using topographic, land use, soils and weather data as input, historic flood events are simulated under present and changed conditions.

The LISFLOOD flood simulation system

LISFLOOD is a physically-based distributed hydrological modelling system, developed for medium and large catchments, embedded in a raster-based Geographical Information System.

Possible scenarios which can be simulated using LISFLOOD:

- engineering flood defense measures
  - reservoirs
  - dykes
  - floodplain enlargement
  - polders / retention areas
- land use changes
  - deforestation / reforestation
  - urban growth and regional development
  - consequences of European spatial policies
  - consequences of other policies, such as agriculture
- climate changes

Example: simulating the effect of reforestation in a sub-catchment of the Oder on the flood peak.

Effects of flood defense measures in the Oder catchment, planned by the Oder Commission (IKSO) until 2030, calculated using LISFLOOD.
EC funded research in the FP5 Generic activity
‘Fight against major natural and technological hazards’
(DG RTD/I.2) - 1998-2002

More than 80 research projects with a total EU contribution of ~ 70 Million Euro regarding:

• Floods
• Landslides
• Avalanches
• Forest Fires
• Earthquakes
• Volcano eruptions
• Industrial risks
EC funded research in the FP5 Generic activity
'Fight against major Natural & Technological Hazards' (DG RTD/I.2)

General Research objectives for projects on hazards:
• To develop methods and technologies (including EO & DSS) for:
  • environmental, social & economic impact and risk assessment;
  • risk management and disaster preparedness;
  • hazard forecasting & monitoring;
  • prevention, evaluation & mitigation;
  • risk perception, communication and awareness;
• To promote strategies with a view of providing input to EU policies (i.e. civil protection) and relevant legislation;
• Particular attention should be paid to aspects of end-user/stakeholder-driven, problem-solving and policy-relevant research;
• To integrate e-science techniques.

1. Fire Research Projects

Specific Research objectives:
The development of improved methodologies and tools for:
• improved fire fighting safety & efficiency
• fire spread and suppression modelling
• assessing wildland fires and fires at the interface with urban and industrial areas
• characterising socio-economic aspects of forest fires
• assessing forest silviculture and pasture management as fuel management tools.

Funded Projects
AUTO-HAZARD PRO - AUTOMATED FIRE AND FLOOD HAZARD PROTECTION SYSTEM
The proposed Automated Fire and Flood Hazard Protection System (AUTO-HAZARD PRO) integrates real-time and on-line fire and flood hazard management schemes into a GIS-type platform. AUTO-HAZARD PRO is scheduled to be developed in EU Member-State Disasters Management and Civil Protection Agencies. Collection, input, storage, management and analysis of the information will depend on advanced and automated methodologies using Remote Sensing, GPS, Digital Mapping and GIS. Proactive development of such infrastructure will assist in fast and realistic prevention and pre-suppression planning, real-time fire suppression operations, and rehabilitation of burned areas. Expected products include: wildfire danger rating indices, Flood danger index; Weather forecasting modeling; Autonomous fire detection system; On-line operational decision support system; Training of personnel; Dissemination of information and technology transfer.

ERAS - Extension Retardant Application System
The reduction of forest fires is correlated with a new technology that will improve fire prevention and ensure a better performance of fire suppression. The ERAS Proposal aims at developing a new approach for fire retardant application and at studying the fire retardant possible impact on the ecosystem. To improve the prevention we'll develop studies to characterize a fire retardant and see how its chemical properties could enhance the vegetation coverage capabilities and the durability of its performance. The validation of dropping and penetration models will complement previous work related to aerial application. Ground utilization of fire retardant will be developed. A simulator will be designed and then validated by the fire fighters. It will be used to study the relationship between the fire propagation and the retardant
application method. At the same time, series of studies will be conducted to assess the product harmlessness on the ecosystem.

FIRE STAR - A decision support system for fuel management and fire hazard reduction in Mediterranean wildland-urban interfaces

The management of wildland-urban interfaces is one of the key-points of wildland fire prevention policy in Mediterranean regions. Foresters, fire-fighters and engineering offices need methods and tools to assess the fire risk for exposed targets (people and houses) on these interfaces, and to test the preventive efficiency of the wildland fuel reduction. The technological objective of Fire Star is to provide methods and tools to the end-users through a decision support system. Researchers and end-users jointly define the functionalities of the Fire Star system, and specify the services offered by it. The predictions of advanced models of wildland fire behaviour and effects, validated by well-documented laboratory tests and field experimental burns, are the bases of the content of Fire Star system. It is build around a common WWW-Interfacing-Tool and standards for inter-operability between researchers and end-users. Its user-friendly characteristics and the interactivity of the Fire Star web site enable to train end-users and to foster dissemination the Fire Star system and documentation. In the frame of this project, researchers also pursue the following scientific objectives: (i) to improve the methods of wildland fuel description and to develop Mediterranean fuel models, (ii) to enhance the predictive ability of the wildland fire behaviour model, and (iii) to improve the knowledge of wildland fire effects on the exposed targets (people and houses).

SHAEP - Un système héliporté d’aspersion verticale développé pour la lutte contre les incendies de forêts.

In the framework of thematic program 4 concerning energy, environment and durable development, the research activity of a generic nature that we propose falls within the scope of the field of major natural and technological risks. In fact the system that we must develop is an innovative technique to fight forest fires. The consortium objectives: - Increase efficiency and optimise the fight against forest fires by providing new systems and new logistics in the use of helicopters, and thus decrease by 30% the proportion of large fires. - Increase the interest of some SMEs in fire protection and win a new market for others at European level. - Create new jobs in their respective fields of activity. - Market the products generated by research in and outside European Union countries once the CRAFT project is completed.

SPREAD - FOREST FIRE SPREAD PREVENTION AND MITIGATION

SPREAD provides a framework for the development and implementation of an integrated forest fire management system for Europe. It will develop an end-to-end solution with inputs from Earth observation and meteorological data, information on the human dimension of fire risk, and assimilation of these data in fire prevention and fire behaviour models. Through a better understanding of physical processes involved in surface and crown fire propagation and their heat and smoke emissions it will improve the capacity to predict fire behaviour to support fire management activities. Based on an improved knowledge of the role played by factors related to vegetation and ecosystem dynamics and their dependence on fire propagation and fire management processes, to support ecosystems preservation and the mitigation of forest fires impacts new tools for fire and post-fire landscape management will be developed in close cooperation with regional and national agencies. SPREAD will improve the knowledge on current problems of end user and develop mechanisms to transfer to them the applicable results and products of the project. SPREAD adopts a highly interdisciplinary and innovative approach that builds on the key scientific achievements of the contributing teams over the last decade to provide updated EU maps of vegetation cover and properties, innovative models for surface and crown fire spread, methods to estimate smoke dispersion and impacts, recommendations for post-fire recovery, guidelines for cost-effective fuel management procedures, a SPREAD decision support service and fireline safety rules.

WARM - WILDLAND-URBAN AREA FIRE RISK MANAGEMENT

Forest fires in the Wildland-Urban Interface (W-UI), the area in which territorial development intermingle with the forest, is a major problem in Europe. A scientific approach and a series of studies and experiments are proposed in WARM project, which will render a methodology aiming at the identification, inventory and characterization of fire risk in such areas. The tasks in the workplan will include research about sources of fire risk, vulnerability of houses and
urban areas, fighting and civil protection operations, mitigation measures, house building best practices, secondary effects such as smoke production and landslides and, finally, methods and protocols for costs and losses appraisal, including land depreciation. The results will be interpreted into numerical models and assembled into a GIS-based Decision Support System. This tool will help planners to design co-ordinated strategies which will minimize effects of forest fires in the interface thus offering safer residences in the wild, hence improving land value and meeting citizen needs. Six pilot study areas have been selected in Spain, France, Italy, Greece, Czech Republic and Republic of Slovakia, which represent most of the cases found in Europe.

2. Flood and Hydrogeological Research Projects

The flood research projects funded in Unit I.3 are not included in this document. For a complete overview over all flood research projects please check the document 'EC Research on Floods in the framework of environmental research' (3.09.2002).

Specific Research objectives:

Development of new and improved methodologies and tools to:
- increase understanding of mechanisms and processes
- allow integrated studies of the occurrence of extreme flood events
- link meteorological and hydrological events & climatic forcing
- assess, manage & mitigate risks resulting from floods, landslides, avalanches, and large storms
- examine relations with land use and land cover.

Funded Projects

ADC-RBM - ADVANCED STUDY COURSE IN RIVER BASIN MODELLING FOR FLOOD RISK MITIGATION

The proposal is concerned with organising an advanced study course in river basin modelling and flood risk management with a view to disseminate recent findings to young researchers and professionals. The dissemination of knowledge will be achieved through a series of lectures/ workshops presented by eminent specialists and two field trips. The course is relevant since flooding claims about a third of all the damaged cause by natural disasters and timely: the recent flooding in Europe and other continents caused substantial damage, disruption, and distress. These are only two recent inundation catastrophes that are fresh in the minds of people. Such disasters stimulate the search to improve methods of mitigating flood risk so as to reduce the impact of flood hazards. Hence it is imperative that the latest information is presented to those who can act to immediately improve the situation, i.e. researchers and professionals.

ALARM - ASESSMENT OF LANDSLIDE RISK AND MITIGATION IN MOUNTAIN AREAS

This project contributes to rise the prevention and mitigation of morpho-hydrogeological hazards and risks in Europe. A review of legislation and rules in European countries, of GIS analytical procedures for hazard studies, GIS techniques and multi-media tools, leads to propose and apply methodologies common to all the participants, for assessing hazard, vulnerability and risk in the study areas. Essential features of this project are, on one hand, the integration of socio-economic and natural process factors with the aim of providing comprehensive information on natural hazards as well as their consequences for society and, on the other hand, the appeal to GIS and information technology for the creation of database infrastructures, spatial data analysis, cartographic representation of hazard and risk, guidelines for mitigation actions, and communication with decision makers and the general public.

CADZIE - Catastrophic Avalanches: Defence Structures and Zoning in Europe develops new methods where numerical models will complement the classical methods based on expert and historical analysis. It will determine the macroscopic law of the interaction between avalanche flows and defence structures. A database will be created containing extreme events, accessible to engineers, consultants and planners.

CARPE DIEM - Critical assessment of Available Radar Precipitation Estimation techniques and Development of Innovative approaches for Environmental Management

Rain deposit and forecasting play a crucial role in the management of flood and hydro-
geological risk events. Better estimation and prediction of rainfall is a relevant part in a flood forecasting procedure. Therefore, objectives are qualitative and quantitative improvements in real-time estimation of radar rainfall field and forecasting. A key component will be the hydrological survey on the improved rainfall field, coupled with an assessment of the sensitivity of hydrological models to different errors in their input. Work will be addressed to assimilate Doppler radar data into NWP model and to use the model results to improve the reliability and accuracy of the radar derived parameters. End-Users are involved in the definition and assessment of project outcomes.

DAMOCLES - Debrisfall Assessment in Mountain Catchments for local end-users will develop a standard approach for assessing the hazard posed by rapid slope failures and predicting debris flow occurrence and magnitude for uniformity into land use planning. Cartographic products and database, guidelines for basin management will be available on the web. End-users will be trained in the project technologies for the transfer of project achievements to public domain.

EFFS – An European Flood Forecasting System: This project aims at developing a prototype of an 4-10 days in advance European flood forecasting system. This system aims at providing daily information on potential floods for the large rivers Rhine and Oder as well as flash floods in small basins. The framework of the system will allow incorporation of both detailed models for specific basins as well as a broad scale for entire Europe.

ELDAS - Development of a European Land Data Assimilation System to predict floods and droughts
The proposal designs, implements and tests a flexible system for estimating soil moisture content on a regional (European) to global scale. Use is made of high resolution precipitation, radiation, satellite derived surface temperature and atmospheric data, and data assimilation technologies developed in the context of Numerical Weather Prediction (NWP). The products of the system will be validated using regional and continental scale data sets. Case studies will allow assessing the value of the system in improving flood forecasts from a routine NWP system coupled to hydrological models, improving the seasonal hydrological cycle in NWP forecasts necessary for better predictions of serious drought events, and improving the modelling of land surface processes in NWP and climate models.

EURAINSAT - European satellite rainfall analysis and monitoring at the geostationary scale
The main aim of the project is to improve rapid-update, quantitative satellite rainfall estimation methods using infrared and passive microwave imagery, and cloud top microphysical characterisation. A real-time method for cloud characterisation within a rapid cycle of rainfall estimation is proposed, exploiting multispectral data from the new METEOSAT Second Generation SEVIRI radiometer and microwave data from SSM/I and TRMM. Operational use over large areas and data assimilation into numerical weather prediction (NWP) models for nowcasting and hydrology are envisaged, e.g.: flood monitoring/prediction and hydrogeological disaster management. Prototype systems are available and more research is needed for a better understanding of cloud and mesoscale processes leading to intense precipitation. A wide interest exists from relevant institutions world-wide.

FloodMan: Near real-time flood forecasting, warning and management system based on satellite radar images, hydrological and hydraulic models and in-situ data
FloodMan will develop methods for near real-time monitoring of flood extent using spaceborne SAR and optical data combined with in-situ measurements, hydrological and hydraulic model data. The result will be an expert decision system for monitoring, management and forecast of floods in selected areas in Europe. The monitoring will also be used to update the hydrological/hydraulic models and thereby improving the quality of flood forecasts. The system will be based on the concept of Distributed Geographic Information network, which handles large heterogeneous interconnected spatial databases for seamless and multiscale representation of spatial data in real-time. The prototype will be validated in Rhine, Germany, Alessandria, Italy and Kemijokki Finland.
GLACIORISK - Survey and Prevention of Extreme Glaciological Hazards in European Mountainous Regions

Glacier catastrophes like extreme floods due to lake outburst or sudden draining of internal water pockets and devastating ice avalanches are scarce but highly dangerous because unpredictable. Today, dangerous sites like moraine dammed lakes are not systematically surveyed, by lack of knowledge and financial support. Dangerous sites are hundreds in Europe. Because of varying environmental and climatological conditions (increasing tourism, global change inducing a glacier retreat in the Alps-), the risk is increasing. The fight against this hazard starts with the development of a database gathering every information on past events and on actual dangerous sites. A durable network of field technicians will permanently update this database. Scientific studies on each phenomenon will be conducted on selected sites. Survey techniques and methods will be elaborated and tested in order to prevent and mitigate new catastrophes. The objective is to develop scientific studies for detection, survey and prevention of glacial disasters in order to save lives and reduce damages.

IMPACT - Investigation of Extreme Flood Processes and Uncertainty

Dams and flood defence structures are essential to modern life in Europe. The IMPACT project involves 9 participants from 8 countries in a programme of research to investigate extreme flood and failure processes (breaching, sediment movement, urban/rural flood propagation) and the risk and uncertainty associated with each process. These processes contribute the greatest uncertainty to flood prediction. Research will investigate processes through a combination of laborator and field work and case studies. A unique opportunity to undertake controlled failure of 6m high embankment dams will be used to provide basic data for the breach and sediment investigation. Each research area will lead to improved understanding and predictive models of the flood processes, with an appreciation of the impact that each process may have on flood risk and any associated uncertainty - and in turn implications for end user applications.

LEWIS - LANDSLIDE EARLY WARNING INTEGRATED SYSTEM

The LEWIS project develops a new integrated Earth Observation (EO) approach for producing landslide warning maps. It first uses the analysis of historical multi-source satellite data for the detection of surface feature changes related to causative and triggering mechanisms, which have preceded landslide events. The images will be obtained for test sites where records of ground-monitored landslide movements are already available. Surface changes and those detected by future periodic EO acquisitions will be verified against landslide events, which occur within the instrumented test sites. A conceptual slope instability model, which relies on spatial ground data stored within GIS and artificial intelligence techniques, will be used to link the changes detected by EO to potentially unstable ground conditions. This new methodology will form the basis for the production of low cost and wide-area prototype landslide early warning for EU citizens.

MITCH - Mitigation of Climate Induced Natural Hazards

MITCH will bring together the various research institutions and user representatives, including insurers, with a leading involvement in the mitigation of natural hazards with a meteorological cause. The aim will be to assist planning and management for these events, by evaluating the state of research, and to match that with both users’ perceptions and needs as to what the research community can provide. A primary focus of the CA will be on flood forecasting and warning, but it will also include other flood-related hazards, such as landslides and debris flow. It will also look at longer term climate hazards, such as drought, and the possible impact of climate change on the frequency and magnitude hazards. The CA will be conducted through a series of workshops and an active web site for exchange of views and evaluation of best practice.

OASYS - Integrated Optimization of Landslide Alert Systems

World-wide landslides are one of the major types of natural hazards killing or injuring a large number of individuals and creating very high costs every year. Between 1990 and 1999, for example, in Italy at least 263 people were killed due to landslide events (Guzzetti 2000). The aim of this research project is to set up an integrated workflow for landslide hazard management. This system should lead the practitioner from the data acquisition to suggestions of risk management measures.
RETINA - REALISTIC EVALUATION OF TEMPORAL INTERACTIONS OF NATURAL HAZARDS
The RETINA project focuses on understanding the links between three types of natural hazard: earthquakes, landslides and volcanoes, in three natural laboratories in Europe: Azores, Alps, and Iceland. Our innovative hypothesis suggests that mechanical coupling can explain the correlation’s commonly observed between hazard events. We will test it using existing observational networks and new measures of crustal deformation from satellite geodetic technologies. These observations will drive development and application of new models for earthquake-and storm-triggered landslides, seismically triggered volcanic eruptions, and volcanically triggered earthquakes and landslides. The main contribution to current-user partners in civil defense/land planning is an additional temporal and spatial component to standard hazard and risk.

SATSIE - Avalanche Studies and Model Validation in Europe
The SATSIE project will contribute to sustainable development in Europe’s mountain regions through (i) substantially improved tools for hazard mapping, (ii) design criteria for protection dams and (iii) low-cost radar systems for monitoring and managing avalanche hazard in critical locations. The emphasis is on improving the physical basis of dynamical avalanche models, in particular on modelling the flow regimes and the rates of snow suspension. Experiments are carried out at full-scale avalanche test sites and in laboratory chutes. Previously developed impact models will be validated through measurements at full-scale dams. For research and monitoring purposes, novel sensors measuring important parameters inside the flowing avalanche are developed.

SPHERE - Systematic, Palaeoflood and Historical data for the improvement of flood Risk Estimation: The recent catastrophic floods in Europe warn of the critical need for Palaeohydrologic data on floods over long-time scales. New scientific frameworks and technical tools integrating multidisciplinary approaches (geologic, historical, hydraulic, statistical and GIS) on extreme flood risk assessment will be generated, for an area in France and one in Spain, for which a complete catalogue of major past floods will be constructed.

THARMIT - Torrent Hazard Control in the European Alps. Practical Tools and Methodologies for Hazard Assessment and Risk Mitigation: Torrent activity in the Alps represents a major threat to permanent settlements, tourist infrastructures and European transit routes. This project will develop practical tools and methodologies for hazard assessment, prevention, monitoring and mitigation. Field measurements will be coupled with simulation models to obtain a deeper knowledge of the dynamics and factors controlling triggering and propagation of the events.

3. Technological Hazard Research Projects
"Technological Risks" - accidents resulting from natural and/or man-made causes related to major hazardous facilities, ie:
- industrial plants
- transport systems & interfaces
- maritime disasters
leading to large scale consequences for people & environment.

Specific Research objectives:
- Understanding of processes
- Risk assessment and forecasting
- Risk management and mitigation

Funded Projects
ACUTEX - Methodology to establish acute exposure threshold levels in case of accidental chemicals release
ACUTEX is aimed at the development of innovative approaches to define a set of Acute Toxic levels to be used in both areas, land use planning as described in SEVESO II directive and also in emergency planning. A methodology, software tools and Technical Guidance Document (TGD) for establishing European Acute Exposure Threshold Levels (EU AETLs) in case of accidental chemical release will be defined. Compared to currently used methodologies,
innovative elements are introduced. This methodology will be validated by cases studies. The methodology will support the harmonised implementation of SEVESO II Directive. Efforts are given to disseminate the methodology to decision-makers in charge of the control of major accident hazards. Thus, the project will be monitored by a critical review panel gathering, risk experts from industry, EU Competent Authorities in order to ensure the widest acceptance of the results.

**CHAF - Quantification and control of the hazards associated with the transport and storage of fireworks**

Serious explosion accidents have occurred in EU countries that have involved the bulk storage of display fireworks. Currently, there is no means of estimating the hazards posed by such storage and the UN transport classification scheme is all that can be used as a potential indicator. This test scheme, however, was developed for high explosives and munitions and in many instances may be inappropriate. The proposal aims to address this deficiency by undertaking work to better quantify what the UN methods measure and to develop more appropriate tests to replicate the effects of confinement in bulk storage and transport. The modes of reaction of packaged fireworks in fire will be examined and the data obtained will feed into the test development. The results from the proposed new tests will be evaluated against those obtained in full scale fire trials on steel containers and cast concrete structures containing packaged display fireworks to validate the methods.

**CLEOPATRA - Chemical Effluent & Oil Pollution Alert and TRAcking**

The CLEOPATRA objective is to achieve an integrated chain (covering research on input data, modelling and output interface) able to feed an advanced service supporting prevention, mitigation and assessment of oil or chemical marine pollution in waters of prime European interest (Mediterranean sea). It uses the most recent Space Technologies (Earth Observation satellites) and Meteo/ocean scientific research to assist national/regional authorities and organisations concerned with coastal disaster emergency management.

**Corrosion testing of ships - Detection and discrimination of corrosion attack on ships (crude oil tankers) with Acoustic Emission (AE)**

Due to disaster of oil ship a tremendous pollution of the maritime environment and the affected coast appears. This leads to damages for the Fauna and Flora with consequences for several decades, like the accident of Erika near to the French coast. The normal ship survey, which depends on time dependent testing periods with random testing points, shall be replaced by an integral corrosion detection system. During an successful performed SMT project the application of Acoustic Emission (AE) was proven and this application shall be transferred to the ship tanks. After establishing a data base for corrosion detecting, based on a frequency domain pattern recognition system, the application of permanent installation as well as a king of spot testing in the harbour shall checked. At the end this testing method shall be introduced in the normal survey program of the registration agencies and the European standardisation.

**e-EcoRisk: A Regional Enterprise Network Decision-Support System for Environmental Risk and Disaster Management of Large-Scale Industrial Spills**

e-EcoRisk will create a regional enterprise network information management and decision-support system that will provide environmental and civil protection agencies and other relevant governmental and non-governmental organisations with improved information and insight on the potential and actual risks (impact) to the environment of large-scale industrial spills for their prevention, mitigation, and control. This will be implemented in a timely, up-to-date, and easily accessible manner through the application of innovative information and telecommunication technology. e-EcoRisk will allow access to the system in real time from fixed and mobile wireless devices via a regional enterprise network (Internet), using terrestrial and satellite high bandwidth telecommunication systems.

**FLIE - Flashing Liquids in Industrial Environments**

FLIE aims at improving the understanding of the processes that occur in accidental flashing releases of liquids at high pressure and to enhance the predictive capabilities of engineering tools used in hazard assessment. Flammable atmospheres contain on the order of 5-10% (hydrocarbon) gas. Such concentrations are only possible close to the release. Detailed
understanding of the source is required in order to obtain reliable predictions of the hazardous region. The project comprises four activities: Lab-scale experiments to improve knowledge about the release processes. The formulation of mathematical/physical models based on data from the experiments. Algorithm development to implement the mathematical description into robust, efficient and correct simulation models. Finally, design and execution of large scale experiments to provide validation data for the developed models.

LOWRISK DT - Low Risk Disposal Technology
The objective of LOWRISK DT is to investigate the possibility of using abandoned mines for disposal of hazardous waste, to outline suitable design and construction for this purpose and to make a performance assessment with special respect to safety and cost. A number of reference cases of typical caverns and drifts in crystalline and metamorphous rock or ore material with waste isolating barriers of clay or concrete will be defined and investigated with respect to the isolating potential. The stability and hydraulic performance of the rock, the transport properties of the barriers, and the integrated performance of the rock, barriers and waste are major issues. Cost will be estimated as well. The outcome of the study will be manifested by a final report, a document that can serve as a basis for design, construction, waste isolation and performance assessment of mine disposal technology in European countries.

SAFEKINEX: SAFe and Efficient hydrocarbon oxidation processes by KInetics and Explosion eXpertise and development of computational process engineering tools:
SAFEKINEX
Process industry is challenged to produce higher product yields at lower costs and less waste while maintaining safety. Sustainable growth requires more partial oxidation of hydrocarbons and biomass. Such developments will increase explosion risk. Risk can be reduced by reliable process design and control tools, which in turn depend on experimental data and models related to extreme process conditions. Presently such data are almost non-existent. SAFEKINEX is an RTD project aiming to fill this gap, through a combination of detailed chemical kinetic insight and a hierarchy of computer models. Experiments up to 500° C and pressures up to 100 bar, will enable development of appropriate explosion safety prediction tools. The end results of the project will include an Expert System for explosion hazards in hydrocarbon-oxygen containing systems and a computational fluid dynamic package to examine the effect of plant environment on these indices.

STRICE - Measurements on Structures in Ice
An earlier EU-funded project beside others has shown that the ice forces on marine structures are significantly smaller than presently used for design purposes. Part of this project is full-scale measurements of ice forces against a Lighthouse in the Baltic. Within this proposed project it is intended to continue the ice force measurements for three more years in order to increase the quality and quantity of data which is necessary to draw reliable conclusions as a basis for the establishment of new design criteria for marine structures. The ice forces will be compared with the numerical results of an earlier EU-funded project as well as with investigations on this matter presently underway in Japan and Canada.

TAILSAFE: Sustainable Improvement in Safety of Tailings Facilities
Tailings are fine-grained wastes of the mining industry, output as slurries, due to mixing with water during mineral processing. Deposits of these residues in ponds or lagoons, usually confined by man-made dams, can present a serious threat, especially where there is improper handling and management. Recent accidents at tailings facilities, such as the Baia Mare (Romania) and the Aznalcollar (Spain) disasters, resulted in major hazards to the environment and human life. The project intends to develop and apply methods of parameter evaluation and measurement for the detection, assessment and improvement of the safety state of tailings dams and ponds. Aspects of probabilistic stability analysis, water management involving paste technology, non-destructive testing and monitoring methods, and intervention and practical remediation options will be considered. The results will be incorporated in a systematic risk reduction framework.
4. Research on other natural hazards
DG RTD/I.2 funded in FP5 besides the presented research on Fires, Floods and technological hazards also research on seismic and volcanic hazards. Info regarding these research areas is not included in this summary, but can be provided on demand.

Outlook into the 6th Research Framework Program (2002-2006)

Research objectives regarding natural hazards in FP6:
The general objective is to understand the mechanisms of desertification and natural disasters (such as those caused by seismic and volcanic activity), including their links with climatic change so as to improve risk and impact assessment and forecasting, and decision support methodologies.

Promote European research towards:
• Investigation of natural disasters (Floods, Fire, Earthquakes, Volcanic Eruptions, Storms);
• Their mitigation, through improved technologies, intervention methods, pre-disaster planning and preparedness;

Research in Integrated projects/Networks of Excellence will focus on seismic hazard, vulnerability, risk assessment and mitigation through earthquake resistant constructions. Mechanisms leading to landslides and avalanches will also be addressed as well as processes of volcanic eruptions, magma properties, magma storage and integration of data from multi-sensor permanent surveillance networks and by spaceborn platforms. Prediction of inland and coastal floods (early-warning), windstorms and their impact assessments considering climate change will be a target. Forest fire management through modelling of fire behaviour, propagation, mapping and prevention (including earth observation technologies) will be considered.

There will be smaller FP5 like specific targeted research projects (STREP), which will deal with seismic hazard, flood, storms, forest fire, volcanic and avalanche risk, hazard and vulnerability assessment with specific emphasis on prevention and mitigation.

Some further infos on FP6:
• There will be specific calls (not all areas at the same time) for Integrated Projects on:
  • Earthquakes and Landslides;
  • Floods;
  • Forest Fires;

• Integrated Projects may have a financial volume of factor 10-15 larger than FP5 projects and a duration of 5 years (FP5: 2-3 years);

• There will be specific calls for smaller FP5 type research projects (STREP, Specific Targeted Research Projects) on all natural hazards;

• First calls will be published 17.December 2002, first proposal deadline will be 8.April 2003, first FP6 projects may start end of 2003;

• There will be no unit covering all aspects of technological hazards (Unit I.2 will not any more deal with industrial hazards).
  But there will be thematic related research in different units on:
  - industrial safety (DG RTD/G.2:‘Industry of tomorrow’/‘Ideal industrial plant’);
  - maritime safety;
  - mining safety.
AN INTEGRATED EU STRATEGY ON PREVENTION, PREPAREDNESS AND RESPONSE TO NATURAL, MAN-MADE AND OTHER RISKS

INTRODUCTION

The Commission Work Programme for 2002 foresees the development of an integrated EU strategy on prevention, preparedness and response to natural, man-made and other risks. In the recent Communication on “The EC response to the flooding in Austria, Germany and several applicant countries”\(^1\), the Commission confirmed its intention to adopt the integrated EU strategy. The Sixth Community Environment Action Programme\(^2\) also foresees a network for exchange of prevention practices and tools” (Article 6, paragraph 2).

The activities in the field of civil protection can be split into three main parts: prevention, preparedness/intervention and response/restoration. In response to the events of September 11\(^{th}\), the EU civil protection activities have mainly focussed on intervention, primarily through a swift implementation of the Community Mechanism for Civil Protection. The scope of the EU intervention in this field encompasses actions to reduce the consequences of Chemical, Biological, Radiological and Nuclear (CBRN) threats to society. New initiatives are also necessary in the field of prevention and restoration. So far, there is no holistic approach to face natural and man-made risks. While technological hazards arising from specific installations are covered quite extensively (mainly through the Seveso directive), natural risks and many man-made risks are only covered partially and at different levels by existing Community instruments.

WHY A STRATEGY?

There is an increasing number of natural disasters with a higher number of victims and economic losses. Although it is difficult to measure the consequences of natural disasters as no reliable surveys have been carried out using common criteria, the current trend in Europe and throughout the rest of the world shows there is more damage both from a human and from economic point of view. In addition, a whole set of indicators (number of major natural disasters, number of disaster victims, economic impact of these disasters) is also on the rise.

This cannot be explained by natural population and economical growth or by statistical approximations. Although particular events can always be attributed to fate, it cannot be systematically invoked to explain why things are generally getting worse.

The implications of enlargement and the risks arising from climate change will increase the likelihood of yet more natural and technological disasters occurring in the Union.


The increase in the level of damage caused by such events would appear to confirm that many so-called "natural" disasters cannot be explained by fate alone and that mankind bears its share of responsibility.

Our increased vulnerability is something that is clearly at odds with the principle of sustainable development or the desire to make Europe a better and safer place to live in.

**WHY AN “INTEGRATE” APPROACH?**

The protection of people and of the environment is a complex issue that has to be tackled by an integrated approach. This is particularly important for the prevention and mitigation of risks. In this respect, sector policies can play a significant role by introducing new means to integrate civil protection objectives. In several fields, the Community has already developed major policy initiatives. They mainly include the following sectors: public health, safety of products and safety at work, radiation protection, transport, chemical accidents, forest fires, research and technological development and industrial policy.

The integrated approach will help identify all Community instruments/initiatives in different sectors that have or can have an impact on the prevention and response to natural and technological risks. This will provide an overall picture of the Community instruments available, which will be evaluated in a broader context. On this basis, it will be possible to consider if these instruments need to be improved and whether new instruments should be established.

This integrated approach will also be extended to Member States, candidate countries and EEA countries to promote dialogue with the different services dealing with these matters. A first meeting with experts from these countries is scheduled on 11 December 2002 (see agenda). Stakeholders such as NGOs, industrial sectors and local authorities will be also involved in this exercise during a meeting, which will be convened in February/March 2003. In the meanwhile, it is possible to contribute to this debate by sending contributions at the following address env-disaster-strategy@cec.eu.int.

**THE AIM OF THE INTEGRATED EU STRATEGY**

The general aim of the proposed strategy is to protect citizens and the environment by

1) Identifying risks,
2) Raising public awareness,
3) Adopting preventive measures,
4) Identifying actions in the field of intervention and restoration.

Public and environment have to face a large series of risks: forest fires, floods, landslides, tornadoes, storms, earthquakes, volcano eruptions, etc… This strategy will mainly focus a few of them, i.e. floods, forest fires and technological risks.

These risks will be taken as a model in particular because the scientific research in these sectors is more advanced and could serve as a model for further developments in other areas in the future.
The integrated EU strategy will deal with the three phases of an emergency situation. However, prevention will be the main scope of the integrated strategy.3

1) IDENTIFYING RISKS

*Floods.* The development of an action plan at Community or even better at pan-European level to forecast, monitor and assess flooding has to be discussed. It will allow for maps and graphs for expected flood risks. In parallel, for the suddenly occurring “flash floods” a European approach is urgently needed. It should focus on forecasting and monitoring as well.

Such initiatives may only be carried out effectively provided the results and ongoing activities of the European Research Area (ERA) are taken into consideration. The candidate countries have to play an active role in collaborating with the flood action plan, not only due to the fact that river basins do not stop at national borders, but also to allow for a smooth transition phase when they become EU Member States.

*Forest fires.* A set of coherent initiatives for preventing forest fires and to forecast them has to be set up. For forest fires, the competent Commission services have already undertaken important pragmatic steps: every year at crucial risk periods, a daily forest fire forecast is delivered to the operational fire-fighting services in the Member States. Additional steps have to be taken in the field of public information and awareness raising. An integrated approach is needed, starting with risk forecasting, risk assessment and management, following through with information to the public, fire damage assessment and mapping to soil loss and climate change issues.

*Technological risks.* While some specific technological risks are covered by the EU legislation, others are not. We will launch a debate on this issue. In particular we will examine whether the existing measures are sufficient and adequate, if new measures are necessary and which ones. A possibility will be to reinforce the provisions related to public information in the field of technological, and/or apply some of the provisions foreseen inside the Seveso Directive to other sectors not covered or insufficiently covered by EU legislation.

2) RAISING PUBLIC AWARENESS

Information to the public will be of paramount importance in our action, while taking into account the subsidiarity principle.

European citizens have a right to be informed in a coherent way on the level of risk and on the adequate behaviour before, during and after a disaster strikes. Children should also be educated on how to behave during an emergency.

Specific initiatives with clear European added value, for example in the field of emergency communications and harmonisation of emergency signals have to be supported.

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3 Mainly because: 1) The cost of prevention is usually much lower than the cost of intervention and restoration; 2) Any action taken on prevention will facilitate the intervention at a later stage; 3) European civil protection activities have been focussed on intervention (and preparedness) and prevention has not been dealt with.
3) ADOPTING PREVENTING MEASURES

The integrated EU strategy will evaluate the following initiatives:

i) Initiative for developing action plans to reduce the level of risks in the most vulnerable areas. Ensure that these areas are covered by emergency management plans that can be implemented.

ii) Integration of the risk component in all Community policies, in the same way as the “environmental component” is taken into account. (For example, no support to projects that would increase the risk to people, request to carry out a Risk or Vulnerability Assessment of a project in the same way that an Environmental Impact Assessment is requested).

iii) Access to best practices based on the experience gained during recent emergencies.

iv) To promote, as possible and necessary, further preventive measures within the Structural Fund.

4) IDENTIFYING ACTIONS IN THE FIELD OF INTERVENTION AND RESTORATION

The integrated EU strategy will explore the following initiatives:

Preparedness/Intervention

i) To encourage/request Member States to systematically use the mechanism\(^4\).

ii) To ensure of interoperability of emergency services equipment. To develop standards in communication and equipment (signals, warning alert).

iii) To establish policy recommendations for the organisation of medical response in case of a large-scale disaster so that European citizens receive high quality medical care.

iv) To ensure better communication with the citizens during an emergency.

Response/Restoration

i) To use the existing financial instruments to incorporate, as possible and necessary, risk assessment in the criteria for allocating structural funds.

ii) To promote suitable reconstruction within the existing financial instruments (Solidarity Fund, EIB loans).