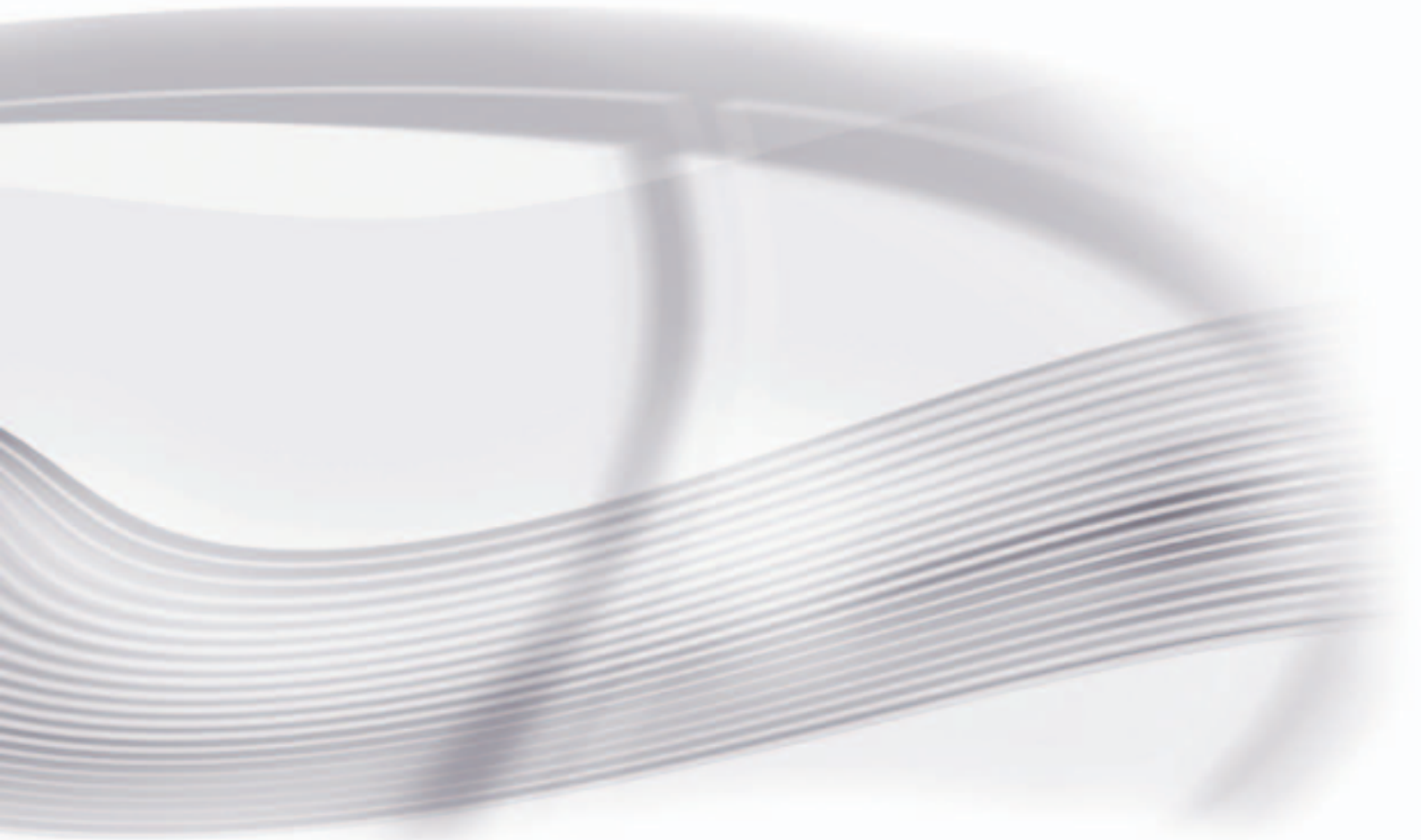

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JRC

Institute for the Protection and Security of the Citizen

ANNUAL REPORT 2006

JRC
EUROPEAN COMMISSION

Report EUR 22734 EN

European Commission
Joint Research Centre

EUR 22734 EN
ISBN 978-92-79-05470-9
ISSN 1725-4469

Luxembourg: Office for Official Publications of the European Communities

Printed in Brussels

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Message from the Director

Dear reader,

2006 was a very active year for IPSC; the Institute has consolidated its position in security related areas of competence, where it has achieved significant results. All this is very visible in the pages to follow. As you will see from the detailed examples, our main areas of expertise are in information and web technologies, digital image interpretation, as well as in several branches of engineering.

Our activities are mainly financed by the EC Framework Programmes for Research, technological development and demonstration activities and the Framework Programmes of the European Atomic Energy Community for nuclear research and training activities and partly through our participation in projects funded as Indirect Actions of the above mentioned Framework Programmes. We work on a global scale and the nature of our intervention differs, depending on the specific need.

We are engaged in scientific and technical support to the European Commission and to other EU institutions in terms of *policy anticipation:* you will see, as an example, the work we do in support to the Directorate General Agriculture and Rural Development (DG AGRI) in the area of crop yield forecasts; *policy formulation:* in the area of wireless communication (Software Defined Radio), for maritime policy, in structural design (Eurocodes); *policy adoption:* the institute is facilitating interoperability tests for the new electronic passports; *policy implementation:* in areas such as animal welfare and fraud detection in maritime transport (ConTraffic); *Ad Hoc responses:* a model of Tsunami's propagation was created, image intelligence was done during the Lebanon crisis in summer 2006; *Policy Evaluation:* in our econometrics and statistics group.

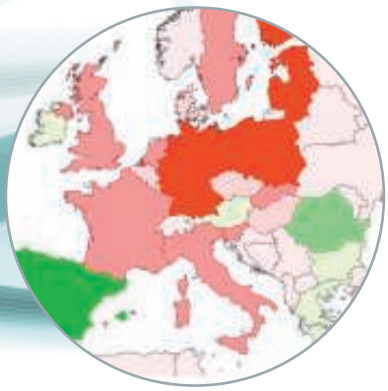
The IPSC annual report is intended to give the reader an overview of the various activities of the Institute and the most important results achieved during the year. For more detailed information and possible collaborations, I invite you to visit our websites and to contact our action leaders.

Acting Director
Alois Sieber

Food Chain • Priority 1.1

As stated in the *White Paper on Food Safety* (COM/99/719), assuring the highest standards of food safety is a key priority for the Commission. The need to understand the links between food and health also demands new ways to understand health threats derived from food and feed. In this context, JRC-IPSC provides scientific and technical support with respect to:

- forecasting pan-European crop growth conditions and production in support to EU decision-making and agriculture policy;
- the development of tools and information systems for traceability of food, feed and livestock



Crop Yield Forecasting and Production Estimates (MARS-STAT)

According to its institutional role[1], MARS STAT provides in near real time to the Statistical Office of the European Communities (EUROSTAT) and to market analysts of the Directorate General Agriculture and Rural Development (DG AGRI) independent analysis and forecasts on crop yield at European and national level. The forecasts are produced running an agro-meteorological system (MARS Crop Yield Forecasting System - MCYFS), which has been conceived and is continuously improved by JRC-IPSC.

Major 2006 achievements

Summer drought forecasts

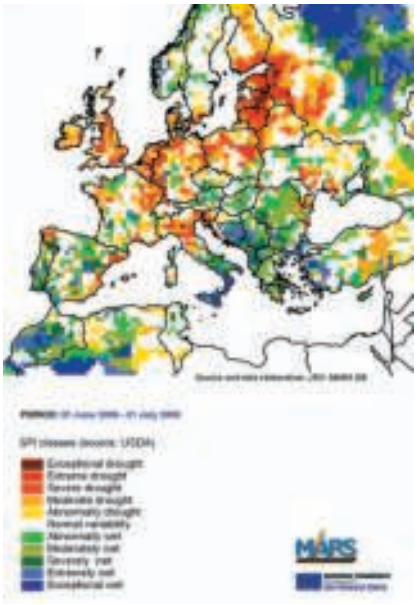
During 2006, MARS STAT forecasted a below average cereal season explained by a summer drought followed by too wet conditions at harvest in many important districts. Germany, Poland, Baltic countries, UK and France marked strong-to-significative yield reductions. According to the reduction in yield of at least 4% the final cereal EU production was forecasted to drop by about 15 Mt compared to 2005 (average year) and to drop by 45 Mt comparing to 2004 (high level year). The forecasts were continuously updated throughout the development of the cropping season. Two press releases were issued in the summer to follow closely the effects of the 2006 June/July drought. The press releases were reported by several international media including televisions, radio, internet and newspapers.

Agriculture Insurances

At the request of the European Parliament and DG AGRI, JRC-IPSC carried out a study on agriculture insurances in order to evaluate the current existing agriculture insurance systems at Member States level and give directions for a possible future EU system in support of a new Common Agriculture Policy. The results were presented during an expert meeting in Brussels on 20 November 2006

Yield forecasts

MARS-STAT reported extensively on crop conditions and yield forecasts (forty-five reports published). Among these, the action produced five special ad hoc analyses on request of DG AGRI concerning the impact of extreme climatic events on specific regions (Italy, Poland and Hungary) and agro-climatological profiling of Ukraine and Russia.



Drought Monitoring, based on Standardised Precipitation Index values.

In 2006 MARS STAT provided specific support to EUROSTAT delivering temperature "corrected" data at EU level for Energy Consumption statistics and actively participated in the LUCAS project (Land Use/Cover Area frame statistical Survey) delivering web sites, estimates and missions. MARS STAT data were presented in two "Statistics in Focus bulletins" of EUROSTAT (Energy and Crops).

Two Technical EUR reports were published, one entitled "New soil information for the MARS Crop Yield Forecasting System" and the second "GEOLAND Report on Yield Inter-comparison study".

Challenges for the future

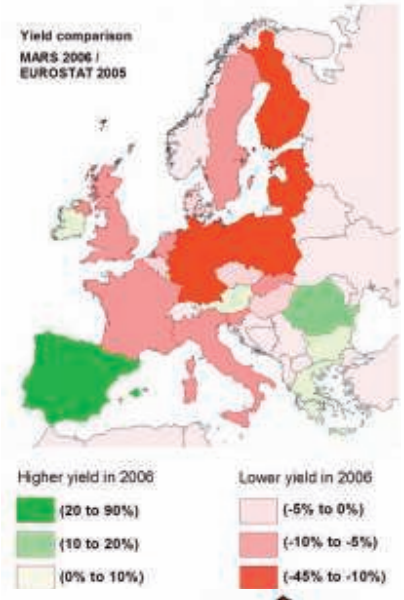
Within the EC Seventh Framework Programme (FP7) MARS STAT will face several challenges. First of all, the action will develop studies

1. Decision no 2066/2003/EC of the European Parliament and of the Council of 10 November 2003 on the continued application of areas-survey and remote-sensing techniques to the agricultural statistics for 2004 to 2007 and amending Decision 1445/2000/EC

and scenarios on the climate change impact on agriculture. The experience and data accumulated within European research projects in this field (such as the ENSEMBLES project) together and in co-ordination with the Climate Change Unit of the JRC's Institute for Environment and Sustainability will be used to study the impact of global warming and how the cropping sector will adapt. A second challenge will be to enlarge the application of the MARS agro-meteorological system to areas such as South America, India, China. This would help to anticipate the availability or extra demand for food commodities on the global market and their impact on prices. A third challenge will be to continue the development of the Agriculture Insurance study and the possible impact on a future Common Agriculture Policy. Finally, the action will contribute to the development of a European agro-phenological network.

What is CGMS?

*The **C**rop **G**rowth **M**onitoring **S**ystem developed by MARS Project provides the European Commission with objective, timely and quantitative yield forecasts at regional and national scale. CGMS monitors crops development in Europe, driven by meteorological conditions modified by soil characteristics and crop parameters. This mechanistic approach describes crop growth (i.e. biomass, storage organ formation...) in combination with phenological development from sowing to maturity on a daily time scale.*
From 23 to 25 October 2006 MARS STAT organised, in co-operation with the University of Liege - Arlon site, a workshop on the CGMS. One of the main results of the workshop is that Morocco, Slovenia, Czech and Slovak Republics asked JRC-IPSC to support the implementation of the MARS STAT CGMS.



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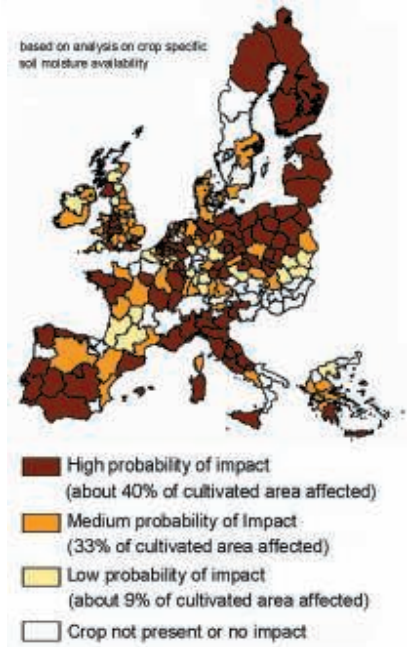

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a) EU 25 total wheat yield to decrease by 5%
b) 2006 Regions where wheat has been affected by dry conditions

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Traceability of Livestock (TL)

How does Electronic Identification (EID) of Animals work?

An electronic device (transponder) is "applied" in the animal as an ear tag, a ruminal bolus or injectable transponder; when the animal is close to an antenna, the signal of the electronic device is read through a reader; the reader sends the information through a processor which retrieves the information and sends it to a database.
Electronic identification allows to:

- *reduce losses, breakages and alterations of the tagging devices;*
- *easier and faster transfer of data and information to other systems;*
- *have less errors in reading and transmitting the identification code.*

(For Radio Frequency Identification see pag. 16)

Animal Welfare

Regulation 1/2005 on animal welfare in long journeys establishes that in all new trucks in operation from 1.1.2007 a Navigation System has to be installed. The system must register all relevant data concerning the location of the vehicle and the conditions of transportation (temperatures of transportation, etc.).

International Workshop "Navigation Systems Required for Long Journey Transportation of Livestock"

Induno Olona (Varese), 11-13 June 2006. The draft technical specifications of the navigation system have been finalised and presented to Member States authorities and other stakeholders. The technical specifications (to be adopted as Commission Regulation in the first half of 2007) will represent a reference document for the manufacturers of navigation systems and for the competent authorities.

On Board Unit installed in a truck dedicated to animal transportation

The key task of the action Traceability of Livestock (TL) is to provide the customers (Commission Directorates, EU Member States Official authorities, farming industry, food processing industry, RFID manufacturers) with technical support in order to improve the establishment of Radio Frequency Identification (RFID) for the traceability of animals and food and – if necessary - to explore alternative solutions. This task is implemented with reliable scientific advice, development of technical guidelines, integrated systems and prototypes.

Major 2006 achievements

Animal welfare in long journeys (Regulation 1/2005)

In the context of the Administrative agreement with the Directorate General Health and Consumer Protection (DG SANCO) and in view of the implementation of Regulation 1/2005 about animal welfare over long journeys, a prototype of "on Board Unit" (OBU) has been designed and implemented. The system is able to constantly monitor and transmit transportation data from the truck (location, speed, temperature, opening/closing of the loading doors, etc.). In 2006 several OBUs were installed and tested in dedicated trucks in circulation in Europe; they are regularly transmitting data to a predefined headquarter (established in the National Data base for Cattle Registration, Italy) without any loss in terms of information.

A collaborative study has been launched to explore the possibility to make all information collected from the Navigation System visible in a website application. The intention is to make available a practical tool which will enable the competent authorities to promptly act in order to terminate a journey in case of a clear non-compliance with the EC animal welfare legislation, as the data can be accessible from any headquarter.

Implementation of Regulation 21/2004 on Electronic Identification: Guidelines

After more than one year of consultations and exchange of views with DG SANCO and the 25 EU Member States' delegations, the draft technical guidelines of Regulation 21/2004 concerning the electronic identification of small ruminants have been presented and accepted. The guidelines include 2 chapters, one fully dedicated to the in-field operations – such as animal tagging and registration – the second one concerning the equipment tests. According to these technical guidelines, the establishment of a Laboratory Network was agreed with the EU Member States.

Pig identification

In 2006 the study concerning the extension of RFID to live piglets has confirmed that the JRC-IPSC approach (tagging procedure / location of transponder) is appropriate and it allows the best retention rate and reading. A prototype of a system of dynamic readings was tested with satisfactory results. JRC-IPSC staff launched a collaboration with Parma Ham Consortium, in order to move onto a larger scale project taking into account an identification model which would cover both live animals and pig products (ham).

Automation of the data collection in the animal diseases eradication programme

In the context of the joint project between JRC-IPSC and the Azienda Sanitaria Locale (ASL) of Varese (the local public health organization), the action completed the design of a full system able to recover the animal identification code from RFID tagged animals and to use the information to feed a double system: on the one hand, an on-farm data collection system (which will update the local ASL database on the animal inventory) and on the other hand the sample reception in the laboratory. Both the systems can be considered a practical demonstration of the feasibility of the integration of RFID/EID into more complex information systems where the data collection/processing operations will be much safer and easier.

Traceability of meat and other animal products

The traceability of food has been thoroughly explored, with the aim of verifying the possibility to use different technologies (13.2 Mhz) and different supports (transponders, labels) to provide a safe identification of the animals / carcasses / meat cuts once they have been transformed into food (slaughterhouses, cutting plants).

Tools for monitoring of animal diseases

An important collaborative study was developed in 2006 concerning the monitoring of airborne diseases (Blue Tongue in particular) with a sophisticated tool. The prototype (called *meteobox)* was developed together with other partners and it aims at transmitting environmental data in order to monitor the population of insects responsible for the outbreaks of the disease. The knowledge of the behaviour of the insects *(vis-à-vis* predefined environmental parameters) allows to build up predictive studies and to take appropriate measures (depopulation, etc.) to limit the economical loss from animal diseases outbreaks.

Technical Support to Member States

In the field of electronic identification of small ruminants, technical support was provided to the Member states, for example to the Italian authorities (Regional breeder association of Sardinia), to the UK Department for Environment, Food and Rural Affairs (DEFRA) and to the Ministry of Agriculture of Cyprus.

Challenges for the future

In support to the EC regulation on animal welfare during long journeys, a further study on the temperature data will be launched in 2007, in order to better identify the location of the temperature sensors and in order to have a more exact relation between recorded and perceived temperature of the transported animals. In addition, the integration of a RFID module with the present system is foreseen in 2007, in order to collect information on the animal identification. In the field of traceability of food, the results of the preliminary research carried out in 2006 are very encouraging and they will be implemented in a larger scale study in 2007. As far as the monitoring of animal diseases is concerned, the study will be further developed in 2007 in the context of a larger scale study called "BtNet2" with a consortium of several research institutes. The action will continue to support Member States' authorities in the implementation of the electronic identification of animals.

In farm test of the devices certified by JRC-IPSC

Meteobox for the predictive studies on the presence of vectors (insects) responsible for the outbreak of animal diseases

Web application for the control of the animal welfare in long journeys

Climatic chambers used in the EID laboratory for the device certification

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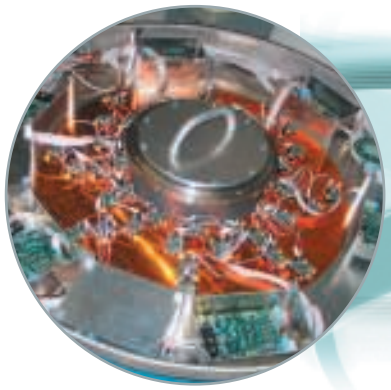


Nuclear Safety and Security • Priority 3.1

Verification and control related to non-proliferation of nuclear materials is performed in the EU by the European Commission's Directorate General Transport and Energy (DG TREN) within the context of the Euratom Treaty and, in the world, by the International Atomic Energy Agency (IAEA) within the context of the Non-Proliferation Treaty. JRC-IPSC gives scientific, technical and training support to both these organizations. This includes advanced information technology, use of remote sensing, knowledge management, effective surveillance systems performance assessment of mass and volume measurements and sealing devices.

Nuclear Safeguards (NUSAF)

The NUSAF action works on the improvement of available safeguards tools and the integration of new technologies into the traditional safeguards workbench.

It advises and assists two overseeing bodies entrusted with safeguards implementation at the international level: the International Atomic Energy Agency (IAEA) and the Directorate General Transport and Energy (DG TREN).

25 years of the EC Support Programme to the IAEA were commemorated in 2006. At a dedicated event in Karlsruhe in October, the Safeguards specialists from JRC-IPSC gave a demonstration of the 3D DIV system and a presentation on solution process monitoring.

What is Nuclear Safeguards?

Nuclear Safeguards (NS) encompasses all activities aiming at verification of quantity and characteristics of the nuclear material during its processing and storage in the civil nuclear fuel cycle.
This verification assures the global community that nuclear material is not diverted from its intended use as declared by the users.
The main techniques used by the NS are based on the principle of nuclear accountancy, complemented by containment and surveillance.

Major 2006 achievements

Solution process monitoring

The Safeguards team has developed a software for Data Analysis and Interpretation called DAI; this tool assists in the verification of nuclear material transfer in an installation and helps to verify the consistency and coherency for accountancy purposes.

In 2006 a preparatory study was completed to install the monitoring tool in the Sellafield reprocessing plant upon request of DG TREN. This would allow an enhancement in the inspection capability in the fuel dissolution part of the reprocessing facility.

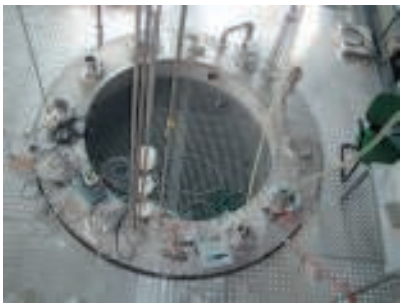
An Administrative Agreement (AA) with DG TREN on "Process monitoring system for THORP" started in December 2006. The purpose of this AA is to provide and install the equipment needed to carry out the data analysis and interpretation, including the replacement of the data loggers and modifications to the related networks already installed. The additional tasks will include maintenance of the equipment as well as training and support to the inspectors.

3D DIV (Design Information Verification) system

Under the Non-proliferation Treaty, it is the obligation of the IAEA to verify that the design and purpose of nuclear facilities under safeguards are as declared and that they continue to be correct. These activities are referred to as Design Information Verification.

To this effect, JRC-IPSC has developed a system capable of modelling a geometrically complex facility (with millimetre accuracy) and automatically identifying all changes that occur between inspections. The system consists of a 3D laser scanner and JRC-IPSC's dedicated software for the acquisition, processing and analysis of the 3D data.

This system was deployed at the Rokkasho Reprocessing Plant in Japan, the largest and most complex facility ever submitted to IAEA safeguards, and it is now used on a routine basis.



Annular tank in the Tank Measurement Laboratory (TAME)

3D Data acquisition during DIV activities at the Rokkasho Reprocessing Plant in Japan

Further advancements in the 3D technologies in 2006 were:

3D containment verification
The IAEA is looking for new technologies capable of uniquely identifying nuclear containers. JRC-IPSC proposed a solution based on the analysis of the surface relief captured by a contactless 3D laser surface scanning device. After encouraging laboratory results, field tests were done at a UK enrichment plant both indoors and outdoors. Results confirmed that it is possible to reliably and uniquely distinguish nuclear containers based on their three-dimensional structure.

Demonstration at IAEA of the Outdoors Verification System (OVS)
Following the successful deployment by the IAEA of JRC-IPSC's 3D Design Information Verification System at Rokkasho, Japan, research focused on the accurate 3D modelling and verification of wide areas (outdoors). A practical demonstration of the prototype OVS system took place at the IAEA in Vienna. The system was successfully used to create a dimensionally accurate and photo-realistic 3D model of the UN complex of buildings in Vienna, including the detection of changes in a few selected areas.

The tools developed above have the capability to integrate data from multiple sources and timeframes, including satellite images or radiation maps.

Support to nuclear inspectors

Direct support was provided to the nuclear inspectors in the areas of training and improvement of technological tools.

Training of inspectors

In 2006 a total of 12 courses with 80 participants were organized. The courses are intended for inspectors of EURATOM, the IAEA, national authorities and also for persons in charge of nuclear material in industrial installations. The aim of all courses is to provide required knowledge and especially practical skills with the methods and instruments used in inspections.
The courses are held mainly in PERLA (PERformance LAboratory), which has a wide variety of nuclear material samples and all the basic measurement instruments used for non-destructive assay of nuclear material and in the TAME (Tank Measurement) Laboratory.

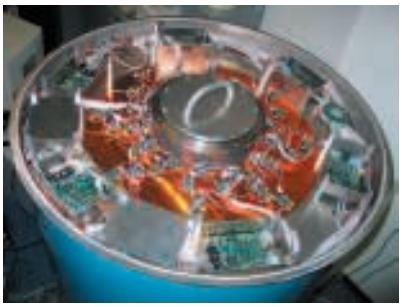
Inspector Support Tools: SRS (Safeguards Review Station)
Surveillance aims at detecting movements of nuclear material in the absence of nuclear inspectors. Cameras provide a visual record of the activities for later review. In the context of the Task 'Safeguards Review Station', a prototype software that assists nuclear inspectors in the review of surveillance images has been installed at DG TREN headquarters. This software reduces the number of images captured by cameras by extracting those images whose visual content is related to typical safeguards-relevant events. It uses machine learning to distinguish relevant from irrelevant images by interacting with the inspector at review time. The installation of the tool was complemented by a training session targeted to a group of inspectors. The prototype is being extended by introducing a novel filter that models regularities in the sequence and timing of safeguards-relevant events.

Inspector Support Tools: SIT-ES
(Site Investigation Tool for European Safeguards)
SIT-ES is a Geographic Information System (GIS) currently developed by JRC-IPSC and DG TREN. During 2006 JRC-IPSC designed and implemented the beta system and installed it at DG TREN premises. The objective is to support DG TREN in the management, analysis and verification of safeguards related information. This includes declarations submitted by Member States under the Additional Protocol to the Non-Proliferation Treaty (NPT), nuclear material accountancy data and Open Source information. SIT-ES integrates distributed DG TREN databases and data related to the NPT Additional Protocol and provides central access to all relevant information through geographic locations on the map-based interface.

This will greatly facilitate nuclear information management at DG TREN. Moreover, SIT-ES will support DG TREN inspectors in planning site inspections and complementary access visits.
Further selected examples of the support provided to JRC-IPSC's main customers were:

Neutron coincidence counter

In support to DG TREN, a neutron coincidence counter, intended for use at the Melox plant (Marcoule, France) for the verification of cans of PuO2 powder coming from Cogema (La Hague, France), has been successfully designed and optimised using Monte Carlo neutron transport simulation techniques. The process of engineering and manufacturing the counter has been initiated with DG TREN and Cogema. The work was accepted for presentation at the 10th international Symposium on Radiation Physics in Coimbra (Portugal) and will be peer-reviewed prior to publication in Nuclear Instruments and Methods A.



Neutron Multiplicity Counter

Proliferation Resistance (PR) of Future Nuclear Energy Systems

Many countries strive for improvement of nuclear energy systems. In order to streamline the research and to prepare the nuclear energy systems of the future, the so called Generation IV nuclear energy systems, which are planned to be ready for deployment between 2020 and 2030 depending on the design features, a number of initiatives are being carried at international level. Generation IV International Forum (GIF) joins several countries. The matter of Proliferation Resistance and Physical Protection (PR&PP) robustness evaluation is tackled by the PR&PP Expert Group of GIF where JRC-IPSC represents EURATOM. In 2006, Revision 5 of the PR&PP Evaluation Methodology Report, including JRC-IPSC contribution, was officially delivered to the GIF. JRC-IPSC was responsible for Appendix D of the report, including preliminary issues related to safeguardability of systems and a chapter on material quality written by the US LLNL (Lawrence Livermore National Lab). Key point of PR&PP 2006 work plan was the definition and execution of a demonstration (DEMO) study to challenge the use of PR&PP Methodology. Object of the test case was a "Slice" of the pyro-chemical Fuel Cycle the facility (FCF), part of the Example Sodium Fast Reactor (ESFR).

EURATOM inspectors in the PERLA laboratory, IPSC, Ispra, during the course on Uranium Enrichment Determination by Gamma Spectrometry, October 2006

Integration with the international safeguards R&D community

JRC-IPSC operates the secretariat and is very active in a number of working groups and the editorial committee from the European Safeguards Research and Development Association (ESARDA). ESARDA is a network of organisations which includes national regulatory authorities (carrying out the controls), operators of nuclear facilities (those being controlled), and research centres (carrying out the safeguards-related R&D).

Because of the typical lack of topics related to nuclear safeguards and non-proliferation in the current university education system JRC-IPSC and ESARDA coordinated in 2005 and 2006 a 1 week training course on this matter. The challenge for the coming years is to achieve full academic recognition of this training (i.e. to allow university students to make it integral part of their curriculum and ECTS points system (European Credit Transfer System)).

Support to the Commonwealth of Independent States

JRC applies its knowledge and expertise of the nuclear safeguards also outside the European Union, as support to the Directorate General External Relations (DG RELEX) and the EuropeAid Co-operation Office (AIDCO), in implementing relevant programmes under the TACIS programme (Technical Assistance to the Commonwealth of Independent States). JRC-IPSC is in charge of the coordination of the new programme 2005 – 2012 dealing with nuclear safeguards, analytical support, fight against illicit trafficking of nuclear and radioactive materials and remediation activities.

Challenges for the future

The action will face several challenges in the next years. An important task is to create a baseline of information (ie, design, dimensions, equipment) for installations and sites (re)entering a safeguards regime. This baseline is to be used as a reference for future inspections and verifications. The technologies envisaged are based on the integration of 3D laser scanning for accurate dimensional measurements, photography for visual documentation and radiation measurements.

As far as Non-destructive Assay Methods are concerned, the research carried out at the new facility Pulsed Neutron Interrogation Test Assembly (PUNITA) is expected to extend the application of the multiplicity counting technique to smaller amounts of fissile material and in particular to uranium. The method is expected to achieve an unprecedented low detection limit of fissile material.

JRC-IPSC is also studying, in collaboration with other laboratories, a new generation of neutron coincidence counters with innovative electronics based on digital signal processing.

In nuclear security and border control the major challenge is to develop sensors able to detect a large variety of dangerous materials (nuclear, radioactive, explosive etc...). Also the reduction of false alarms (based e.g. upon the presence of Naturally Occuring Radioactive Materials) is a challenge. In particular in the nuclear field the detection of shielded nuclear material is still an unsolved problem.

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Nuclear Sealing and Supply Chain Security (NSSCS)

In support to the Directorate General Transport and Energy (DG TREN) and to the International Atomic Energy Agency (IAEA), this action groups the tasks that are related to development and deployment of sealing and identification equipment, tasks related with environmental and electromagnetic testing of inspector equipment in the TEMPEST (Thermal, Electro-Magnetic, Physical Equipment Stress Testing) laboratory, and tasks related with the collection of open sources data to support Nuclear Country Profiles.

Major 2006 achievements

Nuclear ultrasonic bolt seals

Up to now, the IAEA has used ARC[1] seals manufactured by Atomic Energy of Canada Ltd. (AECL) to seal underwater storage of spent nuclear fuel bundles from CANDU[2] type reactors, specifically located at the Cernavoda (Romania) power generation facilities. After a nearly twenty-year service life, the ARC seal is no longer easily supportable. As such, the IAEA urgently needs a reliable and secure alternative sealing system for the various CANDU reactors throughout the world. Within the framework of the European Commission's Support Programme, IAEA asked this action to develop a new CANDU sealing system based on the patented JRC-IPSC ultrasonic sealing system currently used in Sellafield and la Hague. In less than 18 months, JRC-IPSC designed & manufactured an innovative & secure ultrasonic seal as well as the associated reading system, fully compatible with existing installation and tools. A functional reading system and a few seals have been furnished for a one-year field trial at Cernavoda (Romania). With the help of the IAEA and the technicians from Romania, JRC-IPSC's personnel successfully performed, for the first time in real life conditions, the complete sealing cycle (installation, reading, identification, removal, rupture and identification as broken). Another full sealing system as well as fifty seals have been manufactured and will be supplied in 2007 to support a Vulnerability Assessment (VA) of the new seal.

Electronics seals for Lithuanian customs

JRC-IPSC has developed and tested technical devices that support the fight against illegal trafficking in order to secure end-to-end movement of cargo through reliable sealing in a pilot project in Lithuania. The results of the test trial carried out by JRC-IPSC will be the basis to establish the specifications for procurements of the new system to be adopted in Lithuania.

Explosive security task force

JRC-IPSC's participation in this task force focused mainly on the detectability of explosives and detonators. Several presentations were made based on the experiments done in Ispra which helped in the definition of possible detection and traceability techniques as well as the identification of non useable techniques. This work will provide

What are seals?

A seal is a device designed to give evidence of unauthorized action. It does not need to provide resistance but only to record that such action took place. Seals are used for nuclear safeguards/non-proliferation and security, hazardous materials accountability, transport security, customs, theft prevention and detection, access control, counterterrorism, counterespionage, law enforcement, and tamper-evident packaging for consumer products.

Ultrasonic Bolt Seals for dry and underwater storage

1. ARC: AECL Random Coil.
2. CANDU (CANada Deuterium Uranium) is a registred trademark of AECL.

the basis for the "EU action plan on enhancing the security of explosives", which could be adopted in Autumn 2007.

Firearms trafficking

Together with experts from Member States, NGOs and Intergovernmental Organizations with experience in the area of firearms control, JRC-IPSC contributed to the development of guidelines to assist Member States in the implementation of the practical components of the Firearms Protocol (combating and preventing the illicit manufacturing of and trafficking in firearms and ammunition).

SESAMONET - Secure and Safe Mobility Network

SESAMONET is a Secure and Safe Mobility Network developed and patented (Patent No 2734) by JRC-IPSC to improve mobility of visually impaired people. The idea consists of using RFID (Radio Frequency Identification) passive transponders (i.e. micro-chips) to create a path to guide visually impaired people to a specific location. The walking stick has an embedded antenna which detects and reads the RFID transponders and sends a signal via the antenna to a Smart Phone equipped with a database with information on the location. Through a bluetooth headset the disabled receives information on the path (e.g. how to reach his/her destination, whether there are obstacles, if some services are nearby...). A test trial in the city of Laveno (Varese, Italy) will give a full scale demonstration of the project.

RFID

Radio-frequency identification (RFID) is an automatic identification method. It relies on storing and remotely retrieving data using the so called "transponders". A transponder is an object that can be incorporated into a product, animal, or person for the purpose of identification using radio waves.

Sesamonet - RFID passive transponders create a path to guide visually impaired people

Country Profiles

Data on nuclear non-proliferation issues are systematically collected from public multilingual sources (e.g. news articles, scientific / technical documentation/ political/legal documentation, events, periodical reports from NGOs and international organisations, commercial satellite imagery). The information is then used to compile regional or state level reports on nuclear activities and other activities that could be linked with development of the nuclear fuel cycle or trade in dual use or nuclear materials or technology. This activity is carried out in collaboration with JRC-IPSC's Units "Nuclear Safeguards" and "Support to External Security".

Challenges for the future

Smart seals and identification systems are evolving from the role of integrity assurance to the wider role of global security to improve traceability.

Safeguard seals will be widely used to control the accountability of nuclear material and for final repositories, seals for commercial applications are more and more requested to guarantee the security, quality, traceability in the supply chain.

The role of JRC-IPSC will be to support and give technical assistance to the different Directorates General of the European Commission to develop common rules, standards and procedures.

Requests for SESAMONET have been manifested worldwide and will make this project an example of how technology can become a real help for disabilities creating a global network of secure and intelligent paths.

JRC-IPSC's challenge will be to facilitate the technology transfer and to promote the application of these innovative technologies for a better and safer world.

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Technology Foresight • Horizontal Priority 4.1

Increasingly, the definition of EU policies depends on the timely anticipation and understanding of developments in science and technology and their social and economic environment. Through the development of statistic and econometrics tools and economic modeling activities, JRC-IPSC is supporting the Commission's services in the implementation of a wide range of EU policies.

Macroeconomic and Financial Econometrics (STAT-ECON)

In 2006 the STAT-ECON action has been involved in different projects by Commission Services, in the field of financial modelling and econometrics, with an active and dedicated support to key EU policies, such as the single market of financial services, competition policies and macroeconomic policies.

Major 2006 achievements

Deposit guarantee schemes

STAT-ECON work gave a substantial input to the review of the Directive 94/19/EC on deposit guarantee schemes. Deposit protection is an essential element in the completion of the internal market and an indispensable supplement to the system of supervision of credit institutions. JRC-IPSC performed a quantitative study to assess the impact of harmonizing the way deposit guarantee schemes are financed. Results were included in the EC Communication published on the official web site of the Directorate General Internal Market and Services (DG MARKT) in November 2006. On the basis of the results of the scenario analysis, the EC concluded that, while the current rules are sufficient for the time being, a number of self-regulatory steps could be taken to improve how schemes work cross-border within the EU.

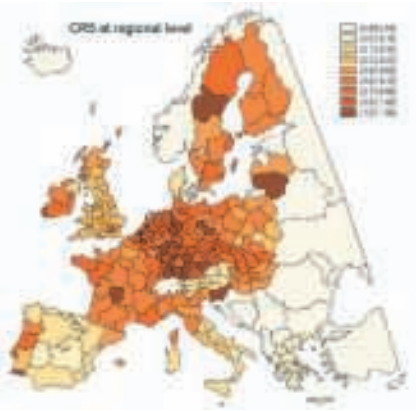
Post trading services

In May 2006, the EC published a working document on post-trading services in the European Union. STAT-ECON significantly contributed to the report by performing an economic impact assessment study. Based on the results of the report, Commissioner McCreevy demanded the industry to commit itself to a series of measures to improve transparency and increase competition. As a result, a new industry's "Code of Conduct" was signed in November 2006.

Sector inquiry into retail banking and business insurances

The econometric work performed by JRC-IPSC formed an important part of a sector inquiry into retail banking conducted by the Directorate General for Competition (DG COMP). A first interim report on payment cards was published in April 2006 and pointed out the lack of cross-border competition among credit card providers. A second report on current accounts was presented at a public hearing in July 2006 and revealed that retail banking markets are still heavily fragmented and closely follow national lines. The final results of the inquiry will be released in January 2007, stating among others the remaining barriers which need to be dismantled to complete the pan-European single market of financial services.

STAT-ECON also contributed to a second inquiry into business insurances, again conducted by DG COMP. A first interim report will be published in January 2007 and pointed to a number of anti-competitive practices, e.g. contingent commissions to brokers.



Regional concentration pattern of retail banking (for DG COMP)

Euro-area Economy Modelling Centre

The Euro-area Economy Modelling Centre (EEMC) focuses on providing methodological and technical support to EU macroeconomic policy coordination tasks. With its expertise in econometrics, statistics, time series analysis, JRC-IPSC supports the Commission and Member States bodies. The EEMC and the Directorate General for Economics and Financial Affairs (DG ECFIN) developed and estimated a model (QUEST) which was used to produce part of the EU Economy 2006 Review, one of the major early economic policy documents. The 2006 Review was published with an acknowledgment of JRC-IPSC's work: "The model is an extended version of a Dynamic Stochastic General Equilibrium (DSGE) model for the euro area, which was developed and estimated jointly by the Directorate General for Economic and Financial Affairs and the Joint Research Centre of the Commission in Ispra [...]".The EEMC organised the first course of Global Sensitivity Analysis for Macroeconomic Models (Ispra, 16-17 March 2006). The course was very well received by the 20 participants, mainly from MS Finance Ministries and Central Banks.

Besides supporting the Commission services in different fields, STAT-ECON has been performing research in the fields of financial modeling, econometrics, and sensitivity analysis. A number of articles have been submitted to peer-reviewed journals. A major achievement is related to the forthcoming book on sensitivity analysis accepted for publication by Wiley.

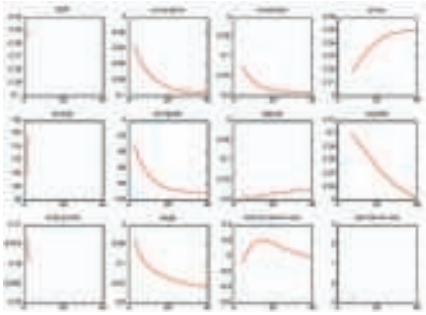
Challenges for the future

In 2007 STAT-ECON will continue supporting DG MARKT and DG COMP on the above-mentioned projects. In the context of deposit insurance harmonization, the action will investigate risk-based financial models to assess the price to be paid by financial institutions to be covered in case of default.

In the field of clearing and settlement, STAT-ECON will also be responsible for a project that aims at quantifying progress on dismantling the Giovannini barriers.

The action is also in charge of assessing the economic impact of Solvency II, the ongoing review of the overall financial position of insurance undertakings. Finally, it has also been recently involved in a challenging project dealing with the investigation of the available information collected within DG MARKT, to achieve a more comprehensive knowledge of the nature, the characteristics and the trends of the internal market economy sectors.

In 2007 the Euro-area Economy Modelling Centre will become an independent action line within JRC-IPSC work programme and will keep on supporting DG ECFIN and MS bodies with its expertise in econometrics and statistics.



Effects on Euro-area economy of a 100% permanent shock to oil price (for DG ECFIN)

Conference "Fiscal Stabilisation Policies in a Monetary Union: What can we learn from DSGE Models?"

12 and 13 October 2006. The conference was jointly organised by JRC-IPSC and DG ECFIN. The scope of the conference was to provide answers to the issue of fiscal policy in the Economic and Monetary Union (EMU) from the perspective of modern quantitative macro-economic analysis as incorporated in DSGE models (Dynamic Stochastic General Equilibrium). These models played a key role in shaping monetary policy in recent years; however, the work on fiscal policy is still in its infancy, albeit from a policy perspective it is one of the main concerns of European economic policy. The conference highlighted that fiscal policy has a relevant role in smoothing business cycle, when monetary policy is committed to the control of inflation. The conference will become a permanent bi-annual forum for research in fiscal policy.

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Indicators and Benchmarks for Education, Innovation and the Knowledge Economy (STAT-IND)

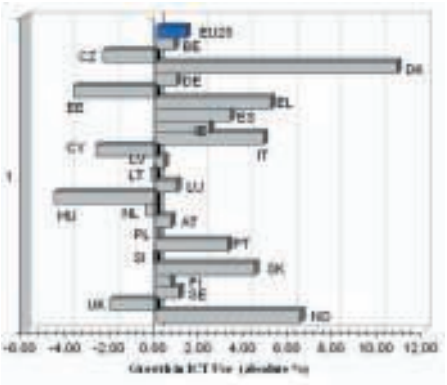
With strengths in statistics, modelling and sensitivity analysis, the action contributes to the conception, development and assessment of indicators needed to benchmark progress of Member States in a variety of policy fields connected to the Lisbon agenda, specifically education, innovation and knowledge economy. The action is divided into three main activities:

- Indicators and Composite Indicators,
- Sensitivity Analysis
- Centre for Research on Education and Life-long Learning (CRELL).

Major 2006 achievements

Workshop on "Measuring well-being and societal progress"

Milan, 19-21 June 2006. The workshop was organised with the support of the Statistics Directorate of the Organisation for Economic Co-operation and Development (OECD). It attracted 120 delegates from leading Universities, Ministries, National Statistical Offices, the World Bank, UNESCO, the European Investment Bank, and many Services of the European Commission.
The workshop focused mainly on the challenges involved in constructing comprehensive measures of well-being, and on the specific role of education in this measure. The workshop explored the structure of a framework for well-being and how to identify a set of key indicators for guiding structural policies towards the well-being of nations.



2004-2005 trend for the composite indicator of e-business use

Concepts of wellbeing and their measurement

One of the Commission's priorities for the coming years is to carry out innovative work on social issues. In particular, the Bureau of European Policy Advisers (BEPA) asked JRC-IPSC to develop the understanding of concepts of wellbeing and their measurement. The general objective of this line of research is to produce recommendations for a framework of indicators that could guide policy in the pursuit of wellbeing.

E-business readiness index

The e-business readiness index is one of the policy indicators selected by the Council Resolution of 28 January 2003 (5197/03) of the European Union to monitor progress in the implementation of the eEurope 2005 Action Plan (COM(2002) 263 final). In other words, it is the tool of reference for benchmarking European Countries in e-business investment and performance. JRC-IPSC evaluates the quality of the data for the indicators and calculates the e-business index for both adoption and use. The e-business index contributes to the annual benchmark of Member States on e-business issues. The e-business index is also published on the annual European Spring Councils.

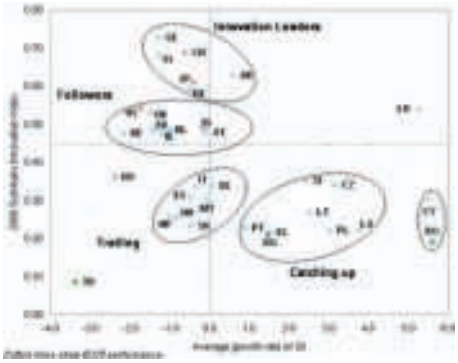
Information and Communication Technologies (ICT) and e-business

Adoption of ICT and e-business are crucial to the growth of the European economy. The Directorate General Information Society and Media (DG INFSO) is in charge of analysing the relation between ICT investments and the objectives of the Lisbon strategy. An econometric study was committed to JRC-IPSC by DG INFSO to investigate for which industrial sectors and for which countries ICT investments are drivers of productivity growth. The results of the study will be reported by DG INFSO in their annual benchmarking report (January 2007) for subsequent recommendations by the EC to Member States.

European Innovation Scoreboard

The Directorate General Enterprise and Industry (DG ENTR) produces annually the European Innovation Scoreboard (EIS), a reference for

Community innovation policy. JRC-IPSC provided intensive support to DG ENTR for benchmarking innovation performance across countries and industrial sectors. In particular, JRC-IPSC wrote a methodological report for the construction of the summary innovation index, it executed the robustness assessment of the innovation indicators; and it prepared two reports on Strengths and Weaknesses of European countries in innovation using the scoreboard indicators and the indicators from the recent Community Innovation Survey (CIS4). DG ENTR co-financed the work via an administrative arrangement.



Summary Innovation Index 2006 and average growth rate in the last year

Trade in high-tech products

The ability to trade in high-tech products is a symptom of increasing efficiency, productivity and competitiveness. The contribution of external trade to the EU's Growth and Jobs Strategy is set out in the Commission paper "Global Europe: Competing in the world" [COM (2006) 567 final]. JRC-IPSC has supported the Directorate Generals Trade (DG TRADE), and Research (DG RTD), and the Statistical Office of the European Communities (EUROSTAT) with analytical reporting on the status of the European exports and market shares in the high-tech industry. The report "High-tech trade indicators 2006: EU25 *vs.* USA, China and Japan" was published.

Policy support in the field of education

Through the Centre for Research on Education and Life-long Learning (CRELL), JRC-IPSC provided the Directorate General Education and Culture (DG EAC) with substantial inputs during the production of the progress report "Progress towards the Lisbon Objectives in Education and Training" adopted in May 2006 ["Progress towards the Lisbon Objectives in Education and Training, Report based on indicators and benchmarks", Staff Working Document of the Commission, SEC (2006) 639, Brussels, 16.5.2006].

JRC-IPSC has supported DG EAC also with the preparatory work for two Commission Communications to the Council and to the European Parliament:

- "A coherent framework on indicators and benchmarks for monitoring progress towards the Lisbon objectives in education and training"
- "Efficiency and Equity in European Education and Training Systems" (COM (2006) 481 final, Brussels 08.09.2006).

Challenges for the future

JRC-IPSC will contribute to the activities aimed at shaping the strategic developments in the field of educational statistics for the coming years. JRC-IPSC will continue its support to the Bureau of European Policy Advisers (BEPA) to the President of the European Commission, to develop the concepts of wellbeing and their measurement, and to produce recommendations for a framework of indicators that could guide policy in the pursuit of wellbeing. JRC-IPSC will embark on three new projects; the first is to develop indicators of flexicurity (flexibility and security) in collaboration with the Directorate General Employment, Social Affairs and Equal Opportunities (DG EMPL); revision of existing indicators and development of new indicators to measure public procurement in support to the Directorate General Internal Market and Services (DG MARKT); and finally to develop indicators to measure the cost of capital, again in support to DG MARKT.

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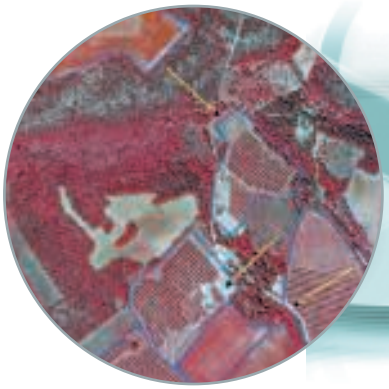
Public Security and Antifraud • Horizontal Priority 4.3

Antifraud and Monitoring Compliance with EU Regulations
Integrated Scientific Area 4.3.1

The responsibility of protecting the Community's annual budget against fraud and monitoring compliance with regulations rests jointly with the Commission and Member States. There is an increasing thrust towards sustainable administration of financial resources. The European Commission's role is to co-ordinate, promote best practice and ensure mutually compatible approaches. JRC-IPSC supports both the Commission and Member states by providing tools for detecting fraud or non-compliance in a broad range of fields, such as fisheries and maritime transport, agriculture, trade.



Monitoring Compliance with EU Fisheries Regulations (FISHREG)

The action FISHREG provides support to the Directorate General Fisheries and Maritime Affairs (DG FISH). Other customers include national fisheries management authorities under Community authority, Fisheries Monitoring Centres (FMCs) and Regional Fisheries Organizations (RFOs).

JRC-IPSC supported the Common Fisheries Policy by addressing a wide range of key issues of importance to fisheries management (e.g. better and more transparent advice, better access to relevant data) and fisheries enforcement (e.g. more effective enforcement of the rules, level-playing field).

In June 2006 the Commission adopted a Green Paper on a Future Maritime Policy for the EU and launched a large consultation exercise. This strategic effort aims at applying an integrated approach to the management of many different human activities that depend on the oceans and the seas (e.g. transport, shipping, fishing, tourism etc.), replacing today's sectorial policies and rules. JRC-IPSC very actively supported this process by contributing to the Green Paper and chairing the inter-service subgroup on "data, observation and monitoring" for ocean-related data. FISHREG's staff also gave a significant technical contribution to maritime border surveillance through its involvement in a feasibility study for the EU Southern maritime border, following an express request by the FRONTEX Agency.

The Common Fisheries Policy (CFP)

The 2002 reform of the Common Fisheries Policy (CFP) identified limitation of fishing effort together with limitation of catches (TACs) and technical measures as the main measures to be used in the management of fisheries. On the enforcement side, fishing regulations are necessary to protect fish stocks and to ensure the future of the fishing industry. Monitoring of regulations is, therefore, crucial to effective fisheries management and control plays a central role in encouraging compliance, deterring fraud and ensuring sustainable fishing.

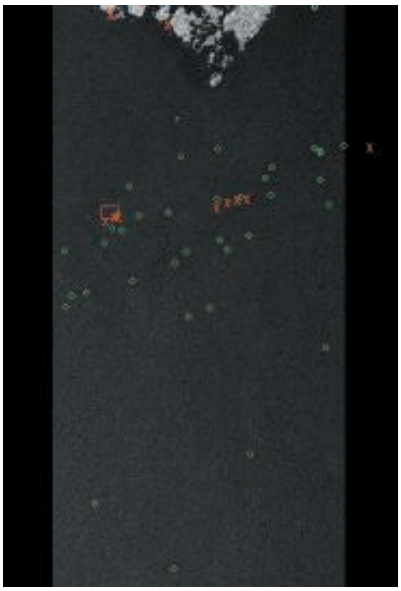
Major 2006 achievements

Policy Support

In 2006, FISHREG consolidated experience with its custom-developed vessel detection technology (VDS) using satellite data (SAR radar images) and tested it over a number of fisheries monitoring campaigns in collaboration with national FMCs. Examples are:

- Western Waters VDS and aircraft surveillance campaign with FMC Ireland in August-September that highlighted the added value of VDS;
- Baltic Sea Closed Box Monitoring campaign, in collaboration with 8 Baltic Sea FMCs in October, that demonstrated the feasibility of near-real-time vessel detection;
- Redfish fishery area campaign of the North East Atlantic Fisheries Commission (NEAFC) with all major flag state FMCs fishing in this area in June-July that confirmed the fact that more vessels are present in the area compared to what is reported using VMS (Vessel Monitoring System).

FISHREG staff used remote sensing to scan a 3000 km-long coastline for Bluefin Tuna (BFT) cages, in areas of interest indicated by DG FISH. The findings served EU policy makers to assess on a more objective basis industry claims concerning BFT farming activity in the Mediterranean.



Monitoring in the Baltic Sea 18th October 2006. The green circles are vessels detected in the satellite data. The red crosses are tracks of two fishing vessels. Only two fishing vessels present in the area of the images. The other vessels are commercial vessels identified with AIS.

Bluefin tuna farms in Hergla (Tunisia). Large Vessels around the cages are about 26m long while smaller vessels are around 8m

With respect to the scientific advice process, FISHREG played the secretary role for the Commission's own Scientific, Technical and Economic Committee for Fisheries (STECF). STECF managed to deliver opinions on all questions within the agreed timeframe. The innovative introduction of stakeholder participation improved the quality of advice and the web site of STECF, operated by JRC-IPSC, became a recognized reference source of information for STECF opinions and upcoming events.

FISHREG helped Member States services with 5 formal Commission requests for data in the framework of the Data Collection Regulation (DCR), mainly through manual pre-processing of the data and a modern web-based platform to upload their data. For what concerns economic data, a start was made in supporting effort to assess the economic performance of EU fleets intended to allow analysis of the impact of proposed changes in management rules.

On the policy front, in November 2006, political agreement was finally reached in the Council for a regulation on electronic recording and reporting of fishing activities and on means of remote sensing. Article 4 of this regulation (on remote sensing) owes a great deal to the many successful demonstrations by JRC-IPSC of remote sensing technology to monitor fishing activity.

Research

In terms of research, at the conclusion of the collaborative project FISHTRACE in June, an online database compiling genetic, taxonomic and geographic information for more than 200 commercially important European marine fish species was made available by JRC-IPSC to the wider scientific community. The information is also of potential use to regulatory and other bodies involved in controlling the authenticity of fishery products.

The collaborative project SHEEL, coordinated by JRC-IPSC, was successful in kicking off a debate on electronic logbooks among European stakeholders, including regulators, fishing industry and solution providers.

Finally, FISHREG staff won the best paper award at the 2006 International Council for the Exploitation of the Sea (ICES) Annual Science Conference, with a paper on the assessment of vessel detection technology for the monitoring of fisheries activities.

Workshop "Scientific and Technical Challenges in applying CFP to the Black Sea"

Trabzon (Turkey) 30-31 October 2006. Since most stocks are transboundary, an optimal management of fisheries in the Black Sea could only be achieved with strong cooperation of the riparian countries. With Bulgaria and Romania joining the EU and the potential membership of Turkey, one of the tasks on fishery would be to increase the knowledge of riparian scientists and decision-makers on the CFP. The workshop aimed at contributing to these issues. It also included training on the use of certain technologies which support the CFP.

Challenge for the future

The Marine Strategy requires that environmental considerations are fully integrated into fisheries management decisions. In addition, impact assessment requirements make economic and social considerations mandatory for all fisheries management decisions. Finally, management tools are changing with the increased use of protected areas and effort management, longer management horizons and lesser emphasis on stock assessments. All the above challenges will require new types of support to produce good advice and effective enforcement tools.

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Support Intelligence and Analysis for the Anti-Fraud and Security Practices (IMIA)

European Commission services such as the European Anti-Fraud Office (OLAF), the Directorate General Justice, Freedom and Security (DG JLS), the Humanitarian Aid Office (ECHO) and the Europe Aid Office (AIDCO) have become increasingly concerned about the misuse of aid funds by beneficiaries and the vulnerability of the non-profit sector to organised crime and terrorist financing. Through the TRAID (Transparent Aid) activity of the IMIA action, JRC-IPSC provides support to EU anti-fraud and security policies.

Also in maritime transport and customs, fraud and security are serious challenges. Through the Commission services OLAF, the Directorate Generals Transport and Energy (DG TREN) and Taxation and Customs (DG TAXUD), initiatives such as the Community Customs Code and instruments such as the EU Port State Control, the EU aims to protect maritime transport and reduce the impact from accidents or potential intentional acts, such as fraud or misuse, as delivery vehicles for weapons of mass destruction. In anti-fraud, OLAF has been long pursing a strategic and operational intelligence agenda to address maritime customs fraud. IMIA supports these EU anti-fraud and security policies with the ConTraffic activity, specifically those in charge of analysis and intelligence in the anti-fraud and security professional communities.

Major 2006 achievements

Control and monitoring of EC aid funds

In 2006, the TRAID system to support monitoring and transparency of aid funds was launched and validated by OLAF. Currently, the system automatically extracts, collects, and visualises data from official aid databases, Commission databases, beneficiary web sites and third-party company databases. TRAID is assisting OLAF in enhancing Community monitoring and control capacities for aid funds to prevent their misuse for criminal activities including fraud.

Regulation of the non-profit sector and prevention of terrorist financing

In 2005, JRC-IPSC at the request of DG JLS, began a study on the regulatory dimension of the non-profit sector in EU25, focusing on registration, monitoring, accreditation, taxation and the gambling sector. The study resulted in two reports published in 2006 and provided recommendations to DG JLS for further action on how the non-profit sector can be regulated so that it would not be misused in general and for terrorist financing in particular. The research aimed to provide support to the Commission Communication (2005, 620) setting out a Recommendation to Member States and a Framework for a “Code of Conduct”, to promote transparency and accountability of best practices in the non-profit sector.

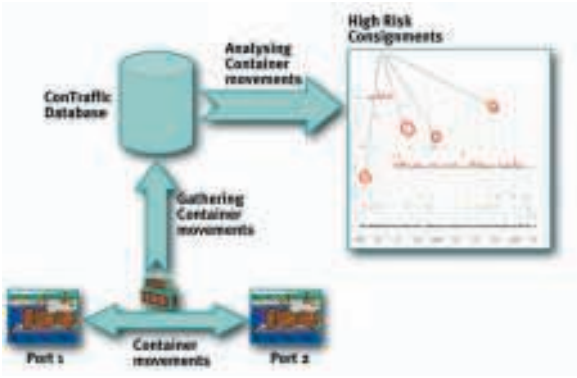
Vulnerability of the non-profit sector and prevention of terrorist financing

In 2006, JRC-IPSC developed a questionnaire concerning identified or suspected cases of misuse for financing terrorism by Non-Governmental Organisations (NGOs). The expected outcome of the questionnaire is

to assess and build a set of risk indicators based on common patterns or characteristics of organisations in the non-profit sector that have been identified or suspected of misuse of financing of terrorism. The information will be used to assess the feasibility of identifying any recurring typologies and of deriving relevant and precise red flag indicators.

Supply chain security - ConTraffic

JRC-IPSC's ConTraffic is a route-based risk analysis system for monitoring the movements of containers. In the context of the EC-US Customs Cooperation on trans-Atlantic supply chain security (during which JRC-IPSC participated in the trans-shipment pilot exercise in 2006 at the request of DG TAXUD), ConTraffic contributed to an increased understanding of the importance of trans-shipment ports in terms of risk, particularly as regards non-proliferation of security sensitive goods from countries of security concerns to the US and the EU. The EC-US Customs Cooperation is considered to be an essential instrument contributing towards combating international terrorism, and cooperation entails identifying ways to improve the efficacy of identifying high security risk containers.



Overview of the CONTRAFFIC structure

Support to Maritime Safety and Security policies

An exploratory system, called ViTesse, was developed to automatically gather ship inspection results data and relate them to port activity in the EU, in support of EU maritime safety and security policies for use by the European Maritime Safety Agency (EMSA) and DG TREN. ViTesse aimed at assessing regulatory (Port State Control Directive 95/12/EC) compliance and developing an early warning system to target high risk ships which have evaded mandatory expanded-inspections. This advanced data gathering technique presents a significant advantage when compared with traditional ways of transferring data between organizations.

Support to Proliferation Security Initiative (PSI)

Results of ConTraffic analysis was delivered to Dutch customs to support the preparation of the PSI interdiction exercise which took place in April 2006 and whose purpose is to identify high risk containers believed to involve illicit CBRN (Chemical, Biological, Radiological, and Nuclear Defense) substances carried on board of containers.

Challenge for the future

The TRAID activity relies on information compiled automatically from databases and open sources. The data sources are varied, not always consistent and non-standard. Part of the challenge in 2007 is producing a consistent data repository that can be thereafter queried and analysed. Other major challenges are: developing advanced information extraction and analysis techniques; developing new risk assessment approaches to understand typologies of misuse in the non-profit sector, and to find ways to extract risk indicators which would help to identify the most vulnerable (to terrorist financing and organised crime) entities in the non-profit sector.

On the other hand, ConTraffic's main challenge in 2007 is to develop web-based tools and applications to automate data gathering from domain specific sources, for information and knowledge extraction from large databases, as well as for analysis and visualization of data (e.g. container movements) to support risk analysis, particularly in near-real time operations.

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Compliance and Control of Agricultural and Regional Policies (MARS-PAC)

The aim of the MARS PAC action in 2006 was to improve the consistency and efficiency of the controls implemented by the Member States for the management of the Common Agriculture Policy (CAP), requiring both EU standardization and adaptation to regional contexts.

MARS PAC provides direct policy support to the technical design and specification of the management and control systems mandated by regulations and the CAP reform. The action is directly involved in quality control, audits and peer reviews carried out by the Directorate General Agriculture and Rural Development (DG AGRI) or the Directorate General Enlargement (DG ELARG), whilst for its scientific role, tests and evaluates new technologies, develops methods and initiates new applications supporting policy evolution (for instance on the Farm Advisory Systems or the controls of environmental cross compliance).

The main technical scope of the action revolves around information management. A prime example of this is the effort made to manage the technically demanding coordination of the imagery required for controlling around 236,000 farms across the EU25.

Major 2006 achievements

ISPRS-ISRO Cartosat-1 Scientific Assessment Programme (C-SAP)

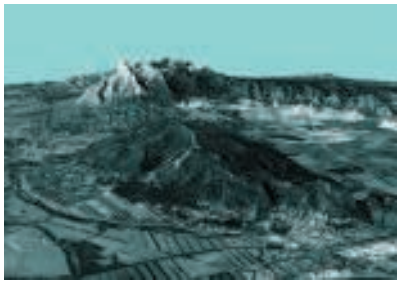
MARS PAC was selected as a Principal Investigator on a joint Cartosat-1 Scientific Assessment Programme (C-SAP) by the International Society for Photogrammetry and Remote Sensing (ISPRS) and the Indian Space Research Organisation (ISRO) to independently assess the mapping potential of the image data from the panchromatic stereo sensors of Cartosat-1 satellite. Such data provides a potential extra instrument that can be used as a supplementary source of imagery, possibly substituting more detailed satellite imagery should this not be acquired. The study focused on the suitability of the sensor - a near very high resolution instrument with a 2.5m pixel size - for inclusion in the EU Common Agricultural Subsidies control programme.

Technical support to Member States

The action delivered, during 2006, over 130,000 km² of very high resolution satellite images to Member States, on behalf of DG AGRI. In support to this work, the action delivered a series of technical documents in support of EU Policy, including quality control reports of the satellite image monitoring program in six Member States. These reports provide feedback on process of the checks on farms that is used by Member States to improve and upgrade their work. The findings also help the Commission prioritise audit plans for their annual monitoring of Member State implementation of the CAP legislation. In addition, technical reference documentation – for example, guidance on best practice related to image processing – was updated in accordance with changes and progress in the technology under use. 10 Framework Contracts for provision of Satellite Remote Sensing Data to the Commission Services were signed for all 14 lots tendered during 2006.

CARTOSAT-1

It carries two state-of-the-art Panchromatic cameras that take black and white stereoscopic pictures of the earth in the visible region of the electromagnetic spectrum. The swath covered by these high resolution cameras is 30 km and their nominal pixel size is 2.5 metres. Two pairs of images were acquired over a study area in Mausanne, France. The stereo imagery permitted the creation of digital elevation models, describing the surface of the study zone, with high precision. These models, combined with accurate points surveyed in the field, permitted the transformation of the raw satellite images into maps, able to be used for measuring field areas. The assessment successfully demonstrated the validity the CARTOSAT-1 instrument for checking of CAP purposes.



Two Cartosat-1 images have been combined stereoscopically to produce a digital terrain model (3-D surface) of the test site in Mausanne, southern France. One of the panchromatic images has been draped onto the surface to make a virtual view of the landscape

Workshop "Geographical Information in Support of the CAP"

Toulouse, 27-29 November 2006. The annual action's conference, jointly organised between MARS PAC and the new "Single Payment Agency (Agence Unique de Paiement, AUP) of the French Ministry of Agriculture and Fisheries, covered the Control with Remote sensing Activities as well as the roles of Land Parcel Identification Systems (LPIS) and ortho-images in all the CAP management and control procedures.
A consensus developed confirming the importance of further activities directly related to geo-information management. This has resulted in the creation of a formal representation of the stakeholder community under the Commission's INSPIRE initiative. The conference thus has formally constituted a forum within which member states, industrial and scientific communities can exchange information concerning the CAP implementation.

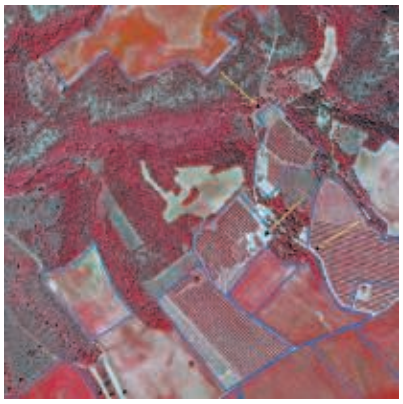


Illustration of some LPIS inaccuracies on an infrared coulour orthophoto

Enlargement

The Action's work concerning the accession progress of Bulgaria and Romania during 2006 consisted of maintaining close technical contact with these countries at this crucial time. As well as technical meetings in Ispra, a series of bilateral visits were carried out at the high level request of the countries themselves.

Furthermore, the work contributed to the process undertaken by DG AGRI of preventive audit: our role ensuring that prioritisation on key acquis areas was made.

MARS PAC intervention played a key part in ensuring that the major instruments of the CAP implementation (LPIS, control systems) were in place for the final review in late 2006.

Challenge for the future

As new technologies emerge and new areas of agricultural policy are added into the existing information management systems, the Action will need to address the challenges of more complex information requirements and undertake research to address these problems.

Furthermore, with more than 8.7M farmers expected to participate in the EU27 direct subsidies schemes – compared with around 3M just five years ago – the importance of efficient and effective controls is on the increase.

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Statistical Methodologies for Control of Fraud against the Budget of the EU (STAF)

STAF action develops statistical methods for the defence of the budget of the European Community. In 2006 the action work evolved along three lines:

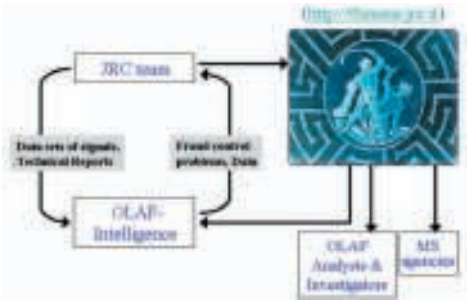
- the formulation of fraud control problems as patterns to be detected in appropriate datasets;
- the packaging in software ARIADNE of tested and promising algorithms for the detection of such patterns, together with graphical user interfaces for making the methods easily accessible by end-users who need to have a knowledge only of the algorithm concepts and their parameters; and
- the dissemination of results obtained, through the website THESEUS and an annual Ispra anti-fraud workshop.

Relatively few patterns were formulated. The two patterns most elaborated so far are spikes in trade flows, i.e, unexpected strong increases in the volume traded between two countries of a product previously unspecified; and outliers in one or numerous scatter plots. These patterns, detected in a multitude of datasets prepared for the action team by the customer or collaborating services in the Member States, give rise to signals or "alerts" that, depending on the trade dataset explored, may indicate wide ranging fraud control problems such as stockpiling before EU Enlargements, fraud in payment of export refunds, deflection of trade to evade import duties or quotas in force for imports into the EU, trade based money laundering, etc. It is up to experts in the subject to interpret and eventually further investigate the signals detected by the statistical procedures developed.

While the volume of results is drastically reduced, results are of considerable complexity due to options made in the detection procedure as well as the target datasets. The Web is perfectly suitable for the representation, storage, and dissemination of results to potentially interested users. Results obtained by the action and judged to be mature for publication by an editorial board comprising JRC-IPSC and customer staff are published on the website THESEUS. Figure 1 presents a print screen from one table of detected spikes published in THESEUS, and the graph for one associated flow. In addition to anti-fraud relevant signals, sorted by pattern, dataset and application domain, THESEUS also includes technical reports on methods applied, and some data nomenclature.

1. Table of spikes published in THESEUS with graphic for a specific flow. (Origins and destinations are masked.)

The primary customer of the action is the European Anti-fraud Office (OLAF). The current flow of results between the JRC-IPSC and customer teams and the action website is presented in figure 2.



2. Flow of results between JRC-IPSC and OLAF teams and THESEUS Website

Major 2006 achievements

Spikes in trade flows and outliers in trade data

The continuous monitoring of spikes in the trade of agricultural products were made operational and accessible through the action website.

Upward spikes in imports of textile products into the European Community were detected and made available to competent Commission

services, OLAF and Directorate General Trade (DG TRADE) and authorized users in the Member States.

High and low price outliers in selected datasets were detected and published on the action's website.

THESEUS

By December 2006, the website THESEUS was already being used by approximately 65 authorised users in 17 agencies in the Member States. These agencies include customs organizations, and payment control and anti-fraud agencies.

Workshop "Dissemination of Statistical Methods, Results and Tools for the Protection of the Budget of the European Community"

Ispra, 11-12 December 2006. The workshop focused on fraud control problems and the detection of statistical patterns in trade data with a view to the protection of the financial interests of the European Community. It was actively attended by 35 participants coming from seven of the New Member States and eight of the old Member States. Participants, mainly managers and analysts in control, customs and anti-fraud organizations in their countries, were introduced to applicable methods and results developed in an on-going JRC-OLAF collaboration.

Collaboration with Commission Services and Member States

The collaboration with OLAF was facilitated by the signature in mid-2006 of a new administrative agreement for advancing the Automated Monitoring of Trade project and the active involvement of customer staff to assess results produced by the action.

Active collaborations and contacts for future work was established with DG TRADE and Directorate General Internal Market and Services (DG MARKT).

In October 2006, OLAF warmly endorsed work results produced by the action team and presented them to the Council Committee on Textiles.

Four members of the action were honoured in December 2006 at the JRC 2006 Excellence Awards for Support to EU Policy.

Challenge for the future

Future challenges and work include advances into a third pattern of fraud control relevance, expanding the current applications and porting the ARIADNE software into the web so as to allow for direct enrichment of user specific websites of anti-fraud signals.

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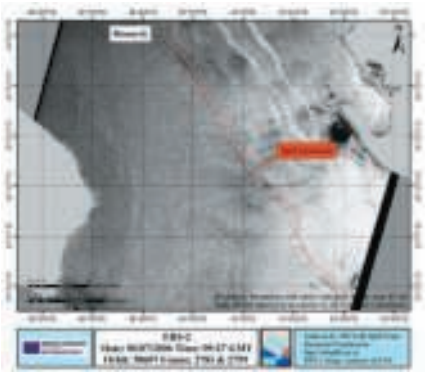
Monitoring Illicit Discharges from Vessel (MIDIV)

In 2006, this Action continued to support the use of space-borne observation to provide updated information on the problem of operational discharges from sea-based sources.

Moreover, since 2004 JRC-IPSC with the Directorate General Environment (DG ENV) launched the initiative to set up a European Group of Experts on satellite Monitoring of sea-based oil Pollution (EGEMP), the Group acts as technical-scientific Working Group in support of the European Commission and its bodies, EU Member States, EU Candidate Countries and maritime European Economic Area Countries (Norway and Iceland) in the field monitoring and assessment of sea-based oil pollution. This Group is now well established and supported by Commission services, national competent authorities and the European Maritime Safety Agency (EMSA).



Oil pollution along the Lebanese coast in July 2006

Major 2006 achievements

Support to the oil spill emergency in Lebanon

MIDIV provided technical support during the oil pollution crisis in Lebanon during the summer 2006. The activities focused on the interpretation of satellite imagery over the area, including radar and optical images. The relevant information was timely circulated, through dedicated reports, to other Commission Services and more broadly disseminated, at a later stage, through a dedicated website.

Systematic mapping of oil spill occurrences at European Scale

The action completed the work aimed at monitoring the number, distribution and evolution of illicit oil discharges from vessels using satellite SAR (Synthetic Aperture Radar) imagery, fulfilling the surveys for:

- 2001 and 2002 over the North Sea;
- 2003 over the Mediterranean Sea;
- 2004 over the Black Sea.

The JRC-IPSC's oil spills database was consequently updated. Corresponding map products were produced and published on the Unit's web-site for dissemination to wider audiences. The comparative analysis of all the data collected during the several years of activities led to the publication of a number of reports, delivered also to Member States authorities in Italy and France, as well as in peer reviewed publications.

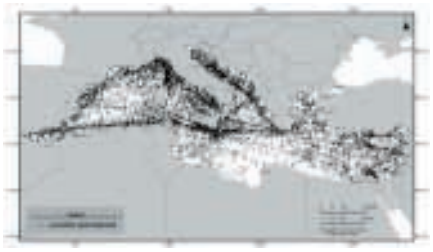
AESOP Project

In 2006 the project AESOP (AErial and Satellite surveillance of Operational Pollution in the Adriatic Sea) was completed.

AESOP intended to assess the possibility of setting up an operational system for the detection of oil pollution at sea and the monitoring of main shipping routes in the Adriatic Sea with consideration of the user requirements. The results of the AESOP project seem very encouraging. For the first time near real time detection of oil spills in

Workshop "Monitoring activities related to the oil pollution in Lebanon"

The workshop was organised in the framework of the European Group of Experts on satellite Monitoring of sea-based oil Pollution (EGEMP). 20 National authorities, the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC), the MarCoast project, the Risk-Eos network and other research bodies attended the meeting. EU was represented by DG ENV, JRC-IPSC and EMSA.
Before the end of 2006, the proceedings and the technical outcomes of the above mentioned meeting were published by JRC-IPSC. This report was presented at the Lessons Learnt workshop following the crisis in Lebanon organised by the Directorate General External Relations (RELEX), the Humanitarian Aid Office (ECHO) and DG ENV and was widely disseminated.



Possible oil spills detected in the Mediterranean Sea during the period 1999-2004

satellite images and immediate verification by the Coast Guard were undertaken in the Adriatic Sea.

Challenge for the future

2006 was the last year for the Action Monitoring Illicit Discharges from Vessel (MIDIV). According to the new strategy and priorities within the Seventh Framework Programme, as well as taking into consideration important changes and the evolution of relevant policies at EU level, it has been decided to reorient the activities of the Institute dealing with maritime issues. A new action on maritime sur veillance (MASURE) starting in 2007 will take over and carry on some of the tasks of MIDIV, including the activities on marine oil pollution.

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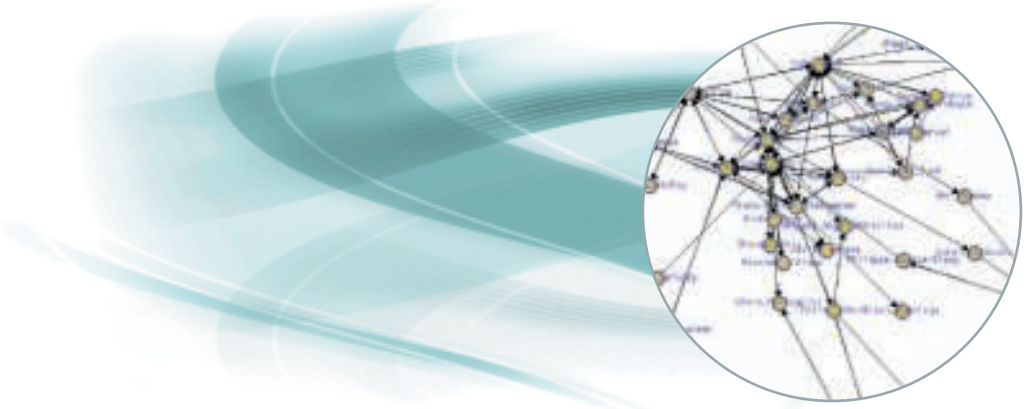
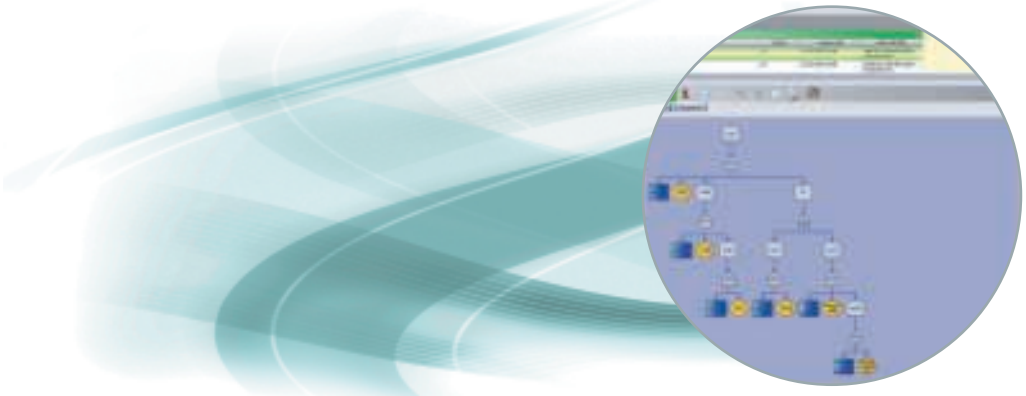


Public Security and Antifraud • Horizontal Priority 4.3

Support to Cybersecurity
Integrated Scientific Area 4.3.2

European society is increasingly dependent upon the correct functioning and correct use of the information and communication infrastructures and of all the applications that compose the Information Society. On the one hand, failure of the infrastructures might cause great damage to society at large, as almost all business and governmental functions rely on information and communication technologies. On the other, systems can be used for illicit purposes, impairing the data of citizens with the intention of committing fraud or violating their privacy.
The Internet, in addition to being a channel for customer oriented applications, is beginning to be used for many industrial functions. Industry is experiencing a silent but inexorable transformation in these years. Industrial systems are being connected to wider networks, even crossing the corporate boundaries. This situation offers new operational possibilities at convenient costs, but paves the way to menacing cyber threats.
For these reasons, in 2005, the European Commission proposed a new strategic framework defining broad policy guidelines for the information society. The so-called "i2010 - A European Information Society for growth and employment" put security and a safer Internet as central objectives.
Because of its technical complexity and its rapid pace of change, cybersecurity is in particular need of reliable and unbiased scientific and technical support for policy-makers. The aim of these JRC activities is to provide S&T support to EU and national policies for protecting citizens, organisations and government against cyber vulnerabilities.



Security of Critical Networked Infrastructures (SCNI)

This action studied during 2006 the vulnerabilities, attacks and countermeasures that can affect the cybersecurity of critical infrastructures. Activities focused on the vulnerability of information and communications networks and electric power systems, and in particular on industrial control and communication systems. The goal is to identify issues of European-wide relevance, and to provide adequate support to policy-making initiatives.

The action elaborated and implemented methodologies and tools for the modelling, assessment and management of the security of complex systems, and applied them to real industrial applications. For backing the theoretical developments, JRC-IPSC expanded its cybersecurity laboratory and conducted relevant experiments.

In addition, the action's activities looked at the standardisation needs regarding security emerging from the application of new information and communication technologies.

Why SCADA security?

The control of industrial installation has evolved from isolated systems to highly connected ones. But connectivity is a double-edge sword: it provides functionality at the price of security vulnerability. This is a critical issue for society, as the consequences of potential attacks might be devastating. JRC-IPSC is actively supporting the policy initiatives in this field.

Major 2006 achievements

The security of SCADA systems

SCADA (Supervisory Control And Data Acquisition) are the systems used for the control of industrial installations. As they have begun to get connected to communication networks, their security is being questioned. They are now exposed to serious cyber security attacks.

Book "Critical Infrastructures at Risk", published by Springer, 2006, in their Engineering series. Written primarily for policy and business decision makers, it explores the potential risks and vulnerabilities of the European electricity infrastructure, other infrastructures and our society as whole increasingly depend on.

In collaboration with a European operator, the action developed in 2006 an in-depth analysis of the control system of an electric power station. This study revealed the seriousness of the situation, indicating the existence of significant vulnerabilities even in the more modern systems, and the possibility of significant attacks. This study opened the door to more studies and led to the setting-up of a dedicated laboratory.

Over 2006, the action also summed up the current state of standardisation efforts in the context of the European Committee for Standardization's working group CEN 161. A survey of the existing guidelines, norms and standards at national, EU and global level was performed, and the needs for further initiatives at the European level were also studied.

An important point is the exchange of information among all stakeholders regarding the security of SCADA systems. The experience of each single actor is too limited, and the evolution of technologies and applications is too rapid. Some countries have launched dedicated initiatives to this end, but it was immediately apparent the need for a European wide arrangement. Interacting with governmental and industry actors, the action launched the idea of a European SCADA and Control Systems Information Exchange (E-SCSIE). Two meetings were held in Ispra, which were instrumental in setting the basis for the formalisation of the working group, expected for 2007.

Critical Infrastructure Protection: Information and Electric Power

Critical Infrastructures developed into one key policy area over the last years. After a set of national initiatives, 2006 saw the proposal by the Commission for the establishment of a European Programme for Critical Infrastructure Protection (EPCIP). JRC-IPSC supported this policy by studying the vulnerability and potential security risk of the electric power and information infrastructures. The work concentrated on the vulnerabilities and potential malicious threats correlated to the pervasive use of information and communication technologies, and on the increasing integration of power networks across national borders.

The studies of the electric power infrastructure were conducted in collaboration with European partners, within the project GRID, a coordination action on ICT vulnerabilities of power systems and the relevant defence methodologies. An R&D roadmap was elaborated in order to guide international, national and industrial actions in the field, in view of the challenges driven by the transformation of the European power infrastructure.

With regard to the information infrastructure, the action developed a methodology and a tool for the security assessment of complex ICT-based systems and networks. The original and innovative approach, called INSAW (Industrial Security Assessment Workbench), was applied to some case studies and has been the object of several papers. The tool will be distributed to all interested users in 2007.

Challenge for the future

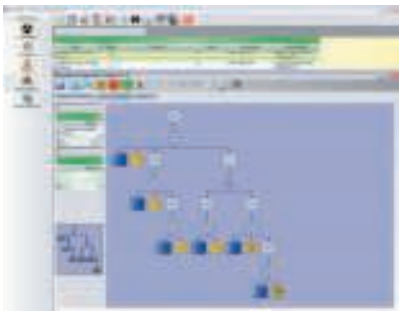
As the topic of critical infrastructures is gaining ground in the political agenda, a key challenge is the ability to connect scientific and technical developments with policy making demands. This will involve the identification and characterisation of European critical infrastructures, as well as the harmonisation of methodologies and best practices. Strong links with key players in Europe will be an unavoidable precondition. It is also envisaged to establish links with institutions such as the European Network and Information Security Agency (ENISA).

From the technical standpoint, a key issue is the continuous emergence of new technologies that change the topology and configuration of infrastructures, and the systems, services and applications deployed over them. The action will continue observing this evolution, and studying the emerging vulnerabilities and threat capabilities.

This will be complemented with an enhancement of the cybersecurity laboratory, the study of security metrics, and the development of security risk scenarios at the European level.

European Critical Infrastructures

While the security of infrastructures is a national responsibility, some of them might involve cross-border issues. For this reason, the European Commission has proposed the concept of European Critical Infrastructures. JRC-IPSC is producing methodologies and tools for their identification and assessment, and for supporting the exchange of relevant security-related information among the different stakeholders.



Screenshot of software tool INSAW: Representation of Attack Tree

Workshop of European electric power Transmission Systems Operators (TSO)

Arona, 23-24 October 2006. JRC-IPSC hosted and co-organised with the Directorate General Transport and Energy (DG TREN) and the collaboration of UCTE (the Union for the Co-ordination of Transmission of Electricity, association of TSO of continental Europe serving 450 million people) and ETSO (the Association of all European TSO), the first security-focused workshop of European electric power Transmission Systems Operators (TSO). The conclusions highlighted the problems deriving from the aging of power system and emerging risks caused by the pervasive use of ICT solutions. Any solution will have to considered legal aspects (i.e. competence spread) and the regulatory dimension (in the sense of additional costs for security protection which will need to be covered by tariffs). Another important deficit regards the lack of mature methods for the assessment of the criticality of the systems vis-à-vis *malicious acts. A harmonised approach to the analysis and representation at the European level was demanded.*

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Web Intelligence and Monitoring (EMM)

What is Web Intelligence?

The Web Intelligence and Monitoring action develops advanced web mining and information extraction tools for application to electronic Media Monitoring and Open Source Intelligence. These tools first retrieve documents from the Internet according to user-specified criteria. Subsequently, they extract information and "facts" from resultant reserves of unstructured text. To be effective, the tools must be able to function in any world language.

The Internet is the richest reservoir of human knowledge that has ever existed. It is not possible anymore for individuals or organisations to monitor and process the vast amount of material available on-line. Advanced software tools are needed for different purposes. Commission services and Governmental bodies need to monitor Europe's press reports, and to research and analyse past events. Law enforcement agencies and counter-terrorism analysts need tools which enable them to mine the Internet and process thousands of documents to identify patterns and produce evidence.

This is a very active area of research internationally with many security-related applications. Specific application areas are: Non-Proliferation of Weapons of Mass Destruction, counter-terrorism intelligence, health threat monitoring and early warning for man-made and natural disasters.

Major 2006 achievements

What is EMM?

The Europe Media Monitor (EMM) is a web intelligence system, which provides a real time news monitoring service. Articles are automatically detected across a large number of on-line media sites as they are published, and are immediately filtered according to topic specific lists of keyword combinations. http://press.jrc.it

Europe Media Monitor

In 2006 the Europe Media Monitor (EMM) was adopted by the Council Situation Centre (SitCen) as the core information service to support Open Source information. It was installed at their premises and customized to focus on topics of interest to SitCen. Similarly, Europol has based their daily report update service on EMM software customized to their interests.

The European Maritime Safety Agency (EMSA), the Civil Protection unit of Directorate General Environment (DG ENV), and other EU agencies have adopted EMM as their primary early warning system.

The News Explorer and public EMM service available at *http://press.jrc.it* has been attracting worldwide interest. There are currently about 30,000 daily visitors to the site, and several agencies including the United Nations are receiving syndicated content.

EMM is the engine that has been feeding emergency and crisis response systems for Directorate General External Relations (DG RELEX), DG SANCO, Europol, and the European Parliament. For example it fed the disaster / crisis portals setup for Lebanon, Avian Flu and the London Bombings (Directorate General Justice Freedom and Security).

Open Source Intelligence Suite

The first version of the Open Source Intelligence Suite (OSInt) has been released and is in operational testing by two national police agencies.

Significant progress has been made on automatic information extraction techniques. In particular new event extraction and relation extraction algorithms have been developed. This allows researchers to derive social networks, and to automate population of incident databases for political science research. This research will be applied in 2007 to a new system called NewsAnalyser and to enhance the functionality of our OSInt suite.

Rapid News Service

Several Directorates General (DG ENV, TREN, AGRI, TAXUD) now use JRC's Rapid News Service (RNS) to define their own subject alerts and to author a newsletter based on EMM sources.

Medical Intelligence System

A public version of the Medical Intelligence System – Medisys has been released at *http://medusa.jrc.it* Medisys scans news and public health sites to filter reports on emerging disease threats. Several disease surveillance organizations, including the European Centre for Disease Prevention and Control (ECDC), subscribe to daily updates from Medisys. The system has been developed with support by the Directorate General Health and Consumer Protection (DG SANCO). The EMM mailing list grew rapidly from 10 officials to over 60 recipients many of whom then forwarded it to their own mailing lists.

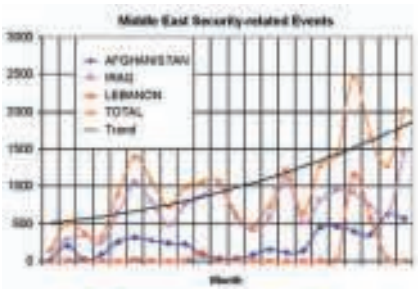
Derived Social Network of contacts during the Lebanon Conflict

Terrorism Knowledge Base

The Terrorism Knowledge Base (TKB) on terrorist incidents worldwide is recognized as one of the world's leading research resource. At their request, EMM's News explorer database was mapped to automatically track incidents concerning 200 different terrorist groups and persons. This now feeds their system together with live news updates. TKB is run by the Memorial Institute for the Prevention of Terrorism (MITB) and supported by US Homeland Security and the Rand Corporation.

Eurovoc

JRC-IPSC developed a software for the Spanish parliament (Congreso de los Diputados) that automatically classifies their documents according to the Eurovoc subject domains and allows efficient manual verification. Eurovoc is a multilingual thesaurus covering the fields of interest of EU institutions and Member State parliaments (see *http://eurovoc.europa.eu/*). The software now processes about 150 new documents about Spanish parliamentary sessions every day. Its usage helped to improve the indexing speed and consistency. The library is accessed by Spanish MPs and assistants.



Automatic extraction of Violent Event data to monitor conflicts

Challenges for the future

Through the success of EMM, JRC-IPSC has developed, during 2006, the key components for automated Open Source Intelligence. However, there is still much challenging research to present automated information extraction to analysts in a meaningful and intuitive manner. Visualizing summaries, extracted facts and relationships between entities are key challenges. Identifying so-called "small signals" which are precursors to major events in the news is another challenge for early warning systems. This is particularly important for Medisys for early warnings of potential health threats.

Furthermore, monitoring of forums, blogs and other frequently updated sites is becoming increasingly important. For these reasons, EMM research in 2007 will look into new methods to monitor the so-called "hidden web". The hidden web is that part of the Internet, which search engines cannot access. Some estimate that the hidden web is actually 95% of the Internet content.

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Public Security and Antifraud • Horizontal Priority 4.3

Technological and Natural Risks
Integrated Scientific Area 4.3.3

JRC-IPSC provides scientific and technical support to the European Commission and to Member States by contributing to the development of a European framework for forecasting, assessing, managing and reducing risk (technological and natural) and enhancing public security. It also supports the implementation of the EU policies on safety and security of transport systems, through technology and risk analysis applied to vehicles, maritime vessels, infrastructures and human factors.

Risk analysis including MAHB and NEDIES (MAHB-NEDIES)

This Action deals with the protection of the citizen from accidental and intentional threats related to the operation of chemical industrial facilities and to the occurrence of natural disasters. It contains the Major Accident Hazards Bureau (MAHB) and the Natural and Environmental Disaster Information Exchange System (NEDIES).

MAHB

The Major Accident Hazards Bureau provides research-based scientific support to the European Union on the formulation, implementation and monitoring of EU policies for the control of major accident hazards, chiefly the Seveso II Directive[1]. Directorate General Environment (DG ENV) and the Seveso Competent Authorities rely on MAHB for receiving guidance for the implementation of the legislation. MAHB has also an instrumental role in managing the European accidents database, analysing trends in accident occurrence, and identifying and disseminating lessons learnt in order to prevent recurrence of similar events.

Major 2006 achievements

The Major Accident Reporting System

A number of obligations put on the Commission by the Directive are being fulfilled through activities entrusted to MAHB. Such key activities are the Major Accident Reporting System (MARS), the Seveso Plants Information Retrieval System (SPIRS) and the Community Documentation Centre on Industrial Risks (CDCIR), which are all maintained and managed by MAHB.

MARS is the reference major accidents database not only for the EU Member States but also internationally. In 2006 an improved version of the MARS system was developed and distributed to the users, a number of analyses on selected safety topics were performed, lessons learnt were disseminated and an e-training tool was developed and distributed to the authorities, especially targeting the New MS and Candidate Countries In parallel, the SPIRS system reached maturity, presently containing data on about 8500 establishments from the EU and European Economic Area countries.

Guidelines and databases

Following the request of the European Parliament and the Amendment Directive[2], MAHB developed in 2006 – in close collaboration with the Member States – guidelines and databases that were adopted and will appear in a forthcoming Commission's Decision, namely:

- Guidelines for the preparation of a Safety Report;
- Guidelines for Land-Use Planning in the context of major accident hazards;
- a technical database with risk data and scenarios to be used in the underlying risk assessments evaluating the compatibility between Seveso plants and residential areas. This database is a big step forward for more transparent and consistent land-use planning decisions.

Support to the network of inspectors

MAHB, in agreement with the Directorate General Environment (DG ENV), established and manages a network of inspectors from the Member States, who jointly analyse case studies, exchange experience and good practices and define recommendations on crucial issues of the inspection policies. In 2006, MAHB organised two such case-studies / visits in the Netherlands and Denmark and it launched

1, 2. Directive 2003/105/EC, OJ L 345, 31.12.2003, pp.97-105.

A Seveso facility: Due to the presence of dangerous substances, the hazards of major accident with severe consequences to the population and the environment need to be controlled

What are Natech disasters?

Natural disasters can trigger technological accidents with severe consequences to the population and/or the environment, due to the release of hazardous materials processed or stored on site. These so-called Natech disasters deserve particular attention, as they can cause multiple hazardous-material releases.

Natech event: Seveso plant flooded during the 2002 floods in Central Europe.

a series of publications / recommendations on best practices in safety management and inspection in Petroleum Storage Depots and in Refineries.

Protection of Seveso plants

Due to the presence of dangerous substances and their importance for the national economy, Seveso plants are often considered as critical installations and need to be protected not only from accidental but also from intentional causes of accidents, including terrorist acts. MAHB delivered to the Competent Authorities an overview of security risk assessment methods and participated in a research project on the security of those Seveso plants regarded as critical installations. Moreover, it developed a database of CBR (chemical-biological-radiological) agents likely to be involved in terrorist attacks.

Natech disasters

MAHB has started a systematic research into the subject by developing methods and tools to assess and represent Natech risk and to suggest approaches for its effective management. Work undertaken in 2006 includes the assessment of the impact of floods and forest fires on industrial facilities, a review of lessons learned from past Natech disasters and the identification of research needs for Natech risk management in Europe.

Integration and Enlargement activities

The action has been very active in Integration and Enlargement activities, assisting the New Member States and Candidate Countries (NMS&CC) to achieve the *acquis communautaire*. In addition to a series of training workshops on safety management issues and the e-training MARS material mentioned above, two research/dissemination projects were carried out in collaboration with institutions from NMS&CC:

- Benchmark on Quantitative Area Risk Assessment and of the relevant uncertainties
- Multi-hazard analysis and risk mapping.

The Natural and Environmental Disasters Information Exchange System

The Natural and Environmental Disasters Information Exchange System (NEDIES) provides to the civil protection authorities a platform for exchange of lessons learnt and practices for prevention, preparedness and response to natural disasters. In 2006 a significant number of new reports were compiled and introduced to the system, while research started on the identification and evaluation of disaster risk reduction measures.

Challenges for the future

Future challenges include the development of a complete suite for assessment and management of all hazards (natural, accidental, intentional), the assessment and monitoring of safety performance, and the use of lessons learnt from past accidents for building resilience in chemical facilities.

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Research in support of Standardisation in Construction and Construction Products (SAFECONSTRUCTION)

The action Safeconstruction addresses part of the research needs regarding standardisation in construction and construction products. Furthermore, it fosters and supports a series of activities aiming at harmonization and further innovation in the construction sector, responding to the European Union Single market and competitiveness policies. Technical support to reconstruction programmes is also considered.

Major 2006 achievements

Conception and development of EU policies

The action was involved in the setting up of the general strategic agenda for the European Construction Technology Platform and contributed to draw up of:

- The future needs for pre-normative research in support of standards and codes, in particular regarding the use of emerging technologies and materials in the construction sector;
- The role that the large research infrastructures existing in Europe can play towards the construction industry to assess and/or improve the safety and security of construction;
- The Strategic Research Agenda (SRA) for the Earthquake Engineering in Europe.

Proposals for development of the policies related to the Eurocodes (set of 58 European Standards for design of civil engineering constructions) were conceived in the framework of the Administrative Arrangement with Directorate General Enterprise and Industry (DG ENTR), namely:

- Strategy for training and promotion of the Eurocodes;
- Structure and approaches of a pilot project on harmonization of the Nationally Determined Parameters (NDP) of the Eurocodes;
- Purpose and justification for a new Eurocode for fibre-reinforced polymer composites;
- Needs to achieve improved design guidelines for seismic protection of structures.

Prescast Industrial Building model tested at the ELSA Laboratory in the framework of the competitive project PRECAST-EC8

Implementation of acquis communautaire

Three informatics tools considered necessary for the adoption, implementation and further harmonization of the Eurocodes in the Member States were developed in close collaboration with CEN/TC250 (European Committee for Standardization):

- A Database for the Nationally Determined Parameters (NDPs), as a means of notification for the National implementation and as a fundamental source of data for the further harmonization of the Eurocodes (Note: the Eurocodes have more than 1300 NDPs, which should be laid down by each of the EU MS and EFTA countries).
- Eurocodes official website of the European Commission giving information on the Eurocodes and monitoring the pace of their implementation;
- A Centralized Helpdesk which will serve as a platform for the maintenance of the Eurocodes linking National Standardization bodies, National Authorities, CEN TC250 and the European Commission.

What are Eurocodes?

The EN Eurocodes are a series of 10 ***European Standards,*** *EN 1990 – EN 1999, providing a common approach for the design of buildings and other civil engineering works. They are the recommended means of giving a presumption of conformity with the essential requirements of the Construction Products Directive for construction works and products that bear the CE Marking, as well as the preferred reference for technical specifications in public contracts. The EN Eurocodes will become the* ***reference design codes.*** *http://eurocodes.jrc.ec.europa.eu/*

Workshop "EUROCODES: Building the Future in the Euro-Mediterranean Area"

Varese, Italy, 27-29 November 2006. The Workshop was the pilot event on the promotion of the Eurocodes outside EU. The Workshop contributed to the objectives of the Euro-Mediterranean Partnership by facilitating the harmonization of the legislative and regulatory frameworks of the Mediterranean Partners with those of the EU in areas such as standardization of design of structural works and certification of construction products. It was jointly organized by JRC-IPSC, DG ENTR, and NATO with the participation of CEN, the European Organization for Technical Approvals (EOTA) and the French Ministry of Transport, Equipment, Tourism and Sea. As outcome of the Workshop the framework for cooperation with the Mediterranean partners in reducing the divergences in the standardization and certification for construction has been determined. Cooperation mechanisms have been identified with regard to the specific needs of the Mediterranean countries. Actions for starting official cooperation with EU in the field of standardization and certification were recommended.
http://eurocodes.jrc.ec.europa.eu/

Workshop on the use of the Eurocodes in the Mediterranean Countries - with Government and Standardization Body representatives from North-Africa, Middle-East and West Balkan countries

Scientific work

The action developed research work relevant for the European Standards. Part of it is pre-normative: the reference tests performed under the project SEISRACKS (Storage Racks in Seismic Areas), development of technical background for Deformation-based design methods, masonry construction, Assessment and strengthening, Performance–based design. Another part of the research is co-normative (there is an urgent need to clarify part of standard) as in the case of PRECAST EC8 project, where the test campaign on pre-cast industrial buildings responded to a specific need of experimental evidence for the Eurocode 8 (European Seismic Design Standard). Virtual Laboratory and Harmonized databases to archive/retrieve experimental data from experimental facilities in structural dynamics and earthquake engineering, as well as tele-presence to the tests were achieved at the JRC-IPSC, which has become an example of the use of cyber infrastructure in a Europe-wide Distributed Laboratory (e-organisation).

Transfer of technology

JRC-IPSC owns the leading laboratory in large-scale pseudo-dynamic testing and is a worldwide leading developer of the testing method. It is a reference lab for Europe and there are many requests for cooperation and transfer of technology. A contract was signed with MOOG-Italy for the transfer of technology according to the JRC official procedures. In addition, JRC-IPSC is providing training of the experimental techniques. In 2006, two institutions from EU and Candidate countries had the opportunity to benefit from the JRC-IPSC training. Collaboration Agreements were signed and, in Turkey, a lab similar to ELSA was constructed (financed by EU funds).

Growth - Support to EU industry

Large-scale reference/qualification tests were carried out on bridges strand-cables for the Italian high-velocity train line. JRC-IPSC created and coordinates the network on structural members made of Glass, which prepared the first draft of a document on justification for new codes and associated standards in this field.

Safety and Security of Nuclear Power Plants

A Memorandum of Understanding between JRC-IPSC and the International Atomic Energy Agency (IAEA) was signed for a multi-annual collaboration under the Seventh Framework Programme in Structural Safety and Security of Nuclear Power Plants and other nuclear facilities.

Challenges for the future

The challenge is to contribute to the creation of a research agenda defined according to the evolution of the construction sector (new materials, new construction systems, new technologies, etc) and with the Union policy objectives in terms of competitiveness, sustainability (energy consumption, reduction of waste) and rational use and optimization of resources. Fundamental research should not be marginalized. Applied engineering oriented R&D and fundamental research should be well balanced. Development of innovative techniques and methods to improve the seismic performance of buildings, infrastructures (and their components) and integrated approaches in a city or /and network scale are of prime importance. Furthermore, more explicit performance based engineering is required including life-cycle cost analyses.

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Quality of Scientific Information in the EU Governance Process (QSI)

Policy development in the European Union has to be based on robust knowledge. In particular, when scientific advice is needed, we have to ensure its quality. That is to say that, not only it should be of high scientific quality and reliability, but it also has to be robust from the point of view of society.

In this action we develop, test and deploy guidelines and tools for quality assessment of policy relevant scientific information, which focus on the one hand on the management and expression of uncertainty and on the other hand, on the communication of complex and sensitive issues in policy making including societal engagement in policy making. The areas of policy in which we have been involved to date are: water governance, climate change, sustainability, health and education.

A book out! Published by Greenleaf Publishers, Interfaces between Science & Society *is edited and authored by members of the group, covering various facets of the challenges posed by science and society conviviality. This theme is also explored in our virtual network InSCights Lab: http://alba.jrc.it/ibss*

Major 2006 achievements

Quality Assurance and Uncertainty Management of Policy relevant Science

The action further developed and applied JRC-IPSC's tool for discussing and communicating uncertainty in policy relevant knowledge: the pedigree methodology.

The World Health Organisation (WHO) - Europe report on *Dealing with Uncertainty in Environment and Health* sets *pedigree* assessment as a tool for implementing precautionary appraisal processes. This report will set the agenda for the 2009 5th WHO Ministerial Conference on Environment and Health.

The Transatlantic Uncertainty Colloquium: a new agreement was prepared during 2006, by the European Union and the United States (USA), through which scientists and researchers from both continents will be working closer together to address common environmental challenges more strategically. During 2006, the action actively participated as a member of the Editorial Committee of the second volume of the European Environmental Agency' s report *Late Lessons of Early Warnings,* contributing to establishing the book's contents.

What is the pedigree methodology?

Assessing the pedigree *of knowledge generates insight in the many assumptions and choices that inevitably have to be made during the production process of* science-for-policy. *It can lead to discerning options for more robust knowledge and to a negotiated management of policy issues characterised by high stakes, value laden positions and disputed knowledge claims.*

Fostering Public Engagement in Policy making

In the last years we have witnessed a growing concern in creating the conditions for citizens to get involved in policy and decision-making processes and a need to create and develop new tools that could facilitate a wider public engagement in policy making. Hence, the action developed several tools that implement the *e-participation* concept which are ICT based options that can facilitate the implementation of public engagement in decision and policy making.

Throughout 2006, the e²FocusGroup platform was used in a significant number of experiments, namely focus groups, meetings, role playing exercises, etc. which is part of the quality assurance methodology pursued by this group. This has lead to design re-conceptualisation of this platform to enhance functionality and to create a more collaborative environment.

What is SOCRATES?

Social multi-criteria evaluation is an assessment framework that allows evaluation of public policy alternatives using a wide range of assessment criteria (e.g. environmental impact, distributional equity, etc.); in this way, multiple perspectives hold across society, and expressed as different assessment criteria, can be accounted for. This is what SOCRATES does!

What is VGAS©?

A computer game that links lifestyles with emissions of 3 greenhouse gases: carbon dioxide, methane and nitrous oxide. It covers personal energy consumption at home and outdoors. It raises awareness of personal burden to the global climate change phenomena, giving tips for achieving a more sustainable lifestyle.
http://alba.jrc.it/vgas

The **Public Information and Policy Support Portal** was developed within the ACCENT (Atmospheric Composition Change) Network of Excellence. We are in charge of developing concepts and tools as well as training within the project's public outreach tasks.

In 2006, a new social multi-criteria evaluation software was developed: SOCRATES (SOcial multi-CRiteriA for The Evaluation of Sustainability).

Key Areas of Deployment of Knowledge Quality Assurance Methodologies

Climate Change: 2006 was the year of **VGAS©** consacration as a tool to promote sustainable lifestyles and empower citizens on how to fight climate change! VGAS© was adopted by the Directorate General Environment's (DG ENV) campaign "You control climate change" as part of its portfolio of educational resources for citizenry. VGAS© is also part of the energy management awareness campaign of the Directorate General Enterprise and Industry (DG ENTR). VGAS© has been widely used all over Europe by concerned citizens, schools, NGO's and local governments.

Lifelong Learning: During 2006, our support to the Directorate General Education and Culture (DG EAC) was granted through a project on Open Source Computer Based Assessment tools (OSS-CBA). This project is part of the CRELL initiative (JRC-IPSC Centre for Research on Education and Life-long Learning, see pag. 21), investigating electronic instruments and methodologies for skills assessment. The project is reviewing current practices on computer based assessment with special focus on OSS applications. In particular, in 2006, the group advised DG EAC's mandate regarding the European survey on language competence.

Sustainability: The action participated in the conception and development of an innovative Internet-based handbook that supports policy makers in finding the most suitable tools and methods to carry out sustainability assessments. This was done through a European Project called SustainabilityA-Test involving more than 20 European institutions.

Challenges for the future

Within the Transatlantic Uncertainty Colloquium, the USA Environmental Protection Agency and the JRC-IPSC will work jointly on formal analysis of uncertainty in environmental models, as well as developing and implementing methods that enable an extended peer community to participate fully in the framing, choice and evaluation of models and policy options.

As far as public engagement in policy making is concerned one of the action's challenges is to deploy the e-FocusGroup platform in Commission's initiatives of public involvement. In the field of lifelong learning, the action will work towards the development of a protocol of quality assessment of Computer Based Assessment tools that may be used in large surveys.

Finally, the VGAS© game will be complemented by a new personal device to monitor personal emissions.

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Vulnerability Assessment and Surface Transport Security (VASTS)

The VASTS Action, created in 2006, focused on the review and development of methods for the security management of European Critical Infrastructures with respect, primarily, to the threat posed by terrorism. These methods include analysis of the threat itself, development of scenarios relating these threats to the vulnerabilities of the infrastructures, assessment of the consequences of the attacks, and development of protection measures. These methodological developments were supported by specific studies related to the threat associated with the surface transport of dangerous substances, how this type of transport can be misused in terrorist actions and the consequence assessment of these actions, and how on-board communication and spatial geo-reference equipment can support real-time traceability, alarm management and rapid emergency response.

As well as terrorism, these developments acknowledge also the existence of traditional man-made and natural hazard, for which protection has also to be provided, resulting in the development of a comprehensive all-inclusive hazard protection strategy.

Major 2006 achievements

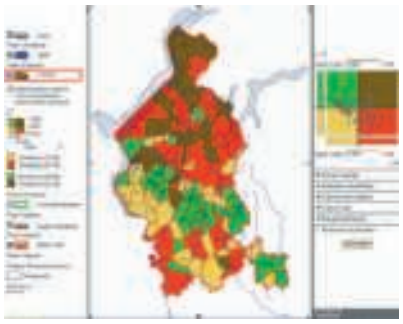
Pilot System for the transport of dangerous goods

A 3-year development of a pilot-system for real-time monitoring of the transport of hazardous goads by road in Italy was delivered and formally accepted by its main end-user, the Italian Ministry for the Environment. The Pilot System allows Regional and National Authorities to monitor and control in real-time the movement and operations of around 70 trucks transporting GPL, fuels or other hazardous liquid substances. Private companies have access to all relevant data for real-time control and a posteriori analyses. Movement and status of hazardous goods are monitored over space and time, and alarms can be timely signaled directly to the correct institutional authorities. Off-line data analyses assist in reconstructing the journeys of each truck, controlling operations and routes, and understanding the spatial and temporal distribution of transported hazardous goods to perform risk analyses.

Oil and Gas Energy Security

Data on gas storage facilities, supplies of Liquefied Natural Gas and the high pressure gas transmission pipeline network supplying Europe from Russia, the Common Independent States and other major gas supply countries were compiled into a spreadsheet model. The model is based on known or calculated cross-border flow rates. Some scenario analysis is possible with the results displayed in both graphical and diagrammatic map form. A database of World-wide terrorist activities linked to oil pipelines comprising over 1100 references was compiled. A network flow modeling software based on the Geographical Information System (GIS) was used to enable detailed analysis of gas flows between countries to be undertaken with the prospect of developing a more detailed understanding of those infrastructures that are critical to the EC.

Simplified model for the gas supply, distribution and consumption in the EU, containing existing (solid line) and programmed (dotted line) cross border transmission pipelines and their capacities. The model includes also all non-EU supplying and transmitting countries. Countries are represented by color coded blocks and contain information on annual and peak daily consumptions.



The Common GIS decision support system with a representation of the Province of Varese and its municipalities. Composite indicators were developed and evaluated to characterize, for each municipality, the different sources of hazard and vulnerability. Cluster analysis, performed over the hazard and vulnerability dimensions, allows spatial representation of homogeneous areas in different colors and, in particular, the identification of high vulnerable areas where more hazard exists (in red).

Regional risk and vulnerability maps and emergency planning activities

VASTS delivered to the Civil Protection Authorities of the Region of Piedmont and of the Province of Varese the technical elements for the preparation of a regional risk management master plan and a provincial emergency master plan, respectively . These deliverables were endorsed formally by the Authorities as guidelines to manage their respective territories. The guidelines introduce an integrated vision of risk management with systematic evaluation of multiple risks and a consistent interpretation of regional vulnerability. The concept of risk and vulnerability maps as a communication and decision supporting tool was developed in close cooperation with relevant stakeholders. High-impact scenarios associated with natural and man-made hazards were studied to develop emergency procedures and to optimize cooperation amongst emergency services.

Web service mapping developments

The action is contributing to the Integrated Projects on development of open architecture and preparatory services within the Global Monitoring for Environment and Security initiative for risk management: ORCHESTRA (Open Architecture and Spatial Data Infrastructure for Risk Management), PREVIEW (Prevention, Information & Early Warning for Risk Management) and FLOODSITE (Integrated Flood Risk Analysis and Management Methodologies). User requirements documents were delivered and case-studies started to demonstrate the interoperability of web-based services applied for risk and emergency management.

European Root Certification Authority and Laboratory for Interoperability Certification

The Digital Tachograph

Commission Regulation 1360/2002 introduced the digital tachograph into the road transport industry. All new goods vehicles registered after August 2005 shall be fitted with a digital tachograph, and the paper charts used to record drivers' working hours shall be replaced by smart cards. The function of the ERCA is to authenticate national-level keys which shall be inserted in tachograph units and cards.
http://dtc.jrc.it

On 1 May 2006, a new control device for road transport, called a digital tachograph, became mandatory on new registered trucks. VASTS managed two major services requested by the current European legislation on the Digital Tachograph: the European Root Certification Authority (ERCA) and the Laboratory for Interoperability Certification. ERCA oversees the cryptographic key management infrastructure supporting the digital tachograph system. It provides and manages digital tachograph public-key certificates and motion sensor data encryption keys, for the benefit of Member States Authority and Industry. The Laboratory for Interoperability Certification performs the interoperability tests and certifications of all types of digital tachograph equipment. Interoperability certification ensures that equipment put on the market will work together with equipment produced by other manufacturers.

Challenges for the future

Future challenges include the development of a set of criteria for the identification of European critical infrastructures in support of the European Programme on Critical Infrastructure Protection (EPCIP) and the associated Commission Proposal of a Directive. The Action will contribute to the development of these criteria. It will suggest different possible sets of criteria and exploit existing information to develop generic models of infrastructures and of their components. Generic models offer the possibility to develop realistic scenarios, not directly connected to Member States' specifics or based on sensitive data, to engage a constructive dialogue with all public and private parties on this challenging and sensitive subject.

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Integrated Safety Assessment and Risk Management in Civil Aviation (ISARM-CA)

This action, which came to an end in 2006, focused mainly on Human Factors in Aviation, as this is the major cause of accidents and incidents. The action covered a much broader and holistic view of the risks associated to Civil Aviation. In particular, the two main areas were:

1. Technological Safety Assessment and Risk Management.
2. Security Assessment and Emergency Management.

These aspects are the major focal points for assessing and ensuring a safe and secure management of the civil aviation system. They were dealt with in similar but not equal approaches, which must be interfaced and activated in a synergetic fashion. In particular, they tackle three aspects of safety: **Prevention, Recovery** and **Containment** of potential events and initiators of accidents or intentional terrorist actions.

The human factor is the major cause of accidents and incidents in Aviation

Major 2006 achievements

The work carried out at theoretical and methodological level during the Sixth Framework Programme focused on methods and theories to carry out safety assessment and risk management in accordance to the new demands for real time safety assessment of flights (both at regulatory and design level), and for human factors integration in relation to flight operations, maintenance, ground and air traffic management. In these areas, data and databases exist and are currently being developed that enable the identification of reference information to sustain the new dynamic and integrated techniques that are developed and applied.

A typical database system for collecting voluntary reports on minor events and incidents in the domain of Aviation Maintenance was developed in collaboration with the Politecnico di Milano.

As far as aviation security is concerned, the importance of prevention and containment of malicious actions concentrated on the early identification of signs and manifestations of behaviour of terrorists and on the countermeasures that can be put into practice to anticipate any terrorist activity as early as possible. A contract on this issue was developed in collaboration with the European Operator Eurofly.

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European Co-ordination Centre for Aviation Incident Reporting Systems (ECCAIRS)

Why ECCAIRS?

From July 2005, Member States need to comply with the Directive 2003/42/EC on "Occurrence reporting in civil aviation". This directive obliges Member States to collect and exchange information on incidents and accidents (occurrences) in civil aviation. The ECCAIRS action supports DG TREN with the implementation of a collaborative network of Civil Aviation Authorities, Accident Investigation Bureaus and other entities related to aviation safety.

To strengthen its policy impact, the ECCAIRS action focused in 2006 on training of the Member States and implementation of JRC-IPSC facilities required by Directorate General Transport and Energy (DG TREN). During the start-up phase of the data collection and integration process, data integration and dissemination was performed by the JRC-IPSC in collaboration with the European Aviation Safety Agency (EASA). To provide this service the action produced a new release of the reporting software and set up a new environment for EU-wide data integration. During 2006 co-operation with the International Civil Aviation Organisation of the United Nations (ICAO) was consolidated. Both ICAO and EASA apply ECCAIRS for their accident and incident reporting systems. EASA's Annual Safety Review 2005 has been prepared from ICAO data using ECCAIRS data-collection and analysis tools. To prepare for the expected extension of ECCAIRS into other transport domains, an agreement was obtained with the European Maritime Safety Agency (EMSA) to provide them with a functional prototype of a Maritime Casualty Reporting System based on ECCAIRS.

Major 2006 achievements

Integration, assessment and dissemination of data

In October 2006 an inventory, made during the ECCAIRS annual steering committee meeting, resulted in 20 Member States currently using ECCAIRS to implement the functional requirements of Directive 2003/42/EC. Most of them are ready to start the integration of data, using the tools made available by the JRC-IPSC, as soon as the required implementing measures are adopted. Anticipating this upcoming regulation, the production environment for the integration, assessment and dissemination has been set up in the JRC-IPSC and has been tested and evaluated with the help of two volunteering states (France and Iceland).

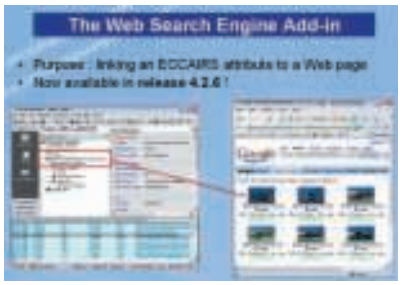
Training for Member States

The work for the Member States consists mostly in providing the required training and education to their representatives. During the year a total of 95 persons from all over the world (including non-EU states using ECCAIRS like Brazil, Bulgaria, Egypt, Jordan, Romania, etc.) were trained in the setup and correct usage of the tools. Most of these training sessions took place in Ispra, but on request, and thanks to the availability of the ECCAIRS Mobile Classroom, some of them were organised also at the premises of ICAO in Montreal and EASA in Cologne. In addition to these workshops, the Member States received the produced software and support in case of problems with the installation or usage of the system.

Taxonomy

International organisations like ICAO, Eurocontrol and EASA adopted ECCAIRS as the base structure for their Reporting facilities. All three organisations are running ECCAIRS, ICAO as their native, world-wide database for aviation accidents (ADREP). During 2006 two updates

have been made to ICAO's ADREP taxonomy. These changes were implemented in the ECCAIRS dictionary and are published (in agreement with ICAO) on the ECCAIRS website. French and German translations of the taxonomy are maintained by the French and German Investigation Bodies using specific tools developed for this purpose by the JRC-IPSC. The translated versions are also distributed in new software releases.



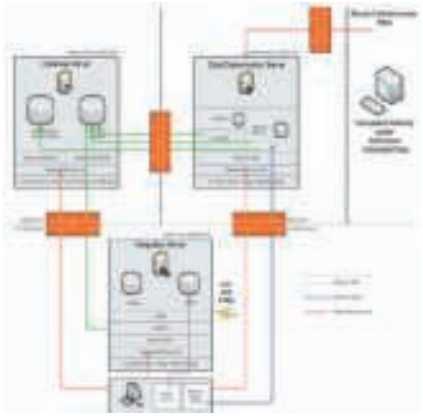
The French Accident Investigation Bureau uses the new ECCAIRS Web Search Engine to link ECCAIRS to Google images

Analysis capabilities requirements

The JRC-IPSC has participated in the Occurrence Data Analysis (ODA) Requirements Inventory. The ODA-2 Working Group (22 persons of 18 organisations) was commissioned by the JSSI Steering Group at the request of the ECCAIRS Steering Committee with the purpose of producing detailed specifications for occurrence data analysis capabilities. After more than one year of work the group produced a final report (NLR Memorandum ATMS-2006-123), with recommendations for ECCAIRS related analysis capability requirements.

MEPHISTO (Modular Entitiy oriented Program for the Harmonisation of Inco mpatible non Standard Taxonomies for Occurrences)

Another important activity has been related to deploying JRC-IPSC's MEPHISTO electronic data conversion platform. This platform, and the various developed conversion projects, has been developed and deployed during 2006 for the electronic conversion of incompatible data originating from the Nordic countries, United Kingdom, Various operators (KLM, Air France, LuxAir) and the People's Republic of China. MEPHISTO is a universal data-conversion platform developed completely by the JRC-IPSC within the context of the ECCAIRS action.



The new ECCAIRS production environment, made available in 2006

Challenges for the future

Regulation (EC) N° 1406 / 2002, establishing the European Maritime Safety Agency (EMSA) defines that EMSA must provide the Commission with objective, reliable and comparable information and data on maritime safety. The ECCAIRS reporting framework, as has been done for aviation, could become a basis for this task. The initial contacts with the EMSA, established at the end of 2005, have been further developed and resulted in an agreement to collaborate in the development of a maritime version of ECCAIRS. EMSA will make available its EMCIP taxonomy and the JRC-IPSC will produce a functional prototype of an ECCAIRS based reporting system for the Maritime domain. After evaluation of the final deliverable, EMSA and JRC-IPSC will determine together if a basis for further collaboration in this area exists. This is the first step towards a multimodal transport safety assessment platform, as has been proposed for JRC-IPSC work programme under the Seventh Framework Programme (FP7). In a similar way, the rail transport domain will also be supported, later on during FP7.

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Advanced Monitoring Techniques for Risk Assessment of Landslides and Avalanches (AMTRALA)

LISA (LInear Synthetic Aperture Radar) is a system developed by JRC-IPSC which is able to monitor in real time ground displacements and avalanches in high risk areas

In 2006, the main focus of this action was given to the avalanche early-warning issue. In this respect, an assessment of the potential operational use of the LISA technology in an avalanche early-warning system was performed. This assessment was carried out in close contact with the Swiss Federal Institute for Snow and Avalanche Research in Davos. Specific aspects of the problem such as the precise mapping of the snow accumulation on the slope and the automatic detection of any avalanche on the slope will be addressed. Concerning the landslides, the focus has on the demonstration of the concept of intelligent monitoring station with the complete processing chain embedded and delivering the results on the spot. In close contact with the Technology Transfer and Scientific Co-operation Unit, the possible licensing of this new technology is currently under discussion.

Major 2006 achievements

Flood Emergency in Romania

Monitoring ground displacements in Romania after the flood event in April 2006

The JRC-IPSC's Linear Synthetic Aperture Radar (LISA) instrument was made available to the Romanian authorities to monitor minute underground movements and then predict likely surface movement that could lead to the collapse of dikes or landslides. The LISA system was transported to Romania, on an emergency basis, on Easter Sunday and was set up, initially, near Cernavoda, on the river banks of the Old Danube, in the Ialomita County. On 27 April, the equipment was moved to Borcea branch of the Danube, near the locality of Bentu, one of the most likely points where the dyke could collapse. This effort was very well received by the Romanian Authorities and the EC Delegation Office in Bucarest.

Demonstration of an Automatic Avalanche Alert System in Alagna

In collaboration with the Italian company Monte Rosa 2000, and within the framework of a project supported by the JRC's Technology Transfer and Scientific Co-operation Unit, a LISA instrument was deployed in Alagna (Northern Italy) at the end of March 2006. The goal of this field campaign was to demonstrate an automatic alert system monitoring all the avalanche events 24/7. The interest in this type of application is high, and at the moment no other alternative technologies are available. The unique feature of LISA is that it can see every avalanche 24/7 under adverse weather conditions. It is especially under those adverse weather conditions that getting a confirmation that an avalanche has occurred is very important. This would lead to an optimal use of the avalanche triggering systems (e.g., Avalex and Gasex Systems) deployed in the vast majority of ski resorts in the Alpine Region.

The results of this field campaign will be used to assess the possible operational use of the LISA technology for this new application. In case of a positive outcome, the licensing for use of this new technol-

ogy will be addressed in close contact with the Technology Transfer and Scientific Co-operation Unit.

Challenges for the future

The action Amtrala has been integrated into a new action on advanced radar and telecommunications technologies for security, which will start in 2007. The main focus of this new action is on security applications of radar and telecommunications systems. The LISA technology is one of the components of this new action. The demonstration of new applications in the context of security applications will be addressed during the Seventh Framework Programme (FP7).

Monitoring avalanches in Alagna (Italy)

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Physical Vulnerability Assessment of Critical Structures (PVACS)

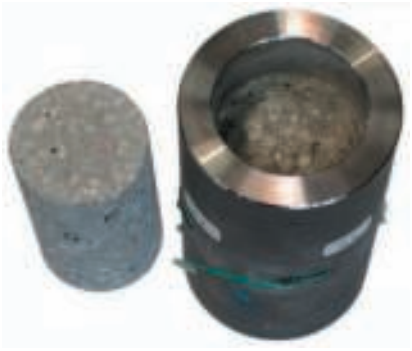
This action entails the development of vulnerability assessment methodologies for the mitigation of the effects on structures and their occupants of terrorist acts involving explosives. The rationale is that if all precautionary measures fail to prevent such events, it will be the physical structure itself, in terms of mechanical resistance and integrity, to bear the first consequences. If adequate provisions against abnormal loads, such as blast, explosion and impact, have been taken in the design, it is possible that catastrophic consequences will be contained and major disasters avoided.

Major 2006 achievements

Simulation techniques

Development of simulation techniques was pursued during 2006 for the assessment of the structural vulnerability of several construction types. Numerical finite element simulations, using the code EUROPLEXUS were employed in order to provide information and predictive insights in the structures behaviour under explosive loading. Efforts focused on simulating open air explosions with geometries representative of urban environment. Complex pressure wave propagation patterns were effectively and reliably obtained. Areas of high risk for the occupants, with respect to injuries potentially induced to humans due to blast wave effects and flying debris, were clearly identified for several explosion scenarios. The efficiency of the code to simulate the process of the detonation of a solid explosive itself was also tested and validated, through the use of the Jones-Wilkins-Lee equation of state.

a



b

Dynamic axial compression of concrete with lateral confinement:
a) Concrete specimen (60mm diameter, 100 mm height) placed inside the confining steel jacket properly instrumented with strain gauges at its outer surface;
b) positioning of specimen at the Large Hopkinson bar for the dynamic testing.

Material models

Parallel activity in the experimental field was undertaken in order to characterise construction materials under higher strain-rates, and to introduce such realistic material models in the simulation codes. Particular attention was given to dynamic compression of confined concrete, a demanding problem due to the very high dynamic pulses required for the testing. A series of tests for the preliminary investigation was successfully conducted, in collaboration with the Délégation Générale pour l'Armement (French Ministry of Defence), at a properly configured Large Hopkinson Bar of the JRC.

Standardisation

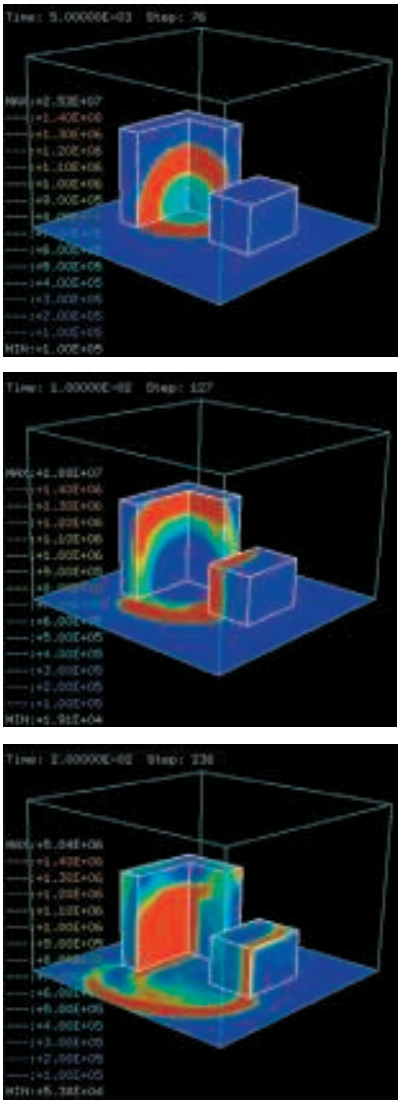
Members of the action also participated and acted as Convenor of the European Committee for Standardisation (CEN) Expert Group "Critical Infrastructure - Building and Civil Engineering Works" within CEN/BT/WG161 "Protection and Security of the Citizen". This is a pre-standardisation initiative in the Security field. In an interim report, gaps of knowledge and lacking standards in the construction field were properly identified, and the work has been included in the standardisation activities under the Security and other areas in the Seventh Framework Programme for Research and Development.

Challenges for the future

In 2006 work commenced in the transport security field under an Administrative Arrangement with the Unit "Security of surface transports and transport of dangerous goods" of Directorate General Energy and Transport (DG TREN). The project, which comes under the title "Innovative Technologies for Safer and More Secure Land Mass Transport Infrastructures under Terrorist Attacks", will run for two years. It deals with the physical protection and mitigation of the bombing attacks risk in the rail transport, and addresses several policy objectives of DG TREN. It will mainly contribute to alleviating the vulnerability of Europe's passenger land transport infrastructures, and it will provide assurances to the European public that the level of security and safety in the land mass transport has been upgraded (as in the air and maritime transport). It is also envisaged that benefits may arise for the European rolling stock manufacturing industry; and that design techniques for new stations, or for retrofitting existing ones to make them more resilient to blast loading, would definitely benefit the European Construction industry.

What is EUROPLEXUS?

It is a structural analysis program based on an explicit finite element formulation. It is suitable for studying fast dynamic responses of structures (explosions, impacts, crashes, etc.), and has specific capacities for modelling fluid-structure interaction phenomena. It has been co-developed by the JRC and the French CEA over 20 years. It is continuously upgraded and validated to cover new needs, and collaboration agreements exist to facilitate the transfer of the technology to partners.



a

b

c

Simulation with the Europlexus code of pressure distribution after bomb explosion at the inner corner of the 40m-high L-shaped building (a) at 5', (b) at 10', (c) at 20'

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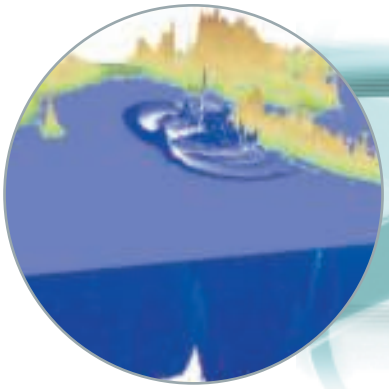


Public Security and Antifraud • Horizontal Priority 4.3

Contribution to Commission Objectives in Humanitarian Aid and Assistance Integrated Scientific Area 4.3.4

Acting through Member States and through programmes governed by the Commission, the EU is responsible for more than half of the world's humanitarian aid and development assistance. Through this financial support the EU aims to promote peace, stability and reconstruction beyond its borders and to integrate the developing world into the global economy. The Commission is also committed to supporting the EU Common Foreign and Security Policy in non-military aspects of crisis prevention and management. The JRC-IPSC competence in remote sensing and decision support systems is widely used to contribute to these actions.

Information Support for Effective and Rapid External Action (ISFEREA)

The action Isferea aims to contribute to global stability and security by providing scientific and technical support to European external policies. Isferea specifically addresses issues linked to security or conflict in third countries and EU external policies by means of developing, validating and applying information technologies, geospatial (including Earth Observation) analysis techniques, and system analysis approaches for the processing and analysis of earth observation data, open source intelligence, and other relevant data such as socio-economic, political, and conflict.

Major 2006 achievements

Support to crisis management

Remote sensing of settlements. Isferea analyses, with in-house software, built-up areas and settlements using very high resolution optical and radar (SAR) imagery. Isferea is also developing a typology of built up structure that can be used to systematically analyze built-up structures globally. The work is conducted in partnership with research institutions and the World Bank. The work will contribute to the territorial planning and sound urban management of the ACP (African, Caribbean and Pacific Countries) Observatory for Sustainable Development.

Damage assessment methodology and support to Lebanon Crisis. Isferea further developed the post-crisis/disaster damage assessment methodology which in 2006 was tested during the Lebanon Crisis. The current work focuses on establishing a standardized methodology for damage assessment and reporting, developed in international cooperation with the EU Satellite Centre, UNOSAT and the RESPOND Consortium (a project funded by the European Space Agency within the Global Monitoring for Environment and Security initiative). Results of damage assessment for Beirut and Southern Lebanon were delivered to the international donor meeting on 31 August 2006, to the Lebanon Government. Furthermore, Isferea is developing algorithms to automatically detect damages in built-up structures (in partnership with the United Nations Development Programme and the World Bank); this work was reported in two peer reviewed journals.

Lebanon crisis 2006. Damage assessment carried out over the Southern part of the city of Beirut

Monitoring for Security

Security barrier and settlements monitoring. In 2006, Isferea provided 3 updates on disputed issues in the West Bank: situation assessment of the construction of the Security barrier and the presence of Settlements. The analysis of the security barrier is conducted using spot imagery and ancillary information made available via the United Nations Office for Coordination of Humanitarian Affairs through a cooperation agreement. In 2006, Isferea also compared the size of built-up structures in the West Bank over time.

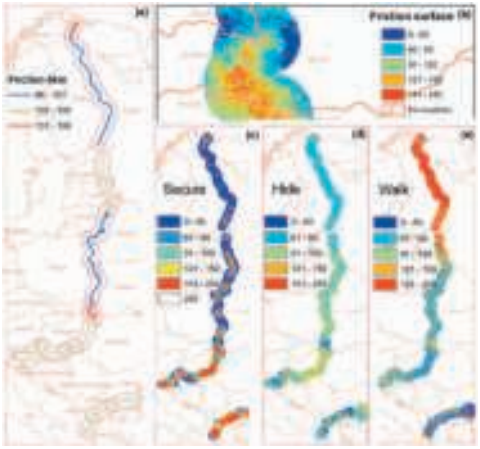
Security events monitoring. In 2006, Isferea continued to quantify, on the basis of the analysis of open source information by means of a peer revised methodology developed by JRC-IPSC, security incidents in the West

bank, Gaza and Iraq. The information is classified on the basis of security incident such as cause, people affected (casualties), institutions that claim responsibility. Monthly updates are made available to the crisis room of Directorate General External Relations (DG RELEX) and in support of the General Affairs & External Relations Council (GAERC) meetings.

Conflict Prevention

Support to the Kimberley process. In 2006, Isferea continued its quantitative and qualitative assessment of diamond mining activities and their dynamics over time in rebel-held areas in countries of concern in Africa by means of very high resolution (VHR) satellite imagery, as requested by DG RELEX in support of its mandate as chair of the Monitoring Group in the Kimberley Process. Use of stereo-pairs imagery was also made for the first time in order to obtain 3D images of industrial mining sites.

Illicit crops monitoring. Isferea started in 2006 a two year project funded by the EuropeAid Cooperation Office (AIDCO) on monitoring of poppy cultivation in support of an EC Project for Alternative Livelihood (PAL) in selected districts in Eastern Afghanistan. The analysis of remotely sensed data from several sources both optical (High Resolution and VHR) and radar (Radarsat1), proved globally to be consistent and provided detailed results at local level that are complementary to the national surveys carried out by the United Nations Office on Drugs and Crime.



Isferea carried out in 2006 an analysis of the permeability of the EU Eastern land border to migration flows. This model focuses on a permeability related to a standard person crossing the "green border" (a) illegally by foot. The basic criteria implemented were: the probability to be stopped by a border police agent posted at border control points (c), the possibility to be hidden by the physical environment (d) and the walking person speed allowed by the terrain and the weather conditions (e). (b) shows a segment at the Slovakia-Ukraine border.

Migration and security

Isferea carried out in 2006 an analysis of the permeability of the EU Eastern land border to migration flows based on a spatial quantitative permeability model for the "green border" of the EU-25 external land border and data on border management capacity. Discussion started with the Directorate General Justice Freedom and Security (DG JLS) and the European Agency for the Management of Operational Cooperation at the External Borders (FRONTEX) on how such a model could be used for a detailed evaluation of the nature of borders and the problems in terms of surveillance. Following a request from DG JLS, Isferea also carried out in 2006 a case study on the root causes of migration in Senegal. The study also looked at a broader prospective on the region of Western Africa and includes proposals for possible follow-up work in this respect.

Challenges for the future

The main sources used by the action in support of external relations policies are high resolution (HR) and very high resolution (VHR) latest generation satellite-derived data both in the optical and radar spectrum. The complexity of these data and the operational constraints related to security applications, require special methodological emphasis on newly-defined morphological and textural image feature recognition and automatic discrimination, volumetric estimation from stereo images using improved automatic image matching procedures, and newly-defined fuzzy spatial inferential engines for integrating different partially non-consistent geo-information sources in the final assessment. Other challenges addressed by Isferea in 2007 include quantifying societal processes such as risk of instability/conflict and root causes migration flows and understanding their link to environmental factors as well as developing benchmarking mechanisms for algorithms, data, products and procedures in support of the Emergency service of the Global Monitoring for Environment and Security (GMES).

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Crop Monitoring for Food Security (MARS-FOOD)

Food Security is part of the first of the Millenium Development Goal and according to the Food and Agriculture Organisation of the United Nations (FAO) 815 million people worldwide are chronically food-insecure, while a further 5-10% of the population is at risk of 'acute' food insecurity by natural and man-made crises. The EC Food Security Policy, defined by Council Regulation (N° 1292/96), makes the European Union one of the leading international donors in Food Security with around 500 M€/year since 1996.

Policy implementation has to be developed based on robust knowledge and information. In the present case, a crucial issue is to ensure the good use of Communitarian funds and to avoid perverse effects on local markets and agriculture. Food aid should be delivered only where necessary, with an appropriate calibration of food aid and other non-food responses and effective coordination between donors.

The EuropeAid Cooperation Office (AIDCO) and the Directorate General External Relations (DG RELEX) need early warning on Food Security crises and accurate assessments of the requirements obtained objectively and independently of commercial or national interest. The EU also supports, in partnership with the UN organizations (FAO, World Food Programme - WFP) the reinforcement of the National capacities and the implementation of efficient Food Information Systems involving advanced information and communication technologies such as remote sensing, meteorological modeling, crop monitoring and geographic information systems.

In this context, since 2001 MARS FOOD has developed a crop monitoring and yield assessment system on 4 regions of the world (South America, central Asia/Russia, Mediterranean, Horn of Africa), in collaboration with FAO.

What is Food Security?

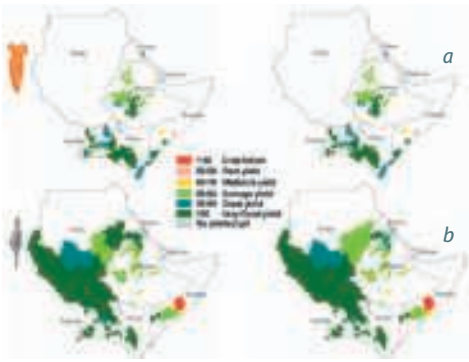
Food insecurity results in 3 types of factors: the agricultural production, the vulnerability of the population (livelihood, but also health, etc), the general conditions of the market (price of the main food products). MARS FOOD' s expertise covers the 2 first areas which are crucial in rural zones.

Major 2006 achievements

Research and development

Main research efforts in 2006 were directed towards the development of crop modelling and yield estimates:

- The implementation and calibration of a Global Water satisfaction Index covering the main food crops for each country.
- The comparison and evaluation of the different source of rainfall information (with meteorological data from ECMWF - 2nd Generation METEOSAT LANDSAF – EARS).
- The comparison and evaluation of different existing land cover products at the African continent level and of their potential use in crop monitoring.
- The development of a maize yield forecasting model for Kenya based on a multiple regression model.
- But also, within the GEOLAND 2 project, the evaluation of new sensors and methods to produce crop areas estimates: use of multidate classifications with medium resolution satellites, neural networks.



a) Maize and Sorghum Water Requirement Satisfaction Index (WRSI) up to the end of August 2006
b) Maize and Sorghum WRSI extended up to the end of the crop cycle using normal rainfall

Field visit during the Crop and Food Supply Assessment mission to Sudan in 2006

2nd Workshop on "Crop monitoring and Yield Forecasting in South America"

Montevideo (Uruguay), 9-11 October 2006. The workshop, organised in co-operation with the EU Delegation and the FAO, grouped 40 experts from Brazil, Argentina, Uruguay, Paraguay, Europe and UN (FAO) representatives. It allowed to establish a clear state-of-the-art in crop monitoring in this region and reinforced the present network of expert which will be essential for the future global development, during the 7th FP, of the MARS STAT and FOOD activities.

An operational support to AIDCO

In 2006, within the framework of a 3-year Administrative Arrangement with AIDCO, MARS FOOD reinforced its support to Food Security systems in the Horn of Africa by:

- The real time production of 10 day bulletins at the national and regional level directly disseminated to the EU Delegations, AIDCO, Directorate General Humanitarian Aid (ECHO) and UN organizations (WFP, FAO).
- The participation as EU observers in several CFSAMs missions (crop & food supply assessment) and ENAs missions (emergency need assessment) organized by FAO and WFP;
- Developing an expertise in vulnerability and socio-economic analyses.
- Providing a scientific support and training to EU-funded projects on Food Security Information Systems.

MARS FOOD Bulletins

MARS-FOOD published in 2006, more than 100 bulletins concerning crop and rangeland monitoring and yield forecasts. Among these:

- 87 10-day national and regional bulletins on the crop and on the Horn of Africa (Ethiopia, Somalia, Eritrea, Sudan)
- 10 monthly regional bulletins for the Horn of Africa
- 8 bi-monthly regional bulletins on South America (Mercosur + Bolivia)
- 6 bi-monthly regional bulletins on South & Eastern part of the Mediterranean basin.
- 6 bi-monthly regional bulletins on Russia and Central Asia.

In addition, MARS FOOD contributed to Agro-climatologically profiling of Ukraine and Russia produced by MARS STAT for the Directorate General Agriculture and Rural Development (DG AGRI).

Challenges for the future

Within the 7th Framework Programme, MARS FOOD will face several challenges for a sustainable deployment of its activities.

- The geographic extension of its activities to the whole Sub-saharian Africa, in the frame of the ACP (Africa, Caribbean and Pacific Countries) Observatory for Sustainable Development , taking into account the national and regional capacities and the programs such as AMESD (Eumetsat) within the Global Monitoring for Environment and Security (GMES) and the results of activities of the Global Monitoring for Food Security (European Spatial Agency).
- The development of common activities with other JRC's actions, linking the Food security concern with Environment and Security.
- The progressive global monitoring of crops and agriculture with the MARS STAT action, to ensure that the issues related to the development of emerging countries (Brazil, India, China) and the climate change which may increase the competition between food, feed and bio-fuels and aggravate food security crisis are addressed.

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Crisis Monitoring and Management Technologies (CRITECH)

Threats to security both internal and external to the European Union are a growing concern. The Commission needs to respond rapidly and effectively to conflicts, terrorism, and natural or manmade disasters, especially for sudden ones for which little or no early warning is available. Commission services are increasingly setting up early warning and crisis rooms with the aim of collecting and analysing information in near-real time in the event of a disaster or a crisis. Crisis management and situation tracking require fast and effective IT tools to monitor, gather, integrate and analyse information from multiple and distributed sources for rapid and effective decision making. One of the action's aims is to establish an integrated information environment that is used to support decision making and coordination relating to global crises management, humanitarian aid and health emergencies.

Major 2006 achievements

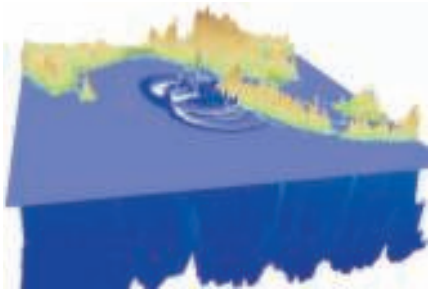
Public health emergencies and disease outbreaks

At the request of the Directorate General Health and Consumer Protection (DG SANCO), the Health Emergency & Diseases Information System (HEDIS) Portal was developed by JRC-IPSC. HEDIS provides a platform for all health emergency related information derived from various sources, with real time updates from MediSys (a health early warning system developed by JRC-IPSC also at the request of DG SANCO) and access to Geographic Information System (GIS) and modelling applications. In addition, the portal allows for communication between stakeholders as well as presenting information in a coherent manner.

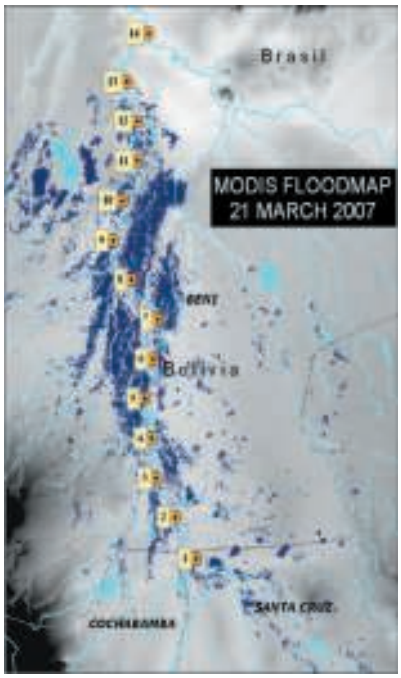
In 2006, the Critech action also set up the NEMO network (European Network on Mathematical Modelling) on behalf of DG SANCO, with the purpose of expanding at a European level the national modelling capacity on control strategies for infectious diseases and other health threats. The network serves as an advisory instance for public health decision authorities at the national and European level on the above issues. Members of the network come from all EU25 Member States. The network is coordinated by Critech and DG SANCO, and Critech also participates in the active work of the network with contributions such as new modelling approaches.

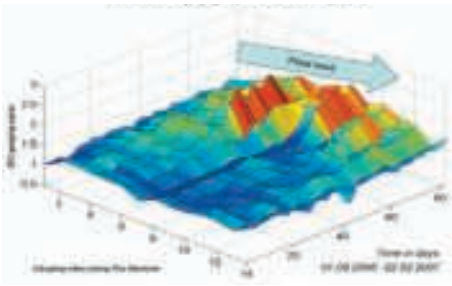
Humanitarian disasters

In April 2006, JRC-IPSC launched, in partnership with the United Nations Office for Coordination of Humanitarian Affairs (OCHA) and the Directorate General Humanitarian Aid (DG ECHO), the Global Disaster Alert and Coordination System (GDACS), which provides disaster alerts for earthquakes, tropical cyclones, floods, volcanoes and tsunamis. GDACS is a well accepted tool in the humanitarian aid community with over 2500 users from all major humanitarian organisations, including all ECHO operational staff. Critech developed a novel tsunami wave propagation model, that was peer reviewed during an international tsunami modelling workshop held at JRC. This system is fully integrated in GDACS and has been activated for several tsunamis including one near the Kuril Islands, which affected Japan, Hawaii and the United States.



3D visualization of a tsunami calculation performed with the SWAN-JRC model for the 2004 tsunami in Banda Aceh (Indonesia)





Flood wave propagation on the Rio Mamore (Bolivia) during the flooding from January 2007 to April 2007. Daily observations every 50 km along the Río Mamore show a high correlation with a flood extent map derived from MODIS images. Propagation of the flood wave can be seen on a time / distance plot of the gauging signal.

The Critech action also began in 2006 a research activity on global flood detection using satellite based observations. This research, in collaboration with the Dartmouth Flood Observatory, is aimed at detecting floods globally on a near-real time basis with the purpose of alerting the humanitarian community for an early response. While the alerts are not operational yet, the system has already been used to monitor the situation in Mozambique and Bolivia floods for Directorate General Environment (DG ENV).

Disaster impact analysis

The Critech action continued to provide support to several Commission Services crisis rooms with disaster impact analysis tools. The Interactive Disaster Analysis System (IDAS) is actively used by the crisis analysis cell of Directorate General Transport and Energy (DG TREN) and the European civil protection crisis room (Monitoring and Information Centre - MIC - of DG ENV). The system provided information for international crisis exercises (MIC tsunami exercise and ARGUS exercises).

Critech is also part of a Sixth Framework Programme Integrated Project on disaster impact analysis, called CHORIST. JRC-IPSC contributes with its expertise in the field and its operational systems.

Political crises

In several complex emergencies (i.e. crises which involve several competencies, such as the Lebanon crisis), the Critech action responded by quickly setting up web portals (often in less than 1h) using all solutions established to date in the Critech action. These portals are able to collect various types of information in an autonomous way and present it in a user-friendly manner for decision support.

Global spatial data infrastructure

In support of the applications described above, but also for direct access, Critech hosts a global spatial data infrastructure related to external security. The infrastructure, which holds over 7 terabytes of geospatial data, is used extensively for internal Commission use, but external use is increasing (e.g. United Nations and NATO).

Challenges for the future

In 2007, Critech will focus on crisis management applications for crisis rooms and for field missions. The current web-based solutions require the availability of the Internet, which is sometimes not available during a crisis. In order to overcome this, stand-alone desktop applications will be developed with similar analysis capabilities as the Internet-based systems. Furthermore, light weight versions will be developed for deployment in the field (e.g. for damage assessment missions), with a special emphasis on data collection tools.

Critech will continue to focus on modelling activities in several areas: disaster impact analysis, flood detection and epidemiological models. Modelling is critical in providing added value in the preparedness and response phases of crises.

Finally, Critech will continue to improve its “portal technology” in order to be able to set up secure information sharing portals tailored to meet diverse demands of stakeholders in crisis management.

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Border Security (BORSEC)

The action started in 2006 to analyse and assess security infra-structures and technologies in use across Member States. The aim is to identify requirements (both technological and political) leading towards an integrated border management concept from the point of view of goods and people. The action addressed key issues such as standards and inter-operability as well as capabilities including identification (including e-identity) and detection (Chemical, Biological, Radiological, and Nuclear - CBRN, explosives, etc.) whilst ensuring the maximum level of privacy.

Major 2006 achievements

Achievements towards Security

BorSec has been an important contributor to the preparation of the report of the European Security Research Advisory Board (ESRAB). It took a very active role in the SeNTRE project (Security Network for Technological Research in Europe) funded under the Preparatory Action for Security Research (PASR-2004), aiming at developing a roadmap for security research priorities, building on capability needs and user requirements. BorSec contributed to the FPVII and FPVIII preparatory work of the Directorate General Research (DG RTD) and generated a report on Emerging technologies in the context of security. The action will be involved in the PASR-2006 STACCATO project (STAkeholders platform for supply Chain mapping, market Conditions Analysis and Technologies Opportunities) where it is responsible for work package 2 – Analysis of the competencies of the Supply chain, covering competence mapping and technology watch.

Achievements towards interoperability of electronic passports

Interoperability is a key issue in the implementation of electronic passports, in order to strengthen security and data protection, while facilitating travelling. Representatives from 13 Member States gathered together in Ispra (Italy) on 15-16 May 2006 to test the interoperability of electronic passports foreseen by EU legislation. The trial, which was hosted by JRC-IPSC in its newly equipped laboratories, showed that the system is working properly, with all passports being read correctly and authentication being carried out successfully.

On 5 December 2006 an Interoperability Test on electronic passports and reading devices was held in Ispra. The test was organized for the Brussels Interoperability Group (BIG), which considers all issues relating to the introduction by EU Member States of electronic machine readable travel documents. The test was organized to ensure that Member States achieve uniformity for their electronic passports. In the test 9 EU countries and 2 non EU countries were present with 85 passports tested.

In the test a substantial subset of the layer 2 to 4, 6 and 7 tests of the e-passport conformity specification issued by the International Civil Aviation Organization was performed. In addition, a classical test of readability with the Golden Reader Tool, provided by the German Federal Office for Information Security (BSI) using a Philips Pegoda reader was done.

Conformity test banch for e-passports

From 6-7 December 2006 the 1st Interoperability test of electronic passports with fingerprints protected by extended access control was organised in Ispra. During the test 10 electronic passport readers with the functionality to access and read the fingerprints were tested. For the test 11 passports and prototypes containing finger prints were presented to the 75 participants from 17 countries.

Achievements towards detection technologies

DG JLS has issued a Green Paper on detection technologies (COM (2006) 474 final) which aims to stimulate a Public-Private Dialogue on this type of security technology in support of the work on law enforcement, customs and inner security. The Green Paper called upon all relevant stakeholders to respond to the various questions raised by the paper about the way forward. BorSec, in cooperation with the European Agency for the Management of Operational Cooperation at the External Borders (FRONTEX) and the European Committee for Standardization CEN BT/WG 161 EG on Integrated Border Management, organised a workshop on 20-21 November 2006 in order to coordinate and structure this public consultation. The workshop was mainly focused on operational and standardisation aspects but addressed also more general aspects of the deployment of detection technologies.

Challenges for the future

The action will continue with the work on the technical specification of the Extended Access Control for the electronic passports with secondary biometric information. To test this Extended Access Control BorSec will actively contribute to the harmonisation of a European test specification.

BorSec will actively support the Explosives Security Expert Task Force of the Directorate General Justice, Freedom and Security (DG JLS), the FRONTEX agency and the European Committee for Standardization (CEN) working groups. With the focus on Biometrics the action will contribute to the development of test procedures for biometric sensors. This work will be carried out with a view to its relevance for identity management.

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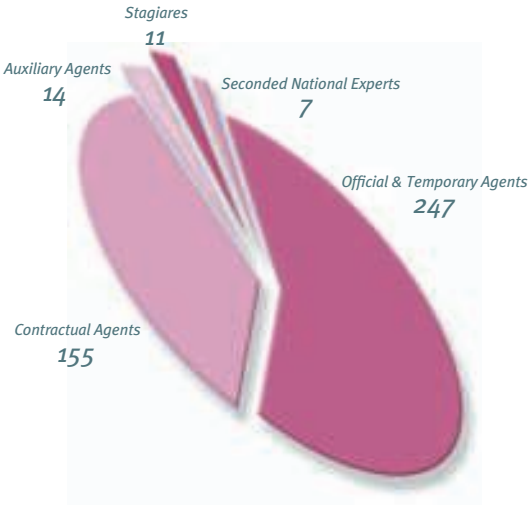
IPSC in Figures

Staff

As of 31 December 2006 IPSC employed 434 staff of which 247 were European Commission officials and temporary agents, the others being holders of temporary contracts (contractual agents and auxiliary agents), stagiares and seconded national experts (SNEs). Women represented 28% of the total staff figures.

Staff breakdown December 2006



Competitive projects

Part of the Institute's budget is competitive income from participation in projects of the EU Framework Programme (Indirect Actions), work performed in support to customer Directorates General of the Commission or work performed for third parties. In 2006 IPSC more than doubled its income from competitive activities compared to previous years.

In total 57 projects started in 2006, representing a total value of 31,248 millions euros, which is a good basis to achieve the target for competitive income in the future years.

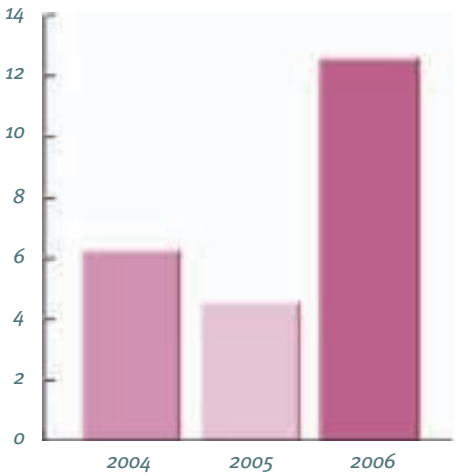
The full list of IPSC indirect actions in 2006 is reported from page 64.

More information is available at
http://ipsc.jrc.ec.europa.eu/activities.php?id=2

IPSC competitive projects started in 2006

Project	*Number*	*Million €*
Support to Commission	*29*	*27,482*
Indirect Actions	*11*	*3,204*
Third Party Work	*17*	*0,561*
Total	*57*	*31,248*

Competitive cashing (in million €)



Publications

Research carried out in IPSC is reported in scientific publications, such as scientific journals, conference proceedings and EUR technical reports.

The full list of IPSC publications in 2006 is available on
http://ipsc.jrc.ec.europa.eu/publications.php

2006 IPSC publications

Category	*Number*
Monographs and articles	*108*
Technical EUR Reports	*66*
Papers published in conference proceedings	*79*
Other publications	*3*
Total	*256*

Indirect Actions 2006

Specific programme	Project Acronym	Project Title
Aeronautics and Space	BOSS4GMES	Building Operational Sustainable Services for GMES
	GEOLAND	GMES products and services, integrating EO monitoring capacities to support the implementation of European directives and policies to land cover and vegetation
	GMOSS	Global Monitoring for Stability and Security
	HAWKEYE	Thermal infra red Hyperspectral sensing Assistance to clandestine weapon surveillance under WorKing conditions linking fixed airbornE or space borne sYstEms
	HILAS	Human Integration into the Lifecycle of Aviation Systems
	LIMES	Land and Sea Integrated Monitoring for European Security
	PREVIEW	Prevention, information and early warning pre-operation service to support the management of risks
	RANKERS	RANKing for European Road Safety
	TANGO	Telecommunications Advanced Networks for GMES operations
*Competitive and Sustainable Growth	PRECAST	Seismic behaviour of precast concrete structures with respect to Eurocode 8
*Environment and Sustainable Development	DECLIMS	Detection, Classification and Identification of Marine Traffic From Space
EURATOM Nuclear Energy	EISOFAR	Roadmap for European Innovation Sodium Fast Reactor
	SARNET	Severe Accident Research Network
Human Resources and Mobility - Marie Curie Actions	FREESUB NET	A European research network on key technologies for intervention autonomous underwater vehicles
	PBSDOS-Marie Curie	Performance Based Seismic Design of Structures
	PRECAST STRUCTURES	Seismic Behaviour of Precast Reinforced Concrete Industrial Buildings
Nanotechnologies and nanosciences, knowledge based multifunctional materials and new production processes and devices	I-SAMCO	International Structural Assessment Monitoring and Control
	SHAPE RISK	Sharing Experience on Risk Management (Health, Safety and Environment) to prepare future Industrial Systems
	VIRTHUALIS	Virtual Reality and Human Factors Applications for Improving Safety

* V Framework Programme

Specific programme	Project Acronym	Project Title
Information Society technologies	AIDE	Adaptive Integrated Driver-Vehicle Interface
	CARE-MAN	Health Care by biosensor Measurement And Networking
	CHORIST	Integrating Communications for enhanced environmental risk management and citizens safety
	EURITRACK	EURopean Illicit TRAfficking Countermeasures Kit
	GRID	A coordination action on ICT vulnerabilities of power systems and the relevant defence methodologies
	HUMANIST	HUMAN centred design for Information Society Technologies
	ORCHESTRA	Open Architecture and Spatial Data Infrastructure for Risk Management
	PIPS	Personalised Information Platform for Life & Health Services
	PRIME	Privacy and Identity Management for Europe
	WIN	Wide Information Network for Risk Management
Preparatory Action for Security Research	GEOCREW	Study on Geodata and Crisis Early Warning Situation Awareness
	IMPACT	Innovative Measures for Protection Against CBRN (Chemical, biological, radiological & nuclear) Terrorism
	PROBANT	People real-Time Observation in Buildings: Assessment of the new technologies in support of surveillance and intervention operations
	SENTRE	Security Network for Technological Research in Europe
*Quality of Life and Management of Living Resources	FISHTRACE	Genetic Catalogue Bilogical Reference Collections and Online Database of European Marine Fishes
Research for Policy Support	CAFE	Capacity, F and Effort
	CEDER	Catch Effort and Discard Monitoring in Real Time
	CEVIS	Comparative Evaluations of Innovative Solutions in Europen fisheries management
	KEI	Knowledge Economic Indicators: Development of Innovative and Reliable Indicator Systems
	SHEEL	Secure and Harmonised European Electronic Logbook
	SIGMEA	Sustainable Introduction of GMOs into European Agriculture
Science and Society	RISK BRIDGE	Building Robust, Integrative inter-disciplinary Governance models for emerging and existing risks
	STARC	Stakeholders in Risk Communications
	TRUSTNET	The making of inclusive risk governance

Specific programme	Project Acronym	Project Title
SME activities	ESECMaSE	Enhanced Safety and Efficient Construction on Masonry Structures in Europe
Sustainable Development, Global Change and Ecosystems	ACCENT	Atmospheric Composition Change: a European Network
	ENSEMBLE	Based Predictions of Climate Changes and their Impacts
	FLOODSITE	Integrated Flood Risk Analysis and Management Methodologies
	LESSLOSS	Risk mitigation for earthquakes and landslides
	MODURBAN	Modular Urban Guided Rail Systems
	NoMiracle	Novel Methods for Integrated Risk Assessment of Cumulative Stressors in Europe
	ROTIS II	Remotely Operated Tanker Inspection System II
	SEAMLESS	System for Environmental and Agricultural Modelling, Linking European Science and Society
	SUSTAINABILITY - A TEST	Advanced-Techniques for Evaluation of Sustainability Assessment Tools
	TRANSFER	Tsunami Risk and Strategies for the European Region

Organisational Chart

Acting Director
Alois Sieber*

Former Director
Jean-Marie Cadiou*

Management
Support
James Gray

Sensors,
Radartechnologies
and Cybersecurity
Alois Sieber

Support to
External Security
Delilah Al-Khudhairy

Traceability and
Vulnerability
André Poucet

Agriculture and
Fisheries
Jacques Delincé

Nuclear Safeguards
Willem Janssens

Hazard Assessment
Gerald Vollmer

Econometrics and
Statistics
Andrea Saltelli

European Laboratory
for Structural Assessment
Michel Géradin

*J.M. Cadiou served as IPSC Director until 30 November 2006.
A. Sieber was appointed Acting Director from 1st December 2006.