In Brief

ESA and the EU: the start of a new partnership

Negotiations on a Framework Agreement for structured cooperation between ESA and the European Community have been concluded. On 12 November the ESA Council adopted the Agreement, which had already been endorsed by the EU Council on 20 October.

The ESA/EC Agreement marks a milestone in their relationship, emphasising that both partners have specific complementary and mutually reinforcing strengths, and commits them to working together while avoiding unnecessary duplication of effort.

The Framework Agreement has two main aims. The first is the coherent and progressive development of a European Space Policy to link demand for services and applications using ESA space systems and infrastructures in support of EU policies. The second aim of the Agreement is to establish a common basis and appropriate practical arrangements for efficient and mutually beneficial cooperation between ESA and the European Union.

"This Agreement will facilitate the setting up of new joint projects and provide a stable framework for ESA-EU cooperation, and that will benefit the European citizens", said ESA Director General Jean-Jacques Dordain. The Agreement also opens up new possibilities for cooperation, such as EU participation in ESA optional programmes, or ESA management of EU space-related activities.

The European Commission also adopted its White Paper on space, drafted with the support of ESA. It presents an action plan for implementing an enlarged European space policy, including proposals for joint ESA-EU space programmes that will take the Framework Agreement as their basis.

Critical decisions on 'Cosmic Vision'

At its 105th meeting, on 5/6 November, ESA's Science Programme Committee (SPC) decided to cancel the Eddington mission and rescope the BepiColombo mission due to the current financial exigencies and no prospect of a budget increase or other financial relief.

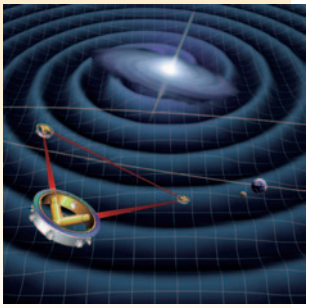
Eddington was supposed to look for Earth-like planets outside our solar system – one of the key goals in the search to understand how life came to be in the Universe. At the same time it was going to follow the path that the ESA-NASA mission SOHO had taken with the Sun of using astroseismology to look 'inside' stars.

The loss of the BepiColombo lander is also hard to take scientifically. ESA, in conjunction with the Japanese space agency, JAXA, will still put two orbiters around Mercury, but the ground data provided by the lander is a big loss.

The origins of the problems were recognised at the ESA Council meeting held in June. Several sudden demands on finance occurred in the spring, the most obvious being the unforeseen Ariane-5 grounding in January, delaying the launches of Rosetta and SMART-1. A temporary loan of 100 million Euros was granted, but must be paid back out of present resources by the end of 2006.

With these decisions, the SPC has brought the scope of the Cosmic Vision programme down to a level that necessarily reflects the financial conditions rather than the ambitions of the scientific community.

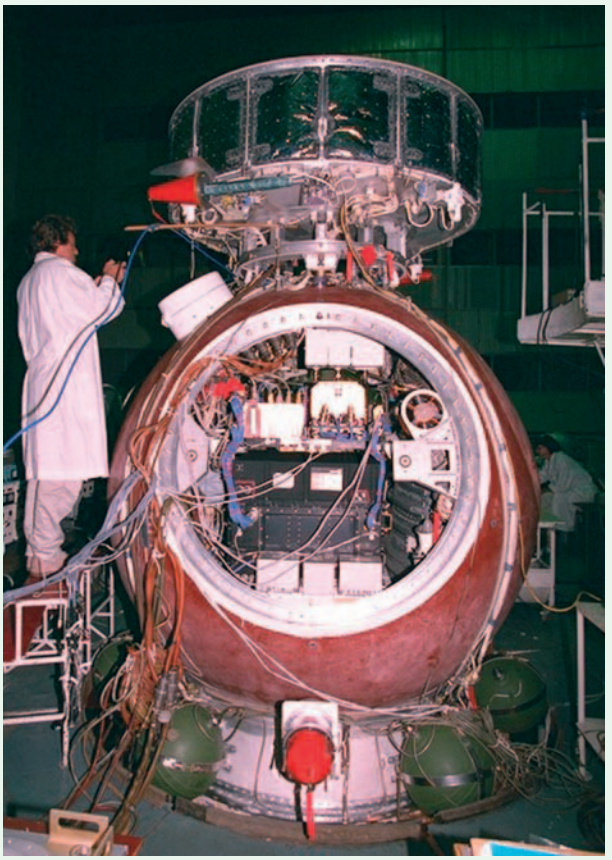
A long and painful discussion during the SPC meeting resulted in the conclusion that only one new mission can be started at this time, namely LISA Pathfinder, the technical precursor to the world's first gravitational-wave astronomical observatory, LISA. The LISA mission, to be carried out in cooperation with the United States, is scheduled for launch in 2012.



Artist's impression of the LISA mission

ESA and Rosaviakosmos sign up for two Foton flights

After a year of extensive negotiations, a new procurement order for two unmanned Foton capsule flights was signed on 21 October between ESA and the Russian Space Agency Rosaviakosmos. This order covers the Foton-M2 and -M3 missions, which will have 660 kg of ESA-supplied scientific payloads onboard.



Two Foton spacecraft will carry 660 kg of European payload

The order binds ESA, Rosaviakosmos and two Russian partner companies (KBOM in Moscow and TsSKB-Progress in Samara) for at least the next three years, with a first launch scheduled for May 2005 and the second for autumn 2006. This will provide reflight opportunities for almost the entire experiment programme originally assigned to Foton-M1 but lost when that launch failed on 15 October 2002. It will also reinstate a substantial part of ESA's scientific objectives for the STS-107 mission, unfulfilled following the Columbia Shuttle accident in February with the tragic loss of its crew, experiment samples and science/technology experiments.

Foton capsules, which first flew in 1985, are based on the design of the Russian Vostok capsule, in which Yuri Gagarin was put into orbit in 1961. But whereas the original Vostok design has been developed for manned missions into the Soyuz spacecraft, it has been very largely maintained for the unmanned Foton, which is primarily used for physics and materials science experimentation. The typical length of a Foton mission is 15 days. The recoverable capsule is launched on a Soyuz-U and returned to Earth at the end of its mission, landing with the aid of a parachute system.

The Foton-M2 payload will include experiments in fluid physics (FluidPac, SCCO), exobiology (Biopan), five material science experiments to be processed in Russia's Polizon automatic furnace and further such experiments in the DLR Agat furnace, a technology experiment (Favorite) and the Autonomous experiments (Photo-Ii, Biofilter). Two further experiments will be embedded in the spacecraft's heat shield, one concerning re-entry technology (Keramik), the other meteoritic science (Stone).

The preliminary Foton-M3 payload definition is planned to include various experiments in biology (Biobox, Kubik, Eristo/Osteo), exobiology (Biopan), fluid physics (SCCO, Gradflex), protein crystallisation, material science (Polizon), new re-entry technology (YES-2), plus other Autonomous experiments. esa

Prestigious award for SOHO

The international SOHO team has been presented with the prestigious Laurels for Team Achievement Award of the International Academy of Astronautics (IAA).

The award recognises both the outstanding achievements in designing, building and operating the mission, as well as the science it has performed. It is a tribute to a team that has contributed to one of the most successful space missions in history.

The International Academy of Astronautics presents this award in recognition of extraordinary performance and achievement by teams of scientists, engineers and managers in the field of astronautics. This honour has been awarded only twice before – to the Russian Mir Space Station Team and the US Space Shuttle Team. Now the SOHO team joins this select group.

Throughout the mission, the team has continued to produce excellent science, and SOHO has revolutionised the way scientists think about the Sun and how it might affect the Earth's environment. More than 1500 papers, representing the work of more than 1500 scientists, have been published based on SOHO data. With SOHO still going strong, the success story is set to continue. esa

Pedro Duque safely back on Earth

Cervantes mission concludes with Soyuz TMA-2 landing

Spanish ESA astronaut Pedro Duque landed in the command module of the Soyuz TMA-2 spacecraft near the town of Arkalyk in Kazakhstan at 03:40 Central European Time (CET) on 28 October, thus concluding the successful 10-day Cervantes mission to the International Space Station (ISS).

The mission proceeded flawlessly with the completion of the experiment programme, the changeover of ISS Expedition crews and the exchange of the Space Station's Soyuz TMA lifeboat.

The Soyuz TMA-2 spacecraft undocked from the ISS with Duque as Flight Engineer, Yuri Malenchenko (Rosaviakosmos) as Commander and Edward Lu (NASA) as 2nd Flight Engineer.

During his 8-day stay on the ISS, Pedro Duque had carried out an extensive programme of scientific, technological and educational experiments as part of the Cervantes mission, the majority of which were sponsored by the Spanish Ministry of Science and Technology.

"The experiment programme has been a complete success", said ESA Mission Manager, Aldo Petrivelli, *"and results have been obtained for all 22 experiments. These included two physical science experiments, which utilised the European-built Microgravity Science Glovebox on the ISS, four biological experiments, four human physiology experiments and a number of educational experiments and technology demonstrations."*

During the Cervantes mission Pedro Duque had numerous contacts with the media from Spain and Germany. He talked via amateur radio with primary schoolchildren, winners of the Habla ISS competition.

In addition to the experiment programme, the Cervantes mission served to relieve the ISS Expedition 7 crew. Yuri Malenchenko and Edward Lu had been stationed on the ISS since 28 April 2003. They have now been replaced by the ISS Expedition 8 crew, Michael Foale (NASA) and Alexander Kaleri (Rosaviakosmos), who arrived with Pedro Duque at the ISS in the Soyuz TMA-3 spacecraft on 20 October and are scheduled to return next April with Dutch ESA astronaut André Kuipers. The Soyuz TMA spacecraft are being used as crew changeover vehicles due to the grounding of the Shuttle fleet following the Columbia accident in February.

This was Duque's second spaceflight, as he was a Mission Specialist on the Space Shuttle Discovery, STS-95 mission (29 October to 7 November 1998).

Pedro Duque conducting the Cardiocog experiment during the Cervantes Mission

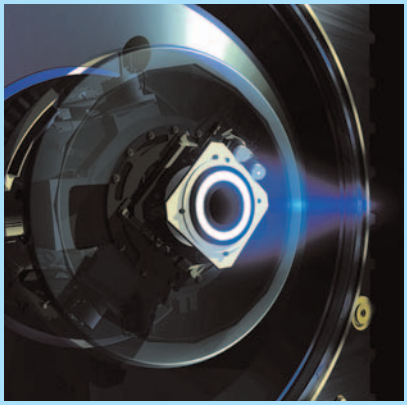
SMART-1 ion engine fired successfully

After a flawless launch during the night of 27/28 September on an Ariane-5, SMART-1's revolutionary propulsion system was successfully fired at 12:25 UT on 30 September 2003, in orbit around the Earth.

Engineers at ESOC, the European Space Agency's control centre in Darmstadt, Germany, sent a command to begin the firing test, which lasted for one hour. In space and in a true vacuum, the ion engine actually worked better than in pre-launch testing on the ground. Engineers will now analyse the data to see exactly how much acceleration was achieved and how smoothly the spacecraft travelled.

This is the first time that Europe has flown an electric primary propulsion in space, and also the first European use of this particular type of ion engine, called a 'Hall-effect' thruster.

The Solar Electric Primary Propulsion consists of a single ion engine fuelled by xenon gas and powered by solar energy. The ion engine will accelerate SMART-1 very gradually to cause the spacecraft to travel in a series of spiralling orbits – each revolution slightly further away from the Earth – towards the Moon. Once captured by lunar gravity, SMART-1 will move into ever-closer orbits of the Moon.



Close-up view of SMART-1's plasma thruster

Envisat radar altimetry tracks river levels worldwide

ESA has unvailed a new product range called River and Lake Level from Altimetry that provides previously inaccessible information on the water levels of major lakes and rivers across the Earth's surface, derived from Envisat and ERS radar-altimeter measurements.

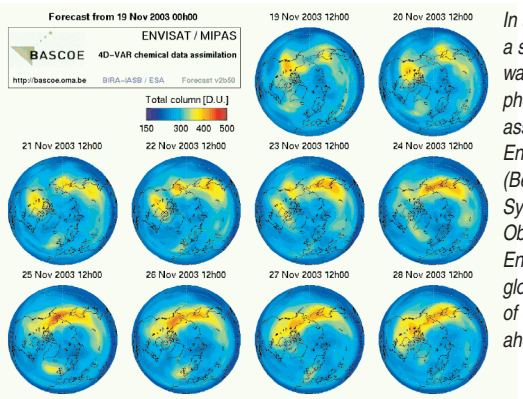
For over a decade ESA has used satellites to bounce radar pulses off the Earth and precisely measure the height of ocean and land surfaces. But inland lakes and rivers have been effective blind spots for radar altimetry – at least until now.

Hydrologists can use this new data to monitor river heights around the planet, assess the impact of global warming and help with water resource management. Inland water bodies are important as key sources of both water and food for the people living round them. They are also often regions of maximum biodiversity and represent early indicators of regional climate change.

The Radar Altimeter 2 (RA-2) flown aboard ESA's Envisat environmental satellite is the improved follow-on to earlier radar altimeters on the ERS-1 and ERS-2 spacecraft. From its 800 km-high polar orbit it sends 1800 separate radar pulses down to Earth every second and then records how long their echoes take to return, timing their journey with nano-second accuracy to calculate the exact distance to the planet below.

A team from the UK's De Montfort University team developed the river and lake monitoring software by painstakingly combing through many gigabytes of raw data acquired over rivers and lakes, taking note of the type of echo shapes that occurred. They sorted different echo shapes into distinct categories, then created an automated process to recognise these shapes within 'wet' signals and eventually extract usable data from them.

The plan is that global altimeter data for the last 12 years will be reprocessed to provide hydrologists with historical information, invaluable for assessing long-term trends. ESA also intends to install operational software in its ground segment so eventually the product can be delivered to users in near-real time, within three hours or less of its acquisition from space.



In another application, a sophisticated software model of stratospheric chemistry that assimilates data from Envisat, BASCOE (Belgian Assimilation System of Chemical Observations from Envisat) forecasts global concentrations of ozone for ten days ahead.

New China-Europe Global Navigation Satellite System Technical Training and Cooperation Centre (CENC)

The European Commission, the European Space Agency and the Chinese Ministry of Science and Technology have decided to establish a training, cooperation and information centre for satellite navigation in China at the renowned Beijing University. The centre will be staffed initially by one or two experts supported by two administrative and technical assistants.

Europe and China share a common interest in cooperating to bring the benefits of satellite navigation, and Galileo in particular, to transport, science, land management, disaster prevention and other user sectors.

Hubble assists Rosetta comet mission

Data from the NASA/ESA Hubble Space Telescope have played a major role in preparing ESA's ambitious Rosetta mission for its new target, comet 67P/Churyumov-Gerasimenko.

Hubble has been used to make precise measurements of the size, shape and rotational period of the comet. This information is essential if Rosetta is to rendezvous with the comet and then release a probe. Observations made by Hubble in March this year revealed that comet 67P/Churyumov-Gerasimenko (67P/C-G) is approximately five by three kilometres in size and shaped like a rugby ball. ESA mission scientists were concerned about the exact size of the solid nucleus, knowledge that is needed to adapt the mission to the comet's gravity.

"Although 67P/C-G is roughly three times larger than the original Rosetta target, its highly elongated shape should make landing on its nucleus feasible, now that measures are in place to adapt the lander package to the new scenario," says Dr Philippe Lamy of the Laboratoire d'Astronomie Spatiale in France.

Mission scientists began looking for an alternative target when the Rosetta mission's launch date was postponed. The delay meant that the original target comet, 46P/Wirtanen, was no longer easily reachable. But scientists did not have enough information on the back-up comet, 67P/C-G, and sought data from the largest telescopes.

Rosetta's launch is currently planned for February 2004, with a rendezvous with the comet about 10 years later.

First Aurora mission design contracts awarded

The winners of competitive contracts for two of the ESA Aurora Programme's key robotic missions – ExoMars and the Earth re-entry vehicle demonstrator – have been selected. This marks a major milestone in this long-term programme for Solar System exploration. Alenia Spazio (Italy), Alcatel Space (France) and EADS Astrium (France) are to head the three industrial teams selected to carry out a full mission design for ExoMars, the Aurora exobiology mission to Mars.

Similarly, two industrial teams, headed by EADS Launch Vehicles of France and Surrey Satellite Technology Limited (SSTL) of the United Kingdom, respectively, have been selected for the pre-development phase of the EVD mission.

ExoMars

The ExoMars mission, to be launched in 2009, is the first of the major Flagship missions in the Aurora Programme. It includes an orbiter and a descent module that will land a large (200 kg), high-mobility rover on the surface of Mars. After delivery of the lander/rover, the ExoMars orbiter will also operate as a data-relay satellite between the Earth and the vehicle on the Martian surface.

The primary objective of the ExoMars rover will be to search for signs of past or present life on the Red Planet. Additional measurements will be made to identify potential surface hazards for future human missions, to determine the distribution of water on Mars and to measure the chemical composition of the surface rocks.

The contracts cover the design of the entire ExoMars mission, from launch, through the long interplanetary voyage, to the landing of the rover on the planet's surface.

Earth re-entry vehicle demonstrator

The second Aurora Flagship mission is a Mars Sample Return mission planned for 2011. Its main goal will be the retrieval of rock samples from the Martian surface and subsurface for subsequent analysis in laboratories on Earth.

In order to ensure the success of this challenging mission, a number of new technologies will have to be developed and tested. Conceived as a small technology-driven mission, the Earth re-entry vehicle demonstrator will be used to validate the design of the small Mars sample-return capsule that will bring back the precious samples of Martian soil.

The Earth re-entry vehicle demonstrator is expected to be launched in 2007. The baseline mission foresees the insertion into a highly elliptical Earth orbit of a small spacecraft carrying a re-entry capsule. In order to reproduce the final phase of a typical Mars return mission, the capsule will then carry out a ballistic re-entry into the Earth's atmosphere at speeds of up to 45,000 km/h.

Two industrial teams have been selected for the parallel Earth re-entry vehicle demonstrator mission studies. The concept presented by the industrial team, under the leadership of EADS LV (France) with the participation of OHB System (Germany) and Plansee (Austria) is solidly based on the experience of past projects.

The industrial team led by SSTL (UK) has devised an innovative concept well adapted for a small technology mission. The participation of highly specialised companies, Fluid Gravity Engineering (UK), Kayser Threde GmbH (D) and Vorticity Ltd. (UK) ensures excellent coverage of the mission's most critical technologies.

The next Aurora contract for Phase-A studies will concern the Mars Sample Return mission. esa

First Space Medicine Workshop at EAC

The first Space Medicine Educational Workshop took place at the European Astronaut Centre (EAC) in Cologne, Germany, in October. It allowed 44 European students, researchers and young professionals to get to know each other and learn more about human spaceflight and medicine.

The Workshop was split into presentations of project proposals by the attendees and lectures by experts. The week began with an opening ceremony during which participants witnessed the docking and hatch opening of the Soyuz TMA - Cervantes Mission via live links to Mission Control in Moscow and Houston.

In order to participate in the Workshop each student had to present an idea or concept in the field of space medicine, endorsed by a Professor, which had applicability both in space and on the ground. Student presentations ranged from an exoskeleton suit that just needs to be worn in order to have an exercise effect, to using remote-sensing data and specially designed low-cost sensors to predict malaria risk based on rainfall temperature and the wing-beat frequency of the mosquito.

The list of experts and guests included Jeff Davis (Director of Space & Life Sciences, NASA JSC), Martina Heer (Aerospace Medicine Institute, DLR), Marco Cardinale (University of Aberdeen), Beth Shephered (Responsible for exercise and countermeasures, NASA), Dietrich Manzey (University of Berlin), Ernst Messerschmid (Head of EAC and former astronaut),

Vincenzo Costigliola (President of the European Medical Association), Michel Tognini (Head of the ESA Astronaut Division), Ulf Merbold (ESA astronaut), Loredana Bessone (ESA/EAC), Oliver Angerer (ESA/ESTEC), Rupert Gerzer (Director of the Aerospace Medicine Institute, DLR), David Raitt and Niels Eldering (ESA Technology Transfer Office).

Each morning, a representative of the Crew Medical Support Office gave the students an update on the status of the Cervantes mission and the role of the European medical doctor supporting the Mission. In the evening, groups were given accompanied tours of the actual medical console facilities used for mission support.

As an immediate outcome and on their own initiative, the participants have started a web-based forum to provide a focal point for both the educational and professional communities, at: www.spacesurgeons.com .

The Space Medicine Workshop was part of a new ESA initiative, "The Health Care Network", aimed at increasing its role in educational activities, by supporting other educational offices in ESA and external partners such as the DLR School Lab in Cologne.

Participants in the Space Medicine Workshop at EAC

Mei Ling Doery's project won the second prize

Parabolic flight veterans

On normal aeroplanes that get you from city A to city B, you earn frequent flyer miles. On the A300 Zero-G Airbus the number of parabolas you fly is counted, and the real parabolic flight veterans earn medals! Sixteen of those – three gold, eight silver and five bronze – were handed out during the 35th ESA parabolic flight campaign on 13 October. Parabola champion is Marcel Thierot with 4242. Other gold medals went to Philippe Fourcade (3608 parabolas) and Christophe Mora (3022 parabolas). Silver medal winners were Gilles Le Barzic (2351), Pierre Vaïda (2323), Charles Dupart (2320), Thierry Gharib (2136), Pierre Bencheik (1424), Roland Dairiam (1350), Vladimir Pletser (1284) and Anneke van der Geest (1107). Süzel Bussieres (882), Frédéric Gai (863), Jean-Pierre Fouquet (822), Jean-Charles De Longueville (498) and Maurice Hinsenkamp (467) were awarded bronze medals.

ZARM Drop Tower becomes an ESA External Facility

ESA has declared the ZARM Drop Tower, a 146-metre high landmark on the campus of Bremen University, Germany, an 'ESA External Facility'. The 'Zentrum für Angewandte Raumfahrt Microgravitation' Tower offers 4.47 seconds of weightlessness up to three times per day.

The Tower, which is unique in Europe and regularly used by ESA, offers the capability of conducting extensive research in microgravity, and it is an essential test bench for projects about to become operational. For both applications, ZARM has provided years of invaluable access to reduced gravity conditions for thousands of experiments, in many of which ESA has been involved.

The introduction of a catapult, planned for this year, will double the time available in reduced gravity conditions, opening broader research possibilities in good time for the International Space Station exploitation phase, and for microgravity applications in particular.

The contract was signed on 2 October by the Mayor of Bremen and President of the City Senate Dr Henning Scherf, Prof. Dr Hans J. Rath, ZARM Director General, Dr Hans Kappler, ESA Director of Industrial Matters and Technology Programmes, and Mr Gaele Winters, ESA Director of Technical and Operational Support. It was 'sealed' with a ceremonial drop in the Tower.

Hoisting the ESA flag: Bremen's Mayor Henning Scherf

ESA Payload Safety Review Panel certified "Cervantes" payload

The ESA Payload Safety Review Panel, established in cooperation with NASA in 2002, met in September at ESTEC for a Training Workshop. October's "Cervantes" mission was the first to carry ESA-certified payloads to the ISS.

Physics on Stage 3 – a great success for physics teaching

More than 400 participants from 22 European countries – most of them teachers – made the Physics on Stage 3 festival a roaring success. After a year of activities in each of the participating countries, delegates selected for their outstanding and innovative teaching projects came to ESTEC, in the Netherlands, from 8 to 15 November, to exchange ideas and methods and find ways of making science teaching attractive again. Physics on Stage is organised by members of the EIROforum and was co-funded by the European Commission as part of the European Science and Technology Week 2003.

His Royal Highness Prince Johan Friso of the Netherlands and Mrs van der Hoeven, Dutch minister of Education, Culture and Science, guided here by Wubbo Ockels, chairman of Physics on Stage 3, attended the Opening Ceremony

A team from Belgium presents "Playful Physics"

Liftoff for the third edition of the Physics on Stage science teaching festival! His Royal Highness Prince Johan Friso of the Netherlands launches a water rocket as the opening act

As a special treat, an Italian chef prepared a meal "cooked with physics" – ice-cream made with liquid nitrogen, for example (left)

Two participants from Poland and Belgium exchange teaching ideas at the fair

The most innovative and inspiring projects received the "EIROforum Teaching Awards". Rudolf Ziegelbecker from Austria and his two students won the second prize for their "cat gymnasts"

The Austrian performance "Eye Like Physics"

European Image Information Mining Coordination Group Gets to Work

The European Image Information Mining Coordination Group (IIMCG) was officially created on 26 May 2003 by its funding members: ASI, CNES, CNR, DLR, EC-IST, ESA, ETHZ, and EUSC.

At its first meeting, the IIMCG defined the IIM focus and areas of interest, as well as its own Terms of Reference.

IIM Focus and Areas of Interest

IIM focus is on research and technological activities for automated and user-centred extraction of information from Earth Observation images and image archives in support of content understanding. The main areas of concern are:

- Information modelling and processing for very large and heterogeneous image sets
- Mediating systems (e.g. learning, adapting themselves to user conjecture, suggesting solutions, etc.)
- Knowledge discovery concepts (including auxiliary data)
- Communicable information and knowledge
- Opportunities (e.g. usage scenarios, test cases, business models, technology transfer, etc.)
- Evaluation methods
- Related standards also for interfaces.

The IIM research and technological axes are:

- Automated and semi-automated processing
- Advanced archiving/computing
- Scalable systems
- Advanced user interfaces
- Content-aware networks
- Data-fusion/assimilation
- Soft-computing
- GRID techniques.

IIMCG Terms of Reference

Charter

For Image Information Mining (IIM) applied to Earth Observation images, the IIMCG shall:

- Promote European research and development of IIM techniques
- Interface with European and National programmes in the field, like the O_2 (Open and Operational) ESA initiative, the EC FP6 activities, etc.
- Foster, within the members, the possibility to:
  - Share scientific and technical experience, data, information and applications
  - Identify relevant scientific and technical issues
  - Suggest technical directions
  - Suggest solutions for funding and coordination of activities
- Provide a forum where interested bodies may:
  - Constantly be kept updated on ongoing activities in the field and on relevant scientific and technical issues
  - Exchange information (including gathering of suggestions and requirements)
  - Be informed about available demonstrators, prototypes, products, etc.
- Identify and suggest/promote appropriate standards
- Facilitate and promote the use of resulting products.

Mandate

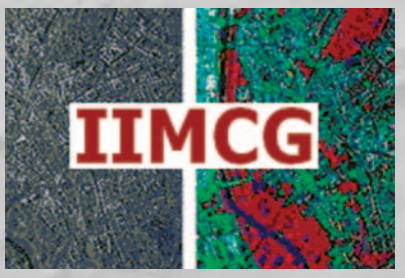
For IIM applied to EO, the IIMCG shall:

- Establish and maintain liaison with other interested bodies and with new sensors' research and design (in particular for the identification of short / medium / long term needs)
- Identify research and technological issues
- Define possible strategies and solutions
- Suggest activities and coordination methods
- Suggest standards and interfaces for possible technologies.

Modus operandi

For IIM the IIMCG shall:

- Prepare periodical plans and reports for internal and European distribution
- Define methods for ensuring maximum participation from European partners (e.g.: define rules for enlarging participation to the WG, foster the creation of Interest Groups or national contacts, gather input from research, institutions, industry, etc.)
- Meet at least twice per year
- Organise the Knowledge Based IIM Workshop once per year
- Establish as necessary internal Task Forces for specific areas
- Provide feedback to the IIMCG members from participation to other events
- Identify information for IIMCG internal use only or for free circulation
- Address and suggest approaches related to potential IPR issues
- Keep an updated list of related events
- Organise and update related Internet pages.



The necessary resources for participation in IIMCG activities will be provided by the respective parent organisations.

Coming Event

The IIMCG is currently organising the ESA-EUSC 2004 Conference on 'Theory and Applications of Knowledge driven Image Information Mining, with focus on Earth Observation' The event is the second in the series jointly organised by ESA and EUSC (the first was held in December 2002 at ESRIN), and is merged with the 2nd Image Information Mining Workshop (the first one took place in September 2002 in Zurich). The 2004 Conference will take place on 17/18 March, at the Torrejon de Ardoz Air Base in Madrid.
Visit http://earth.esa.int/rtd/Events/ESA-EUSC_2004 for further information and registration details.

Further Information

Further information about IIMCG projects, articles, documents, events, etc. can also be obtained via the Internet, by visiting http://earth.esa.int/rtd/IIMCG , or from the following Contact Points:

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Sergio D'Elia, ESA/ESRIN

ESA-EUSC 2004 Conference

Theory and Applications of Knowledge-driven Image Information Mining, with focus on Earth Observation

17 – 18 March 2004
Torrejon de Ardoz Air Base, Madrid, Spain

Organised by:
The Image Information Mining Coordination Group (IIMCG)

Sponsored by:
IEEE Geoscience and Remote Sensing Society

Objectives:
To review the state of the art and identify R&D requirements in the following fields of Earth Observation and other domains:

- Theoretical foundation of information retrieval from very large image data sets
- Image syntax and image semantics
- Knowledge-driven image information mining
- Knowledge sharing and management
- Multi-domain, multi-dimensional semantic information indexing and retrieval
- Multidimensional database systems
- Exploratory image information extraction
- Modelling user conjecture and human/machine interaction.

The main target audience includes the European space agencies and organisations, aerospace industry and research centres, and research and academic institutions involved in one or more of the above areas.

Registration:
The deadline for registration (no fee) for the Conference is ***16 February 2004.***

Further information can be found by visiting:
http://earth.esa.int/rtd/Events/ESA-EUSC_2004.