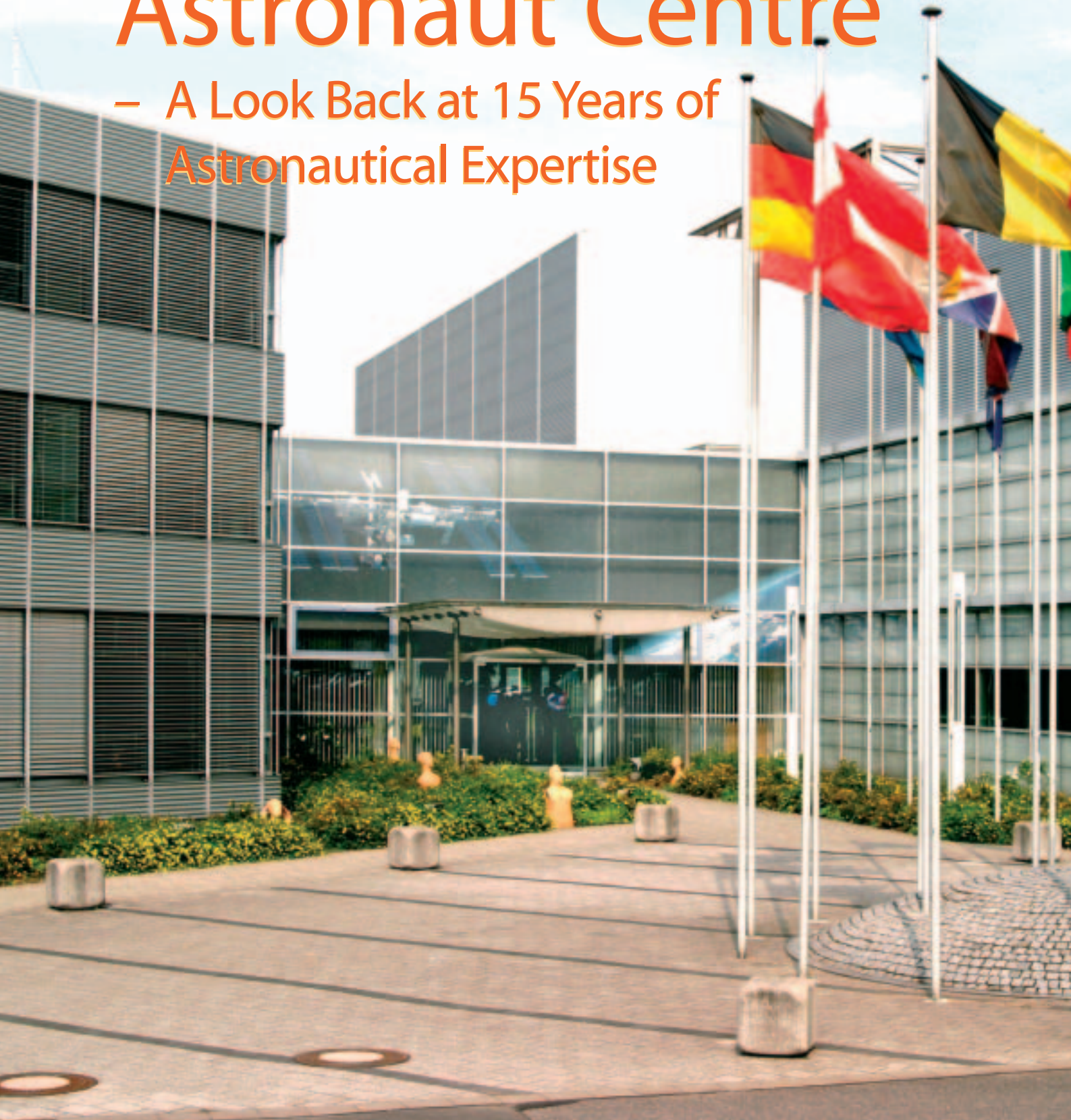


The European Astronaut Centre

– A Look Back at 15 Years of
Astronautical Expertise



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The European Astronaut Centre (EAC) in Cologne is unique among the ESA centres for a number of reasons: it is the home base of the European Astronaut Corps, it is located on the premises of a national agency, it has a very specific organisational setup integrating staff from various origins, it enjoys tremendous public visibility and, last but not least, it is the youngest ESA Centre. The Centre has developed impressively since its official founding 15 years ago, with the signing of the Host Agreement with Germany on 10 May 1990.

Early Plans

The first steps towards the setting up of EAC in Cologne were taken in 1988. At that time, the planned European manned space programme was very ambitious. With the goal of achieving autonomous human access to space for Europe, the programme included as major elements the Columbus Laboratory (Attached Pressurised Module, or APM), the reusable Hermes space plane to be launched by Ariane-5, the Man-Tended Free Flyer (MTFF) as a free-flying laboratory, the European Robotic Arm (ERA), and various experimental payload facilities. The original scenario for the astronaut support and training facilities corresponded to the demanding requirements of that programme.

** As Head of the Astronauts Training Division, Klaus Damian, now retired, contributed to EAC's development from the outset. Michel Tognini, former ESA astronaut, is now Head of EAC.*

The decentralised training-facilities concept

Early in 1988, an ‘Astronaut Training Concept and Associated Facilities’ proposal had already been submitted to the ESA Council. Based on the requirements of the Columbus and Hermes programmes, it foresaw a buildup of the ESA astronaut team to 38 astronauts, including 12 Hermes pilots. This was based on the assumption of a permanent European presence onboard the APM, with a crew exchange taking place every three months, two Hermes missions per year for MTFF servicing, and two Shuttle missions per year.

The concept proposed for the astronaut training foresaw a decentralised set-up at various national facilities (see figure): the Hermes pilot training with flight simulators and the Hermes training aircraft was to take place in Brussels (B), the Hermes systems training in Toulouse (F), the training for the Columbus Laboratory, the Hermes/MTFF composite and payload training in Cologne (D), the European Robotic Arm training at ESTEC (NL), and the underwater training for extravehicular activities in Marseilles (F). There was also to be a medical centre in Denmark and crew quarters in Kourou (Fr. Guiana).

For the overall management of astronaut activities, under ESA’s responsibility, and as a home base for the ESA astronauts, the planned European Astronaut Centre, called the ‘Astronaut Headquarters’ at that time, was to be located in Cologne. There were two decisive factors in opting for this location: Germany’s major financial contribution to the European manned space programme, and DLR’s relevant experience in supporting ESA’s first Spacelab mission and carrying out the national Spacelab-D1 mission.

A major step forward was made in September 1989, when the ESA Director General and the Directors for the Columbus and Hermes Programmes met the Board of DLR and representatives of the German Federal Research and



Technology Ministry (BMFT) for a site inspection in Cologne. The purpose of this meeting was to choose a site for the ‘Astronaut Headquarters’. Basically two options were being discussed: an independent location outside the DLR premises, or a location adjacent to the planned DLR Crew Training Complex (CTC) on the DLR premises. The latter option was ultimately chosen, but with a separate external access as an ESA facility.

This agreement became the basis for the EAC Host Agreement, which granted the smallest ESA centre full international and extraterritorial status, as well as direct privileged access to Cologne Airport, a

special requirement for the pilot astronauts.

Realistic Implementation

As we now know, the European manned space programme developed somewhat more modestly than was originally planned. Hermes and the Man-Tended Free Flyer were scrapped, the scale of the Columbus Laboratory docking module was halved, and the overall schedule was extended. On the other hand, the Automated Transfer Vehicle (ATV) came onto the scene as an additional flight element and the fundamental political changes in Russia opened up many new



Artist’s impression of the Hermes Pilot Training Facility in Brussels



Top-level site inspection in Cologne

with the DLR Astronaut Office. The plans for a separate adjacent EAC building have not been implemented and the EAC staff have been accommodated since 1993 on one floor of the CTC office wing. Initially the EAC and DLR teams worked largely independently on their respective missions, e.g. IML-1 with ESA astronaut Ulf Merbold and MIR 92 with DLR astronaut Klaus-Dietrich Flade. The DLR team also provided support for EAC activities, on the basis of a framework contract.

In parallel, the development and preparation of the first training course at EAC, namely the Basic Training for astronaut candidates, made progress. An overall training concept was worked out and endorsed in 1991 by a Review Board composed of experienced astronauts and training experts from the USA, Russia and Europe under the chairmanship of astronaut Ernst Messerschmid, who later became Head of EAC (1999 – 2004).

Back in 1978, long before the creation of EAC, ESA had recruited three astronauts for the Spacelab-1 mission: Ulf Merbold, Claude Nicollier and Wubbo Ockels. Though assigned to EAC, they remained in their respective environments at DLR, NASA and ESTEC. When the need to recruit more astronauts became obvious, the first astronaut selection process conducted by EAC in 1991/92 was a Europe-wide endeavour, involving national pre-selections with more than 6000 applicants, who were distilled to no more than five candidates per Member State. The final selection of six Astronaut Candidates, endorsed by ESA's Director General, brought the total ESA astronaut team to nine.

Thereafter, it took some time for the decision-makers to come to the conclusion that the maintenance of a European and several national astronaut teams in parallel was neither logical nor efficient. This led to the ESA Council's decision in 1998 to integrate the national and European

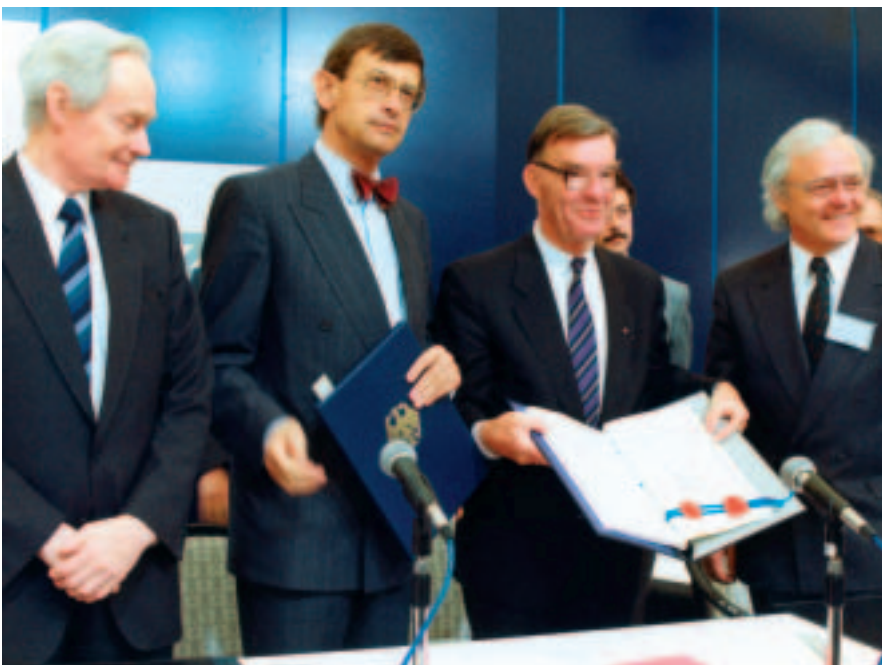
Signature of the EAC Host Agreement by German Minister Heinz Riesenhuber (left) and ESA Director General Reimar Lüst (right) in Cologne on 10 May 1990

possibilities for cooperation. It took some time, however, for this development to mature and be transformed into formal programmatic changes.

On 1 September 1988, Andres Ripoll, the first Head of EAC, took up duty at ESA Headquarters in Paris. He reported directly to the Director General, but he had to fight for his budget with the Hermes and Columbus Programmes, both of which tried to reduce their contributions below 50%. On 1 October 1989, the first EAC staff member in Cologne, Franco Rossitto, took up duty as Head of the Astronaut

Division in temporary offices provided by DLR, followed by the Head of the Astronaut Training Division on 1 November. With a planned long-term complement of about 200 staff, the mid-term recruitment planning aimed at 88 ESA staff and 20 contractors until 1994.

The construction of DLR's CTC building, funded by the German government and the Land Nordrhein-Westfalen on a fifty-fifty basis, was started in 1991. It was ready for use in 1992 and initially accommodated the DLR Training and Crew Operations Departments along





Construction of DLR's CTC building, with its Neutral Buoyancy Facility, in August 1991

astronaut teams. The resulting single European Astronaut Corps grew to 16 members with the following distribution of nationalities: France (4), Germany (4), Italy (3), Belgium (1), Netherlands (1), Sweden (1), Switzerland (1) and Spain (1).

It was then only logical to apply the same integration model to the ESA and DLR support teams working in parallel in the same building. In 1999, therefore, an

agreement was reached between ESA and DLR on the integration of DLR experts into the EAC team and the transfer of the former CTC building to ESA for its exclusive use. Under similar agreements, a number of staff from the Italian Space Agency (ASI) and the French Space Agency (CNES) have also been integrated into the EAC team.

The implementation of these organisational changes was, of course, not an

easy task, but was successfully accomplished due mainly to the outstanding management skills of the late Erik Slachmuylders while Acting Head of EAC, and his predecessors Heinz Oser and Franco Rossitto.

Today, the Centre has 80 staff drawn from ten different countries, including 13 active astronauts. Of these, 55 work in Cologne, about one third of them being seconded from DLR. A further 20 come from outside firms and organisations: instructors from industry, guest instructors from partner organizations, and other industrial support personnel. The astronauts are periodically assigned, for short- or long-term stays, to training locations such as Houston and Moscow, or to support ESA's programmes at ESTEC or in industry.

Missions Flown

To date, 31 astronauts from ESA and its Member States have taken part in a total of 39 missions. EAC has been actively involved since its establishment in 21 of them: 11 Shuttle missions and 10 Soyuz missions, including 8 to the International Space Station (ISS). The experience accumulated thanks to these missions has proved invaluable in preparing the training and medical support for those European astronauts given ISS assignments. The latest of them, a Soyuz mission known as ENEIDE with Roberto Vittori onboard, was launched on 15 April and successfully completed with a safe landing on 25 April. After the Shuttle's return to flight, the first long-duration mission by an ESA astronaut to the ISS will be that of Thomas Reiter, with Leopold Eyharts as backup.

Training

The work of the Astronaut Training Division has focused on building up the infrastructure and the training facilities for the ISS, preparing the training



The EAC Team



The EAC Training Hall, with the ATV simulator under construction

programmes, and qualifying the necessary instructors. Today, the specific training facilities for Columbus, the ATV and the payloads are ready for service and have already been used for a number of training campaigns with international astronaut teams. These facilities notably include a

Columbus simulator, a Columbus mock-up, an ATV trainer docked to a mock-up service module, ATV rendezvous and docking simulators, and a simulator for each payload rack. In addition, there are the general training facilities, which include: a huge water-tank for diving

exercises in preparation for extra-vehicular activities, class rooms with ultra-modern multimedia equipment, facilities for computer-aided learning and, just as important, a fitness room.

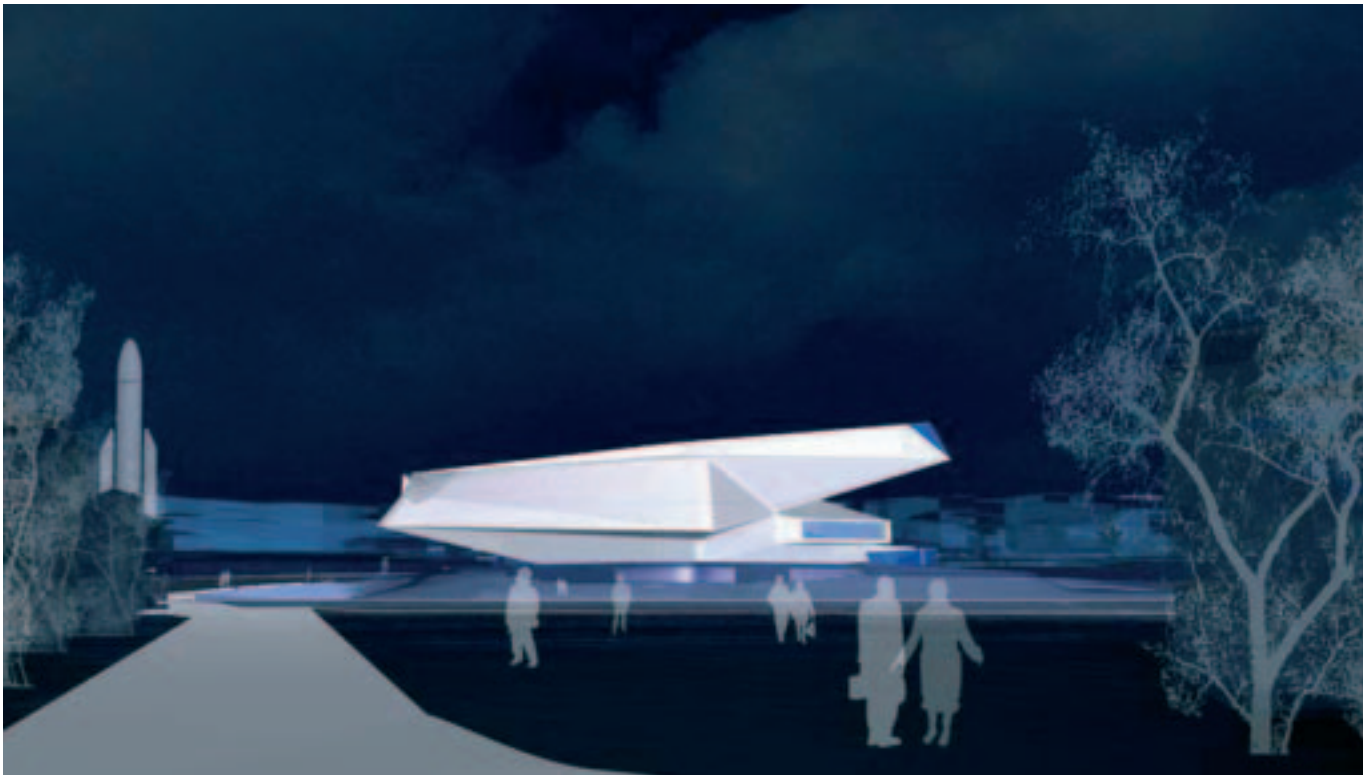
Whilst this equipment was being built, the necessary personnel for operations and training were being qualified. EAC instructors are certified according to multilaterally agreed standards, and instructors from partner organisations are already being trained at the Centre. The exhaustive Training Readiness Reviews have been successfully completed.

In addition to the experiment training conducted at EAC since 1993 for the Soyuz missions and for some of the European payloads for the Shuttle missions, there have been regular training campaigns since 2002 for the astronauts assigned to ISS duties. Training for the ISS elements is the responsibility of the contributing Partner in each case. This results in decentralised training at the ISS Partners' respective training centres: Houston, Star City/Moscow, Tsukuba, Montreal and Cologne. Because there will not always be an ESA astronaut onboard the Space Station after docking of the Columbus laboratory, the astronauts of the ISS Partner organisations also have to be trained to tend the ESA elements. To date, astronauts from the USA, Russia and Japan have undergone such training at EAC alongside ESA's own astronauts. This close international cooperation not only allows an all-round exchange of experience, but it also makes for tougher competition on quality, presenting a challenge which even the smaller contributing Partners need to be able to meet.

In the wake of the 'Columbia' Shuttle disaster, the transportation of the Columbus laboratory to the Space Station has been delayed. Once Shuttle operations have resumed and things get back to normal, some 70 ISS astronauts and ESA as well as international flight controllers are expected for training at EAC annually.



The ESA Crew Surgeon and biomedical engineers in the EAC Medical Control Room



Artist's impression of 'Cosmos Cologne'

Operational Medicine

EAC's Medical Support Office is responsible for the medical welfare of the astronauts from their selection and their annual check-ups through to all phases of a mission. It is supported in this task by the DLR institute for flight medicine. The care provided also includes fitness training, nutritional advice and psycho-social care, for relatives too. To support the astronauts during each mission, a Medical Control Room is activated at EAC to monitor all medically relevant data.

Medical Support Office staff, certified as ISS Crew Surgeons and/or ISS Flight Controllers, are already supporting ongoing missions as members of the multilateral medical team.

High Public Interest

The 'German Space Day' in Cologne, held every two years, is the high-point in terms of numbers of visitors to EAC. People of all ages want to meet the astronauts face to face, marvel at the space technology and be brought up to date regarding the missions taking place. Throughout the year, however, there are an average of forty

visitors to EAC every working day. The demand is actually much higher, but the limited availability of personnel and constraints due to non-interference with day-to-day operations limit the numbers that can be received. This has prompted ESA and DLR to jointly consider setting up a dedicated visitor centre, provisionally known as 'Cosmos Cologne', with thought currently being given to how a self-funding, privately-run operation could convey the fascination of space to even more people.

Preparing for the Future

This look back over the last 15 years of EAC is, of course, a good occasion to look into the future also.

EAC is well prepared to support the upcoming long-duration mission to the International Space Station in 2006, and looking forward to the challenging missions related to the European elements of the International Space Station, which include the Columbus launch and activation and the first launch of the ATV 'Jules Verne'. ESA certainly needs a new astronaut-selection process in the near

future in order to support the subsequent routine operations. But also looking beyond the next 15 years, EAC will continue to actively participate in the European Space Exploration Programme, which foresees missions to the Moon and Mars by European astronauts by 2030. It is not a dream to imagine ESA astronauts chosen in the next selection process and trained at EAC participating in these missions.

