General Studies

For the European space sector to move forward effectively, its rate of learning must be equal to or greater than the rate of change in its environment. The General Studies Programme (GSP) is ESA's mandatory contribution to European space industry and academia to facilitate learning and decision-making in a fast-changing world. It is through this programme that the Advanced Concepts and Studies Office, created in 2000, catalyses innovation and actively contributes to enabling the future of European space activities. In 2002, 73 GSP studies were initiated and 58 were completed, some of which are highlighted below.

Long-term activities included industrial-policy studies focused on specific software, launcher production, and ground-segment infrastructures and facilities. Following the completion of a feasibility study phase, the GSP is sponsoring an application-oriented space-weather pilot project on a shared-funding basis in cooperation with external organisations. The goal is to verify external interest in space-weather services furnished by a network of service providers, supported by a common infrastructure and using data from existing assets. The project will establish a clear view of the long-term potential and support decision-making regarding European involvement in and coordination of space-weather applications.

In the science and exploration domain, pre-Phase-A studies of the Flexi and Cornerstone missions NGST, LISA, SMART-2 and Eddington were performed. A Call for Exploration Technologies contributed about 40 new ideas from small companies.

In the applications-related area, the focus was on issues associated with sustainable development. The Earth's water resources, desertification processes and atmospheric carbon-dioxide content are important environmental parameters to be tracked in order to develop treaty-enforcement services using Earth observation from space, and to provide support to the ESA/European Commission Global Monitoring for Environment and Security (GMES) Programme. Through Envisat and these studies, ESA was able to play a constructive role at the World Summit in Johannesburg on the protection of Earth's environment.

In the area of new technologies, new methods and systems for time and frequency distribution via satellite were being investigated.

In the field of Infrastructures, the GRID and fuzzy logic for mission-control processes received special attention. The Propulsion 2000 study charted the roadmap for future propulsion R&D.

As in past years, 1.5 MEuro from the General Studies budget was allocated to small industrial studies to support various aspects of the main studies, or to cater for urgent and interesting proposals emerging during the two years of the plan's execution. These so-called 'fast-track' activities usually cost around 50 kEuro and have allowed the early involvement of Small and Medium-size Enterprises (SMEs), research institutes and universities, which would otherwise hardly participate in GSP activities. The fast-track approach contributed significantly in speeding up the interaction between ESA and its partners, and is currently being used as a model in other ESA programmes.

The Concurrent Design Facility (CDF), introduced as part of a new methodology by the GSP four years ago, has achieved a leadership role in Europe in the field of concurrent engineering. It is therefore time to look beyond the current infrastructure and prepare to continue to serve as a pathfinder for European Industry and national agencies. In

Engineers at work in the ESTEC Concurrent Design Facility (CDF) on the Mars Sample Return mission, with the live video link to ESOC on the leftmost screen

2002, the CDF provided support to among others the Aurora, General Studies and Microgravity Programmes for the pre-Phase-A studies of the following projects:

- Exobiology on Mars
- Mars Sample Return
- BepiColombo
- Droplet Combustion Experiment Requirements Definition.

Further information about the GSP is available from a dedicated area on the ESA Portal, (http://www.esa.int/gsp), where the planned and on-going studies are briefly described and where executive summaries of the activities performed are posted as they become available. This service is key to providing timely and fair access to all companies and researchers about ESA's new directions. The GSP home page, which had 25 000 visitors in 2003, also serves to collect comments, queries and suggestions.

A special effort will be made in 2003 to improve the process that leads to the General Studies plan, in order to provide the Agency and its Member States with increased guidance and coherence in terms of innovative and breakthrough ideas in science and technology. In this respect, having a well-prepared Advanced Concepts and Studies Office is an asset that underwrites the future of space activities in Europe, by anticipating and forecasting major changes that might happen in the future. In this context, greater interaction with academia is one of the main goals for 2003.