

What is MSM-M?

The Development Department of MSM

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Introduction

The core responsibility of MSM-M is the development of the infrastructure items being delivered by ESA to the International Space Station: the Columbus module, the first

MSM's Development Department is building ESA's main contributions to the ISS...

Automoated Transfer Vehicle (ATV; Jules Verne), the Cupola, Nodes-2 and -3 and the European Robotic Arm (ERA). We have already delivered the environmental control and life-support (ECLS) elements for the three Multi-Purpose Logistics Modules (MPLMs) of the Italian Space Agency (ASI), all of which have flown, and all the European contributions to the prototype Crew Return Vehicle, the X-38, unfortunately cancelled by NASA. The department provides ESA's representative on the Station's top technical forum, the Space Station Control Board (SSCB). We are also responsible for developing the family of building blocks, in the form of studies, technologies and pre-developments, for the Directorate's future activities in Exploration and Station enhancements.

To carry out this work, there are:

- four main development project divisions;
- a Future Activities Office;
- a Product Assurance and Safety Manager (who is both the ESA interface to NASA for PA/S matters at the infrastructure level and the ESA representative on the independent ISS Safety Review Panel);
- a Systems Support Office and the ESA Houston Office, both of which serve not only all MSM-M projects but also all other ISS activities of the Directorate.

In total, we are 52 staff and 16 support contractors, located in ESTEC, Les Mureaux (F), CNES Toulouse (F) and Houston, and we are

backed up by some 25 man-years of functional support from our colleagues in the Technical Directorate.

Columbus Project Division

MSM-MC, managed by Bernardo Patti, is responsible for developing the Columbus module. It also has the mission management responsibility for Flight 1E to ensure that all elements for the successful launch of Columbus, including its payload rack facilities, external payloads and carrier, ground segment, launcher interfaces, operational support products and crew readiness, are ready. Columbus is well advanced: it has completed its qualification and acceptance programme at the module level. This spring will see a series of end-to-end tests involving the module, its payloads and the ground segment, including the NASA side of the loop. Columbus was on track for launch in October 2004 until the tragedy of *Columbia* last year, and now faces the prospect of going into storage later this year, until a few months before its revised launch date of late 2006.



ATV Project Division

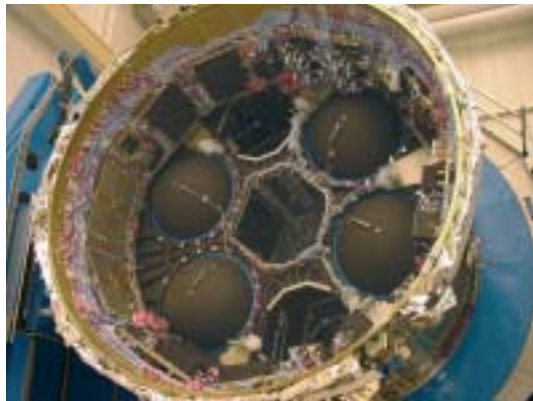
MSM-MA, led by Robert Lainé and sited at the Les Mureaux facility of prime contractor EADS-ST, is responsible for the development of ATV. It has the mission management responsibility to ensure that all elements for launching the first ATV are ready, including its pressurised cargo, propellants, water and gases, ground segment, launcher interfaces, operational support products and crew readiness. ATV has had a difficult development ride, unsurprisingly for such a complex vehicle, but it is now in the final stages of system functional and physical integration and test.



agency. An alternative scenario is again this year being seriously sought, as part of the overall ISS Programme Action Plan.

With respect to future activities, the development of closed-loop ECLS systems is

well advanced, with integrated demonstrators under ground test and preparation for flight test of an electrolyser (the only part that is gravity-sensitive) under way. Studies of inflatable modules and their associated ergonomics are being made. All of these activities are also supported by the Columbus division.



The main hardware elements are at the integration site in Bremen (D), and this summer will see the complete Flight Model shipped to ESTEC for environmental tests before delivery to the Kourou launch site early in 2005. Meanwhile, the system software is being tested; its various versions with different levels of functionality and complexity are being evaluated.

Human Spaceflight Systems & Robotics Division

MSM-MR, headed by Rainer Steinmeyer, has the job of completing ERA, managing the coordinated robotics activities agreed with the Technical Directorates, and leading the human systems future activities of the department. ERA has been through its qualification and acceptance programme, and the flight hardware is being prepared for storage. Its original launch and operational scenario, as part of Russia's Science & Power Platform, has been in jeopardy for several years because of the financial problems of the Russian space

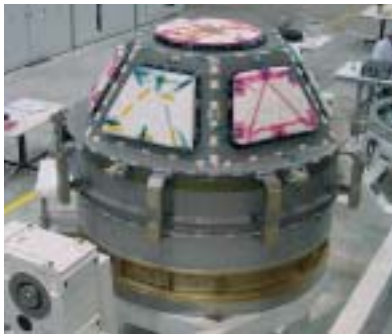
Reentry and Human Transport Division

Marco Caporicci leads MSM-MX, which is responsible for all transportation activities other than launcher development. Created to manage the X-38/CRV projects, which were cancelled by NASA as part of their cost-reduction exercise in 2001-2002, the division is now responsible for running the Interim Technology Programme for reentry and reusable launch systems, managing coordinated activities agreed with the Technical Directorate, and leading the study activities for future cargo and human transportation elements that support the Exploration and ISS enhancement activities.

The Expert aerothermodynamic flight testbed is being built to validate the computer-model and wind tunnel data for designing reentry vehicles (see the article on Expert in this issue). Derivatives of the ATV as a platform for scientific payload download and cargo up/down logistics are being studied.

Development of the International Berthing and Docking Mechanism, initiated as part of ESA's CRV contribution, continues, and ideas for a flight demonstration are being generated.





Nodes/Cupola Office

Philippe Deloo is the MSM-MN office! The Cupola is one of the barter elements from ESA in exchange for 'goods and services' from NASA instead of paying hard currency. It is almost complete: the Structural Test Model has been delivered to Houston and the Flight Model will arrive at the

Kennedy Space Center this summer. Until about a year ago, we were only observers in the Nodes project, since the technical, programmatic and contractual management was delegated to ASI. However, there has been a rapid enlargement of ESA's role over the last year following the revelation of significant cost overruns under the ASI contract. It is not yet decided if there will be a change in management responsibility for the remaining work; if so, ESA staff involvement will have to grow quickly!



Future Activities Office

MSM-MF, under Claus Reimers, coordinates all the future activities work in the various divisions, whether robotic, habitation or transportation and whether funded by the STEP, General Studies or ISS Development Programmes. Dietrich Vennemann has worked full-time on the Aurora programme for its first 3 years. The office's main activity has been studies into a small cargo-return system based on Russian inflatable heat shield technology, and the associated flight demonstration using a Volnya launcher later this year. In addition, the office carries the burden of coordinating the Directorate's interface to ESA's Technology Research Programme (TRP), General Support & Technology Programme (GSTP) and General Studies programme, and representing us on a number of the steering boards.

System Support Office

MSM-MS, headed by Arie Bossche, has a truly

horizontal function within the department. With the support of the Houston Office, they analyse the multitude of proposed Station changes issued by NASA, determine whether they are applicable and then follow up with the relevant project teams via the department's Engineering Board to ensure a minimum impact on ESA. They are also responsible for maintaining the Department's technical system and system support requirements (i.e. the Agency's baselines) and the verification control methodology and documents. They are the custodians of the Bilateral Verification, Hardware/Software Exchange and Documentation Exchange books that are agreed with our ISS Partners. This office, in the person of Pia Mitschdoerfer, is also responsible for internal departmental communication and reporting, without which we would soon cease to function effectively.

ESA Houston Office

On the fifth floor of Building 4S at NASA's Johnson Space Center, one finds the ESA



Houston Office, MSM-MH, managed by Dave Wyn Roberts. This office is the eyes, ears and mouthpiece of ESA within the NASA ISS Program Office. As such, they represent the Directorate's technical departments (development, operations and utilisation), and administratively support the local ESA astronauts and their direct support staff. In addition to the Station, Dave and his team keep up with the Shuttle programme and the various technology efforts that go on within the confines of JSC, to ensure that we all have the latest reliable information.

Summary

So that is the MSM-M Department. Like all the others, we rely on the full-time support of team members from other Departments and Directorates. We have our Project Controllers (Klaus Schmidt and Andrea Amaldi), our Configuration Managers (Bram Bekooy and Rob Meijer) and our Contracts Officers (Patrizio Graziano, Emilio Cerou and Franck Germes), without whom we could not function as ... MSM-M. ■