

EUROPEAN RESEARCH PLANS

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SPEECH

It is difficult to say in 30 minutes what we shall do in the next 30 years, since the Space Station will be used up to the year 2025, which means that the majority of users are still in school and even some of them are not yet born.

It is also difficult to speak after almost ten speakers about the same subject. As a matter of fact, the European plans on Space Station utilisation are very similar to the plans of the other partners - we have the same hopes and we have the same problems - but we are trying to contribute significantly in the following challenge: How to make the Space Station not only beautiful, but also useful?

Finally, I would like to recall that the European part of the Space Station Freedom is called Columbus, which means a lot!

- Christopher Columbus was truly a European, born in Italy and sponsored by Spain.
- Christopher Columbus established the first link between Europe and America.
- Christopher Columbus opened a new era even though he did not know that he was doing so.

The success for the Space Station would be that future historians could distinguish the pre-Freedom period as they did for the pre-Columbian period.

I shall limit my presentation today to the three following aspects:

1. Why Columbus and, more generally, the Space Station Freedom is a unique tool for Science?
2. What are the capabilities offered by Columbus to the users, in terms of accommodation capabilities and environment?
3. Columbus utilisation has already started, through Precursor Flights: IML-1, ATLAS, EURECA-1 in 1992, Spacelab D-2 next year, later on EURECA-2 and -3, IML-2, SPACELAB E-1 and we are also looking for using the MIR Station and Spacehab, which means any opportunity to prepare the Space Station utilisation and also through ground testbeds. Columbus utilisation is very active on ground. I shall show you pictures of the real stuff and not only artists' concepts and plans. You can visit the Space Station mock-up here in Huntsville; you are all welcome to visit and use the Columbus facilities at ESTEC in the Netherlands.

First Aspect, the Columbus elements will be used as laboratories, which means a place where we are providing capabilities for doing experiments, i.e. power, computers, . . . and as space laboratories, which means a place where we are taking benefit of the space environment, i.e. altitude, vacuum and microgravity. It must be pointed out that scientific utilisation is not the only driver for developing the Columbus elements. To make man live and work in space is also a key objective.

As a matter of fact, most of the science we plan to do onboard the Space Station could be done without the Space Station, except for Life Sciences, which are obviously linked to the presence of man in space. We can do Astronomy, Earth Observation, Technology Experiments, Material Sciences, Fluid Sciences, without the Space Station and **WE DO**.

However, we shall use, and extensively use, the Space Station because, first, it is there, but not only because it is there. Compared to other means to do science in space, and especially regular satellites, the Space Station has key features that make it a unique tool for science.

1. The Station permits us to avoid the transport through the atmosphere of all resources necessary to make an experiment, each time you wish to make an experiment. The resources stay in orbit and you can limit the transport to just instruments, which is a big advantage when you know that, for example, Spacelab is 13 tons for 3 tons of instruments. The key is to carry less through the atmosphere.

2. The Station has large utilisation resources, at least one order of magnitude above those of a regular satellite - 30 kw, tenth of square metres, hundreds of cubic metres.

3. The Station is permanently available with an access every two to three months, which means that you can change, you can repair, and you can introduce new technology as soon as they are available.

4. The Station is manned, which can be very useful, even if not mandatory. Therefore, the Space Station is a unique tool for scientific utilisation.

The Second Aspect I would like to address is the capabilities which are offered by the Columbus elements. These capabilities are twofold:

- Accommodation capabilities, which mean the number and type of instruments you can accommodate and operate.
- Environmental capabilities, i.e. the microgravity environment for instance, which must satisfy the requirements of experimenters and which could be improved by the development of Microgravity Isolation Mounts.

As for the accommodation capabilities, I would like to comment on two key words:

- multidiscipline, which means that we have to satisfy the requirements of a wide range of users;
- cooperation, which means that we have to take the best benefit of the overall capabilities and resources which are available, i.e. avoiding duplication between the partners.

About the multidiscipline aspect, we consider that it would be a mistake to limit the users to a few categories, considering the 30 years of utilisation in front of us. Five years ago, the favourite users were among the Material Sciences type of users; today the favourite users are with Human Physiology because of space exploration; perhaps five years from now they will be recruited in the biology field, and I trust the scientists to have dynamism enough for proposing completely new ideas on how to use space environment 20 years from now. We have to, therefore, be prepared to face this evolution, and our plans are balancing the utilisation of Columbus among all present user communities.

I shall come back to cooperation later on and let me show you now some material on existing ground facilities, available to prepare the utilisation of Columbus. The Columbus Attached Laboratory full size mock-up includes:

- the real interfaces between the Laboratory system and the payload racks;
- breadboards of typical payload and of the General Purpose Workbench;
- a Telescience testbed simulating the interactive payload operations;

- a Crew Work Station testbed evaluating all technologies able to enhance the role of the astronauts;
- an Automation and Robotics testbed evaluating the capabilities of a multi-purpose robot.

In addition to these ground facilities, extensive utilisation of underwater tests and parabolic flights complete the preparation of Columbus utilisation on ground.

I would like to conclude my presentation with the international aspect: The Space Station is an international venture; we are partners with rights and duties. These rights and duties are clearly defined in the Space Station agreements, the IGA and MOUs. But we have to go beyond these papers and to practise this cooperation, and this is the reason why the preparation of the utilisation of the Space Station must be truly international at both levels, user and agency levels, utilisation and operational levels.

To practise cooperation is the best way to realise that cooperation does not exclude competition and that the combination of cooperation and competition is very fruitful. We know that in Europe, where 13 countries are cooperating through the European Space Agency.

This cooperation is already under way:

1. With NASA, thanks to the IML flights and a cooperative agreement on the EURECA reflights.
2. With all the Space Station partners in order to ensure common interfaces for the users and, in order to share the common equipment on board.

This cooperation does not exclude any partner and, therefore, I am confident that the Space Station will offer a new era of space activities, and just to show you what is true cooperation, let me show you the first advertisement I have discovered for Columbus in a US newspaper . . .

