The Pioneering Days of the Columbus Control Center (Col-CC)
"How Columbus learnt to Fly"

The Bavarian Moon Summit convened by Prime Minister Markus Söder on 4. July 2025 decided to enlarge and expand the existing Columbus Control Center (Col-CC) into the European astronautical control center, the Human Exploration Control Center (HECC) at the premises of DLR (German Aerospace) at Oberpfaffenhofen.

This decision is the highlight of a long journey which began in 1984 with a business trip of Joachim J. Kehr to Rome.
The various milestones and setbacks of this enterprise to establish a control center for human spaceflight at Oberpfaffenhofen as part of the German Satellite control Center are described in the book "How Columbus Learnt to Fly" ESA SP-1321). As the book is no longer available the first couple of chapters relating to the design and development of the Col-CC are summarized to salute the "Col-CC pioneers".

Columbus—Born in Rome?

When the routine, almost emotionless voice of the NASA commentator announced main engine cutoff during the live broadcast to the Columbus Control Center lobby on February 7, 2008, Joachim Kehr—former Columbus Project Manager at the German Space Operations Center—thought, "Finally made it." His mind drifted back to another flight that marked the beginning of the Columbus adventure for him.

At dawn on a sweltering July morning in 1984, he boarded Lufthansa's first flight from Munich to Rome. His mission: to attend the final presentation of a German-Italian space station study by companies ERNO-MBB, Aeritalia, and the predecessor of today's DLR (German Aerospace Center). As an expert from the German Space Operations Center, he was to present the ground operations concept. The meeting, held at the Italian Ministry of Research in Rome (Lungotevere Thaon di Revel 76), included representatives from both nations' ministries.

This study—launched a year before Spacelab's successful maiden flight with Ulf Merbold in 1983—aimed to explore Spacelab evolutions. Such ambitious, almost sci-fi-like studies are common in spaceflight: they kick-start a chain of increasingly concrete plans that ideally culminate in a mission.

By 1984, Columbus was only in Phase A study. The study's goal—to define Europe's path toward an autonomous space station—the name "Columbus," was chosen by officials Gottfried Greger (German Ministry of Research), Manfred Fuchs (ERNO-MBB), and Ernesto Vallerani (Aeritalia) for a potential 1992 launch (marking 500 years since Columbus' voyage).

At the Rome presentation, a grand vision emerged: polar/equatorial platforms, dockable labs (crewed/uncrewed), transport vehicles, and relay satellites. The centerpiece was a 33-foot-long, 15-foot-diameter pressurized lab module based on Spacelab, operable by astronauts or autonomously. Innovations included modular design, on-orbit maintenance, and unlimited flight duration.

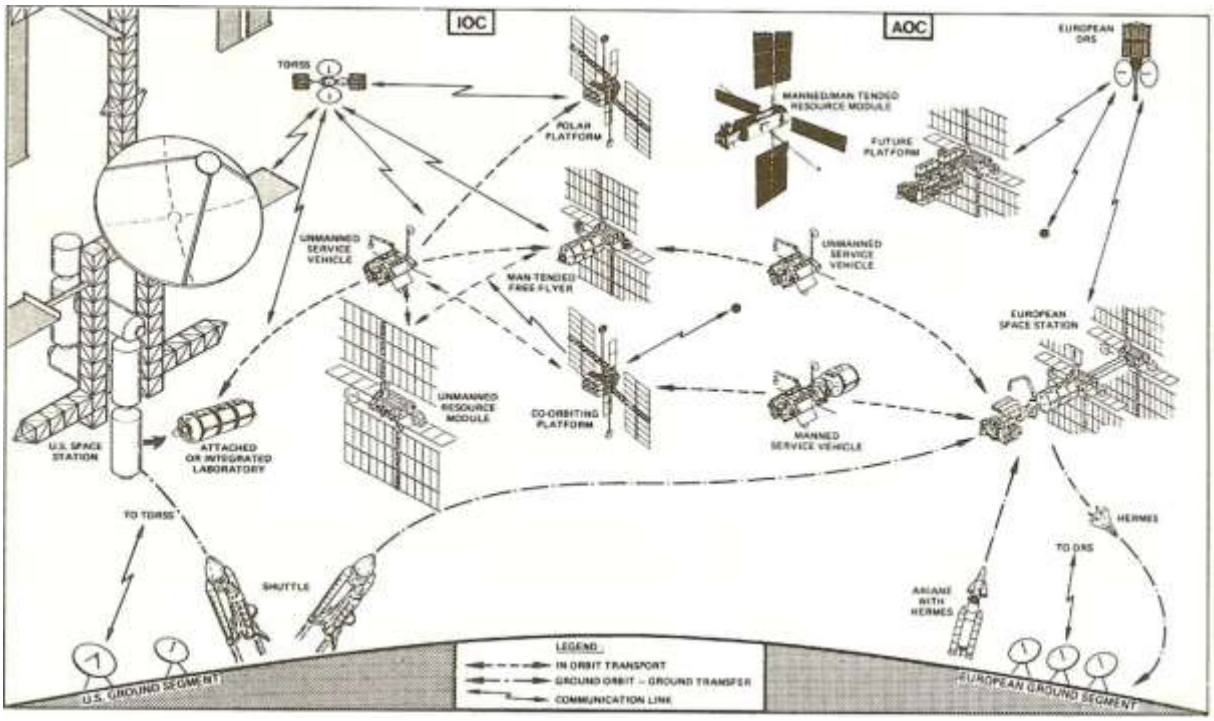

Fig 1 Columbus Ph-A German/Italian In- Orbit-Infrastructure (IOI) Scenario

Three operational concepts derived from Spacelab operations “shortcomings” were envisioned:
> High-speed transatlantic data transfer between U.S./European control centers.
> Direct raw data access for scientists at their home institutes.
> Commercial ground communications infrastructure.

One idea not further pursued was to stream monitoring data to flight controllers’ offices in order to get rid of the “marching armies” in the control rooms (deemed a security risk).

Despite great enthusiasm, the bilateral studies stalled because the cost estimates exceeded German-Italian budgets dramatically and the financial question remained unresolved, on the other hand in 1984 President Reagan proposed a permanently crewed space station and issued a worldwide invitation to participate as partners.
So, the Phase A study results were handed over to ESA, which adopted them and merged them with their own ideas. This new concept was accepted by all ESA member states on the ESA Council of Ministers on January 31, 1985 in Rome, and green light was given to commence with Phase B studies.

Further budget constraints later narrowed Europe’s contribution to only four elements summarized under the project name "Columbus":
> Attached Pressurized Module (APM)
> Man-Tended Free Flyer (MTFF)
> Co-orbiting Platform
> Polar Platform

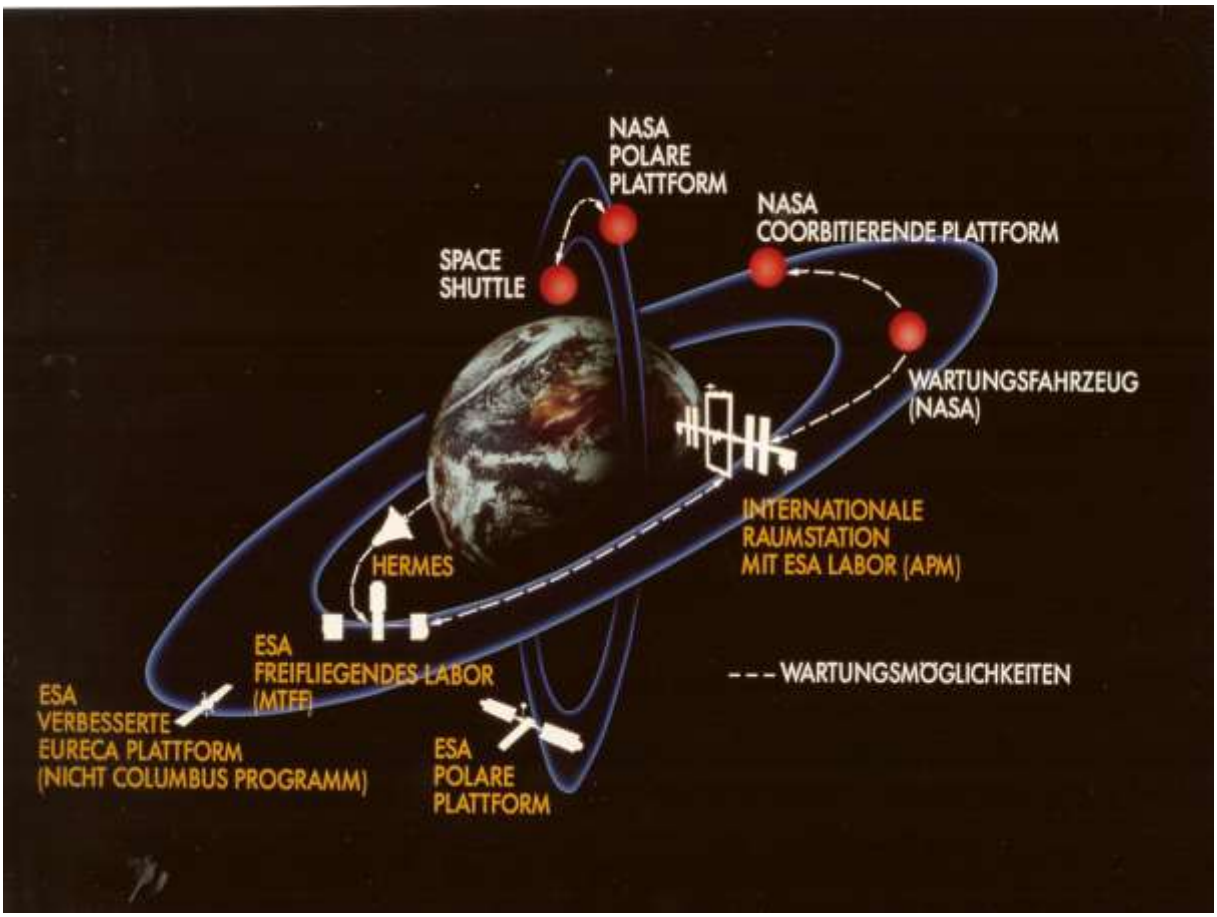

Fig. 2 Reduced ESA scenario for the international US space station "Freedom"

By 1987, only the APM remained. The polar platform evolved into ENVISAT, operated later successfully by ESOC in Darmstadt.

To achieve "independent European human access to space," ESA approved three major programs: the Hermes spaceplane, Data Relay Satellites (DRS), and Ariane 5 (to launch Hermes),
The Ground operations would be decentralized to involve the major European participants:
> Central Mission Control (Darmstadt)
> Hermes Flight Control (Toulouse)
> Manned Space Labs Control (Oberpfaffenhofen)
> User Support Centers (across member states)

Finally twenty (20) different Ph-B studies with appropriate cost assessments with binding offers to ESA, had to be conducted over the years to adapt to the ever changing scenarios.

Germany funded 38% of the Columbus development program , Italy 25%, France 14%.
Total cost: 3.7 billion Accounting Units (~ €3.7 billion)

Oberpfaffenhofen—Bavaria is Not Texas

After successfully hosting Spacelab-D1 operations in 1985, Bavaria's Minister-President Franz-Josef Strauß allocated ~$20 million German D-Marks as advanced national

contribution to build a human spaceflight control center in Oberpfaffenhofen. Construction began in 1988; and was completed in 1991 for crewed precursor missions.

A time capsule embedded in the visitor platform reads:
"This control center was planned and built by the GSOC team and the Columbus management staff Messrs. Joachim Kehr, Jürgen Fein and Peter Dau in 1986–1989.
May only successful projects be conducted here!"

Operations activities started appropriately and the new center supported Klaus-Dietrich Flade's 1992 mission on the Russian Mir space station, and fully managed the 1993 Spacelab-D2 mission.
After NASA's 1994 decision to decentralize international space station operations among the participating partners Oberpfaffenhofen was appointed for:
> Columbus systems operations (including life support).
> Experiment coordination across 16 European User Support Centers.
> Ground communications (including for ATV missions).

ESA invested additional 60 million Accounting Units (€60 M) for the Columbus operations control systems and officially inaugurated the new complex as the Columbus Control Center (Col-CC) in October 2004.
The Col-CC is responsible for European ISS operations since the launch and attachment of the Columbus module to the ISS on February 7, 2008.

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Fig. 3 Col-CC as completed in 1991 (Left wing: In-Orbit Simulation Facility (IOSF) middle: Operations Simulation Facility (OSF), rigt: Columbus Control Center (Col-CC)

Strategic Impact

- The establishment of Col-CC provided Europe with autonomous capability for human spaceflight operations, integrating European scientific communities with real-time mission operations.
- Col-CC's role extends beyond operations—it represents Europe's technical sovereignty and expertise in managing complex international space infrastructure.

The build-up of the "Human Exploration Control Center" at DLR Oberpfaffenhofen as decided at the Bavaria Moon Summit in July 2025 proofed the above approach right, although the timespan between the beginnings and the final success after more than 40 years was unbelievable long.
A German proverb says: "Was lange währt wird endlich gut".

"All good things come to those who wait".

References:

How Columbus learnt to Fly (ESA-SP 1321)
Glipses of a unique space mission
Authors: Thomas Uhlig, Alexander Nitsch, Joachim Kehr
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See also:
Wie Columbus fliegen Lernte
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