

2 The MAP Operations Centre (MOC) in Innsbruck

2.1 Tasks of the MOC

The operations during the MAP-SOP were coordinated from the MOC, where the Science Director, the Operations Director, and most of the members of the Mission Selection Team resided. However, the MOC remained permanently in close connection with the POC in Milano Linate, Italy, and the COC in Bad Ragaz, Switzerland, and transferred to these centres the responsibility of coordination at specific times and for specific aspects. One member of the Mission Selection team resided at the POC in order to facilitate the coordination between the centres.

The main items of the process by which the MAP operations were coordinated included:

The concentration on all information concerning the status of measuring systems, the weather situation, the previous achievements or failures during the field phase, and the proposals of the PIs.

The decision to start an IOP and to finish an IOP. This must be based on consideration of the interest of the upcoming weather, and availability of measuring platforms and resources.

The selection of the most promising flight missions for the next following days. It must be issued approximately at noon on the day before the mission, and must be based on adequation between the missions and the weather situation, and on a precise record of previous achievements and agreed apportionment of resources to the various scientific objectives. Full consideration must be given to the coordination and overall balance of flight missions for any given day.

The selection of the most appropriate operation modes and timing of some other measurement systems (radiosondes, constant level balloons, radars, etc...).

The notification of the above decisions to whom it may concern.

The pre-flight ATC contacts by the MOC, and in-flight aircraft coordination by the POC.

2.2 International Structures

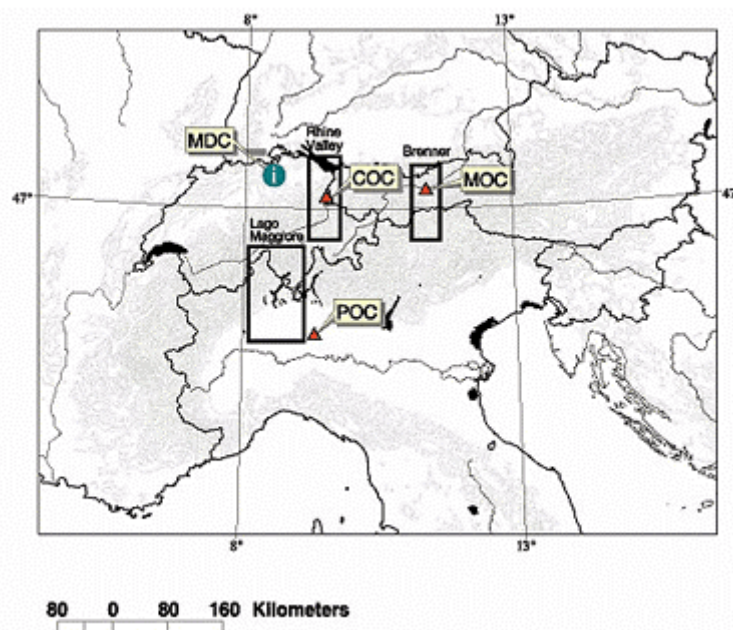


Figure 2.2.1: Key features in MAP: Three target areas (frames do not indicate hard boundaries); MOC: MAP Operations Centre in Innsbruck; POC: Project Operations Centre Radar in Milano-Linate; COC: Coordination Centre Rhine Valley in Bad Ragaz; MDC: Map Data Centre in Zurich.

2.3 Organisational Structure of the MOC

2.3.1 National Structure

Herbert	Pümpel	Dr.	herbert.puempel@astrocontrol.at	A	10 weeks	MOC Director
Peter	Parson	Mag.	Peter.parson@zamg.ac.at	A	2 Years	Head of Forecasts
Harald	Schellander	Mag.	Mocibk@zamg.ac.at	A	2 years	MOC Operations
Claudia	Schmid		Claudia.schmid@zamg.ac.at	A	6 weeks	MOC Operations

Table 2.3.1: National MOC staff.

Pavol	Beranek		Pavol.Beranek@shmu.sk	Slovakia	3 weeks	
Martin	Bolliger	Dipl. Geogr.	bol@sma.ch	CH	3 weeks	
Barbara	Chimani		a9601675@unet.univie.ac.at	A	2 weeks	
Florian	Eywo		a9503625@unet.univie.ac.at	A	2 weeks	
Bernhard	Forstner			A	2 weeks	
Wera	Gruber		a9503219@unet.univie.ac.at	A	2 weeks	
Alexander	Kann		a9502001@unet.univie.ac.at	A	2 weeks	
Daniel	Leuenberger		ledaniel@student.ethz.ch	CH	2 weeks	
Petra	Malcher		Petra.Malcher@uibk.ac.at	A	3 weeks	
Mario	Mech			GER	2 weeks	
Ronald	Prodinger			A	2 weeks	
Martin	Puchegger			A	2 weeks	
Zsuzsanna	Racz		zsuzsa@meteo.physik.uni-muenchen.de	GER	2 weeks	
Peer	Röhner		Peer.Roehner@stud.uni-hannover.de	GER	5 weeks	
Paul	Skomorowski		a9600305@unet.univie.ac.at	A	2 weeks	
Manfred	Spatzierer		a9504082@unet.univie.ac.at	A	1 week	
Hristo	Tchervenkov	Mag.		Bulgaria	3 weeks	
Simon	Tschannett		simon.tschannett@ap.univie.ac.at	A	2 weeks	
Martin	Vill		martin.vill@uibk.ac.at	A	3 weeks	
Franz	Wimmer		wimf@yahoo.com	A	2 weeks	
Hong-Yan	Zhu		hongyang@meteo.physik.uni-muenchen	GER	2 weeks	

Table 2.3.2: Student assistants.

2.3.2 International Structure

Week# Date	MOC Director	SD (alternate)	OD (alternate)	Facility Status Coordinator (FSC) (alternate)	Aircraft Operations Support Manager (AOSM) (alternate)	Head of Forecasting Office	MAP Data Centre and MAP Network Manager
35: 31.8.	Pümpel					Parson	Hirter (Guy)
36: 7.9.	Pümpel	Bougeault (Schär)	Dirks (FSC)	Rossa (I. Steinacker)		Parson	Hirter (Guy)
37: 14.9.	Pümpel	Bougeault (Schär)	Dirks (FSC)	Rossa (I. Steinacker)	Finkenzeller	Parson	Hirter (Guy)
38: 21.9.	Pümpel	Bougeault (Schär)	Dirks (FSC)	Skubis (19.9.) (I. Steinacker)	Finkenzeller	Parson	Hirter (Guy)
39: 28.9.	Pümpel	Bougeault	Dirks (FSC)	Skubis/ I. Steinacker	Finkenzeller	Parson	Hirter (Guy)
40: 5.10.	Pümpel	Bougeault /Smith (arr.10.10.)	Dirks (FSC)	Skubis/ I. Steinacker	Finkenzeller	Parson	Hirter
41: 12.10.	Pümpel	Bougeault /Smith	Dirks/Binder (FSC)	Skubis/ I. Steinacker (16.10.)	Finkenzeller	Parson	Hirter
42: 19.10.	Pümpel	Smith	Binder (FSC)	I. Steinacker (student assistant)	Pümpel	Parson	Hirter
43: 26.10.	Pümpel	Smith	Binder (FSC)	I. Steinacker (student assistant)	Pümpel	Parson	Hirter
44: 2.11.	Pümpel	Smith	Binder (FSC)	Rossa (1.11.) (I. Steinacker)	Pümpel	Parson	Hirter
45: 9.11.	Pümpel	Smith	Binder (FSC)	Rossa (I. Steinacker)	Pümpel	Parson	Hirter
46: 16.11.	Pümpel						Hirter
47: 23.11.	Pümpel						Hirter

Table 2.3.3: International MOC staffing.

More detailed information on Operations Coordination can be obtained from chapter 2 of the MAP Implementation Plan (<http://www.map2.ethz.ch/mip/chap2.pdf>).

2.4 Infrastructural facilities

2.4.1 Offices – Accommodation

2.4.1.1 Location

Administrative Offices, offices for the aircraft people and the MOC Forecaster Centre were located within the facilities of the Austrian Civil Aviation Authority AustroControl, at the General Aviation tract near the Tower at Fürstenweg 180 at the airport. The office of the Scientific Director and additional administrative offices were within the same building on the first floor. The scientist room, general assembly/briefing room- cum-display- room for forecast products were located nearby at the WIST Student Hostel at Fürstenweg 174.

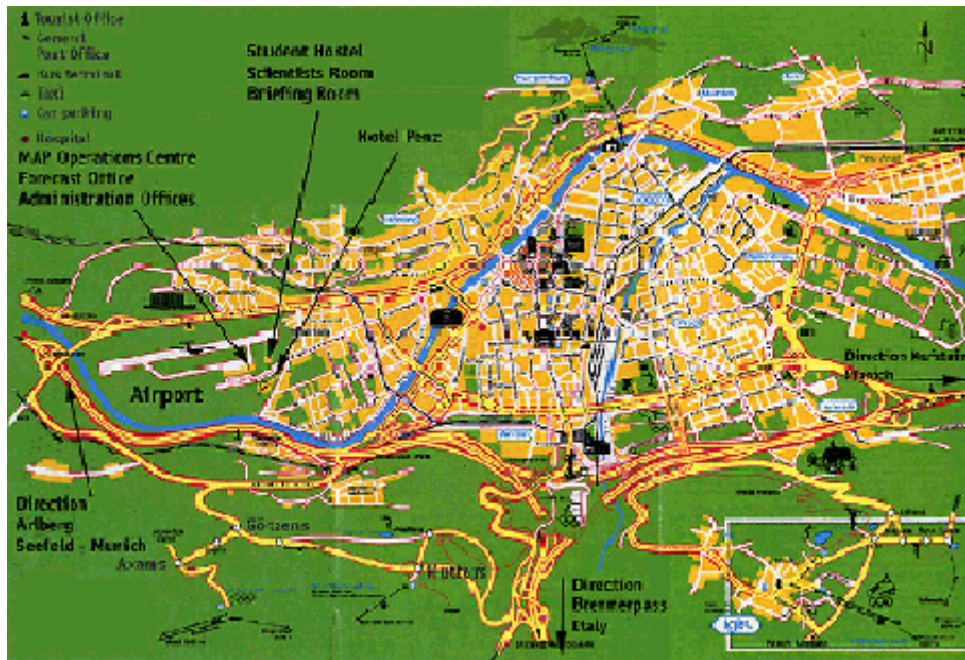


Figure 2.4.1: Map of Innsbruck with MOC facilities highlighted.



Figure 2.4.2: Student Hostel: Accommodations for participants, private offices.

Accommodation / private offices for participants to the experiment were mostly at the Student Hostel (Fig. 2-4-1-2), and partly at the Hotel Penz opposite. Storage and workshop facilities for aircraft operators were being handled by the Tiroler Flughafen Gesellschaft Innsbruck (TFG) by individual arrangements with aircraft operators.

2.4.1.2 Floor plans for administrative, scientific and operational requirements

Administrative Offices: Operations Director (OD) and Aircraft Operations Support Manager (AOSM) were housing within the AustroControl (furtheron called ACG) area of the airport building. The Scientific Director (SD) was offered a first-floor office, the OD and AOSM were housing on the same level, but within the Airport

Authority office area. Flight support groups from NCAR and NOAA were located at a large communal office (~70 m²) on the ground floor within the ACG complex next to the office of the MOC Director (27 m²), see Fig. 10-5.

MOC Forecasting Office: This facility was also within the AustroControl-compound at the ground floor, opposite the MOC Directors Office (Fig 10-5). About 46 m² large it focussed to all the meteorological information both of the MOC-net and the network of the Austrian NWS's. Access was restricted to the forecasters and the members of the mission selection team. Briefings for whole MAP community took place in the big briefing room of the Student Hostel (see Fig. 10-4).

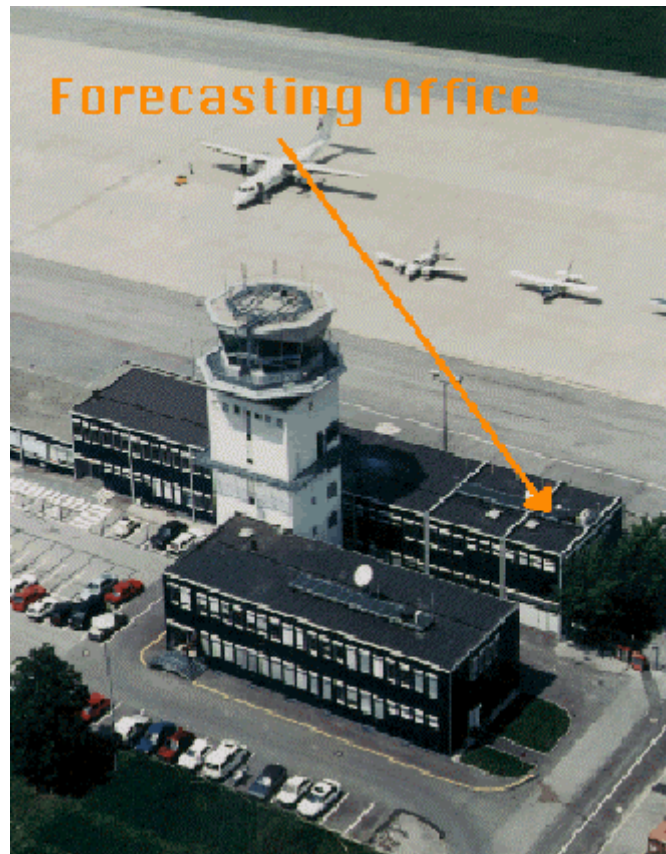


Figure 2.4.3: Forecasting Office, Innsbruck airport.

Scientist's room: The Scientist Room for workgroups at the Student Hostel (Fig. 10-2) was located in a quiet courtyard, sheltered from the hustle of the hostel and airport traffic and had approx. 50m². Workspace for approximately 15 workstations was provided in this room (Fig. 10-6). A local network was permitting access to both the MOC-net and the Internet via the University of Innsbruck computing centre (UICC, see Fig. MOC net). For each workstation (brought by research groups), an account was established through the MDC management. There was some user support available for connecting users hardware to the local net, and for trouble shooting throughout the SOP. For scientists requiring hardware a limited number of workplaces could be made available upon request at the UICC.

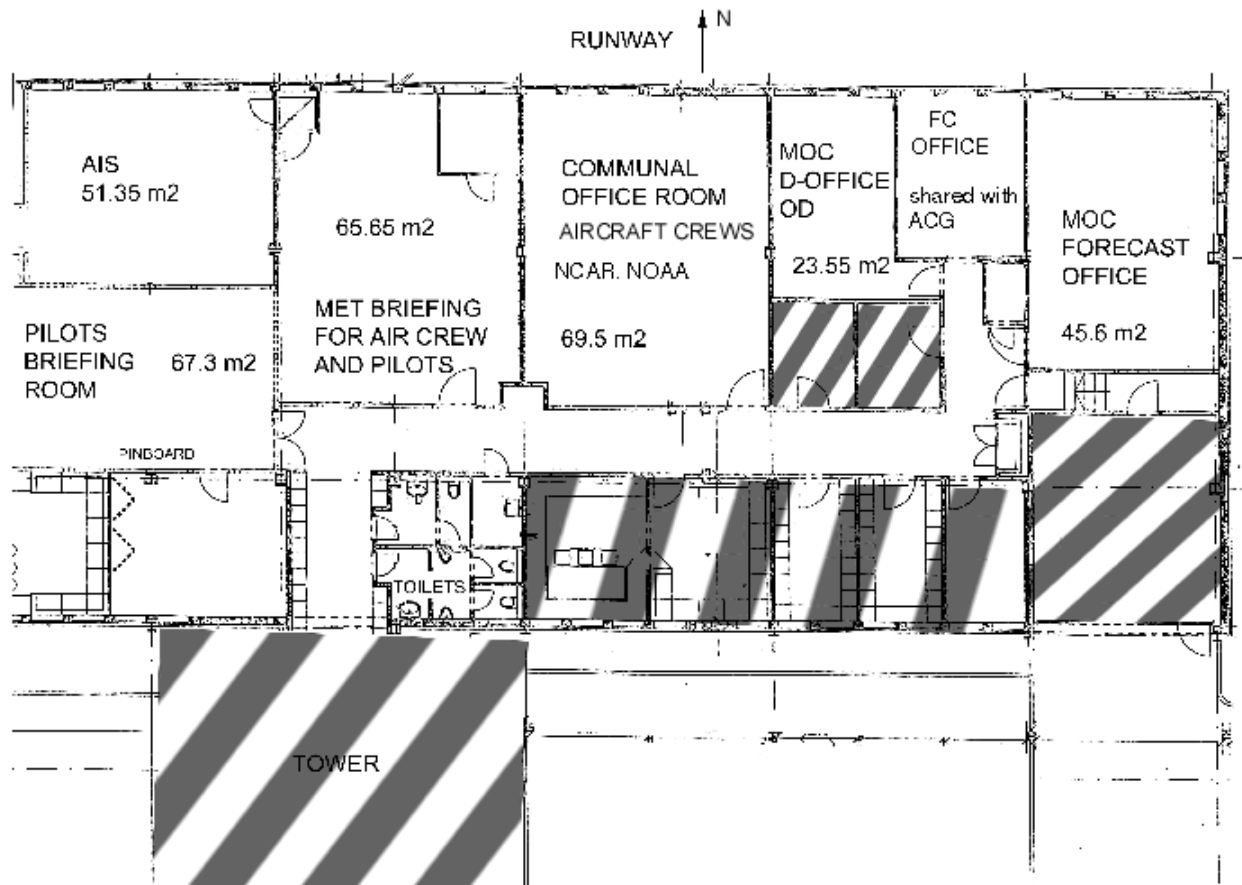


Figure 2.4.4: Floorplan of AustroControl area. Administrative Offices and MOC Forecasting Office.

MOC-net in some rooms of the Students Hostel: For scientists wishing to access the Internet and the MOC-net from their living quarters at the Students Hostel, a limited number of rooms were connected directly to the MOC-net.

The General Assembly/Briefing room: The General Assembly/Briefing room at the Student Hostel was located on the ground floor and had dimensions of appr. 15 x 10 m². There was daytime access for all participants, for security reasons a student assistant was available during daytime (Fig. 10-4 and 10-6). In this room a space of appr. 10 x 6 m² could be separated by a dividing wall, equipped with further 8 working places for scientists which were connected to the MOC-net. In the briefing room a workstation provided the forecast products of the Austrian NWS's including data visualisation MAVIS.



Figure 2.4.5: General Assembly / Briefing Room at the Student Hostel.

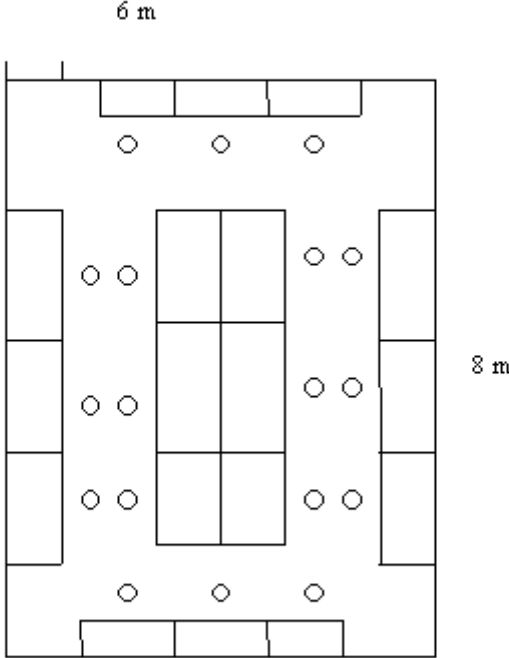


Figure 2.4.6: Sketch of Scientist Room (Student Hostel)

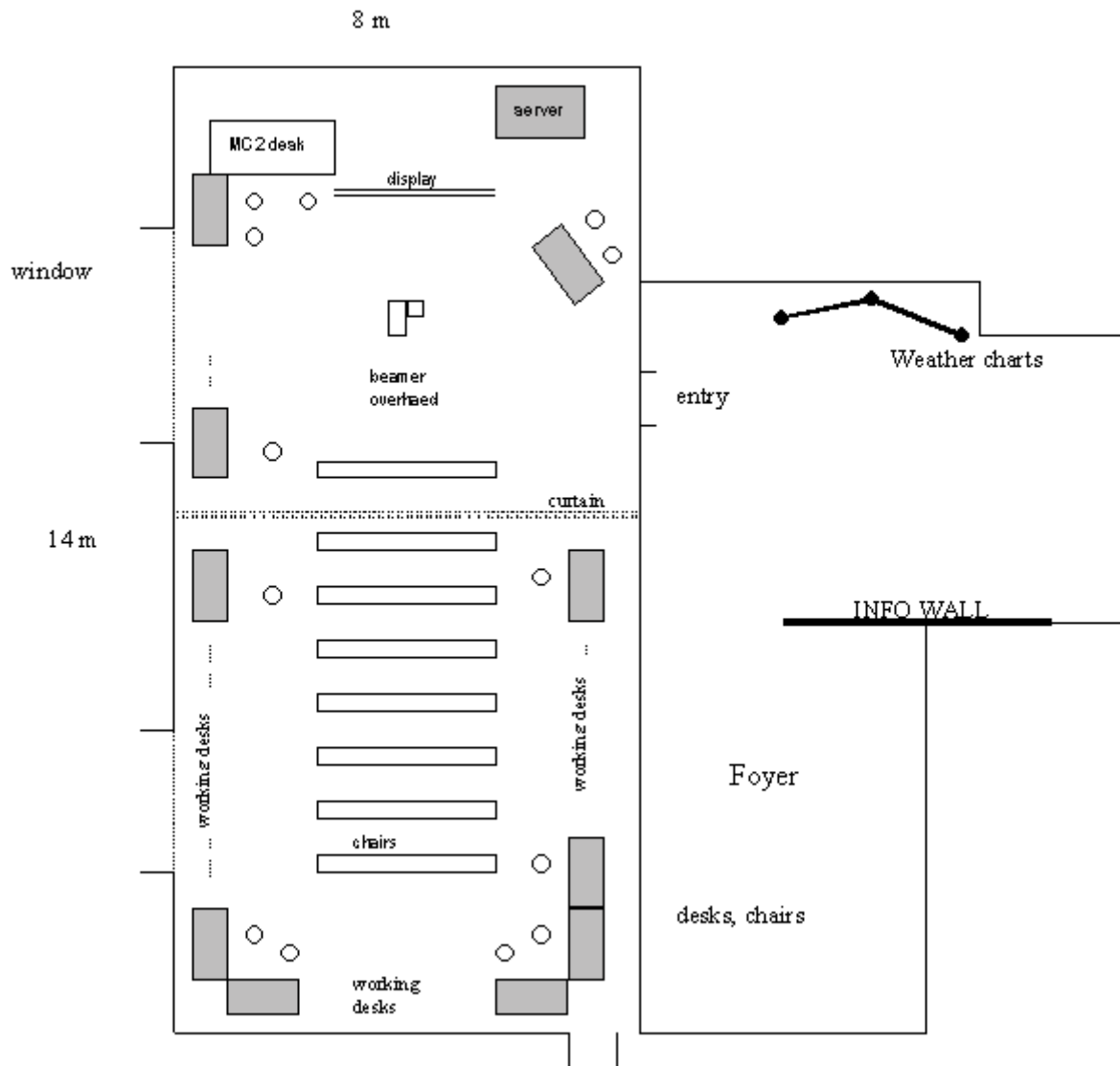


Figure 2.4.7: Sketch of General Assembly / Briefing Room.

2.4.2 Technical Setup

2.4.2.1 MOC Network

All real-time data (model forecast fields, surface data, radar and satellite images, etc.) were available on two different servers within the MOC compound. MOC server I was located in the Forecasting Office. It was connected via a dedicated line (256 kBit/s) to the Internet and the MDC in Zurich. It supplied data only to the forecasters, the aircraft crews and to Administration Officers. The main task of MOC server II in the Briefing Room in the student hostel was to supply data to the scientific community inside the MOC network and to other scientists who worked at their home institutions. It was connected via a dedicated line (2 MBit/s) to the internet and the MDC. Intranet speed was 10 and accordingly 100 Mbit/s. Installation and maintenance of the network was done by the MDC staff, the Computing Centre of the University of Innsbruck and professional companies.

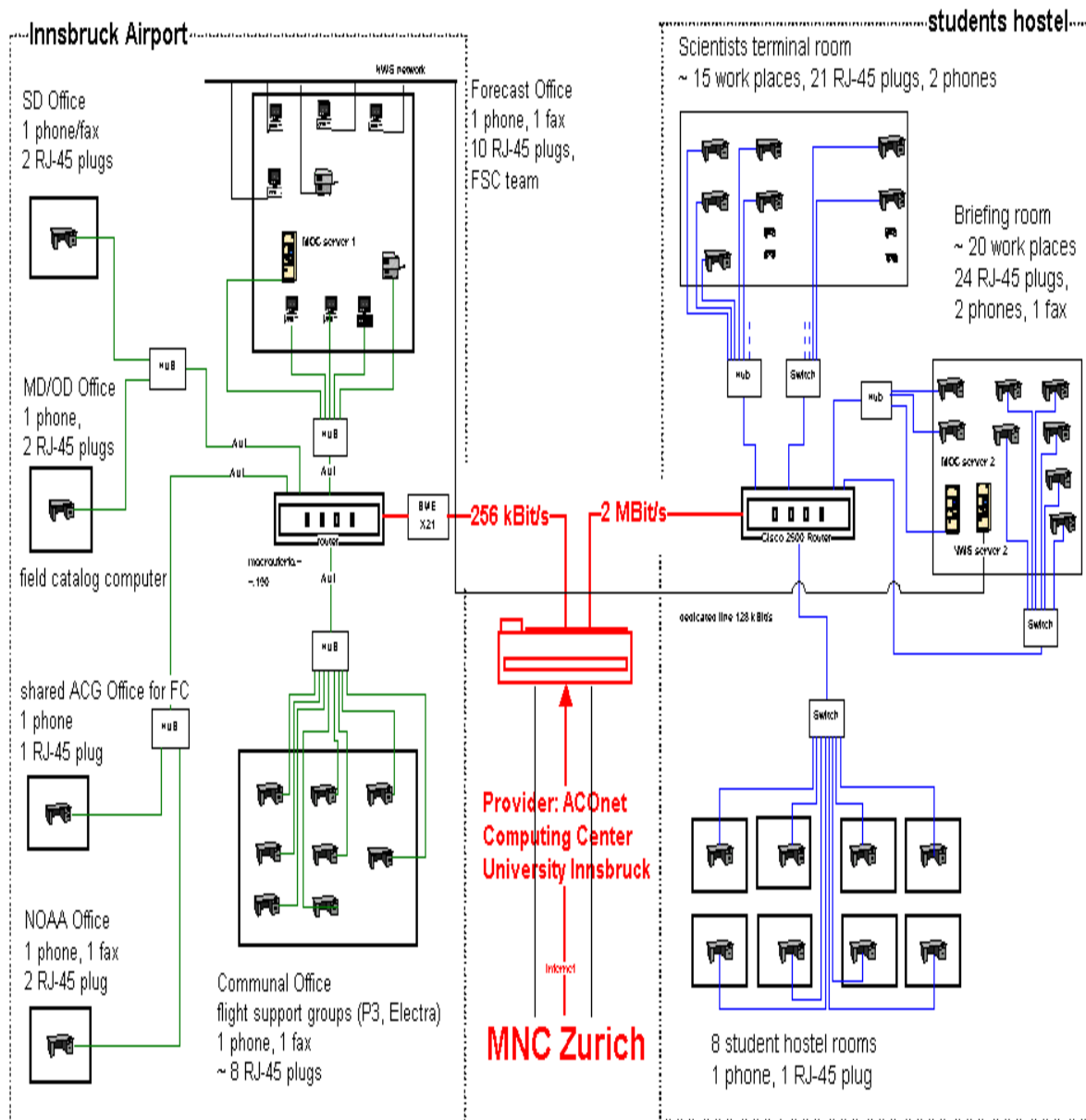
Before the start of the SOP the MOC allocated 57 IP-addresses in two different subnets (airport, student hostel). For security reasons 3 SUN workstations, one PC and one printer in the Forecast Office were only connected to the network of the Aeronautical Met. Service Austro Control.

	number	Operating system
All	57	

PC	18	Windows 9x, NT, Linux
Workstation	10	SUN, HP
Laptop	22	Windows 9x, NT, Linux
Macintosh	2	
Printer	3	
Router	2	Cisco

Table 2.4.1: Computers hooked up to the MOC net during the SOP.

MOC Network



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Figure 2.4.8: Schematic of the network at MOC Innsbruck (MOC-net + NWS-net).

For a general overview of MAP communications and data flow management see chapters 8 and 9 of the MAP Implementation Plan (<http://www.map2.ethz.ch/mip/chap8.pdf>, <http://www.map2.ethz.ch/mip/chap9.pdf>).

2.4.2.2 Other technical equipment

33	Handys	Operations and participants
11	landline telephone connections	2 student hostel Briefing Room
		2 student hostel ScientistRoom
		2 Airport Forecast Office
		1 each for dedicated offices at the airport
4	fax connections	1 student hostel Briefing Room
		1 Airport Forecast Office
		1 each for dedicated offices at the airport
4	cost manager	Telephone connections at the student hostel
1	Communication device, 2 microphones, 1 loudspeaker	audio conference between Innsbruck and Milan
1	data projector	Briefings
1	Overhaed projector	Briefings
3	ISDN data connections	backup for data servers
5	Dedicated lines	data transfer

Table 2.4.2: General technical setup.

2.5 Operational Activities

2.5.1 Forecasting Support

The basic requirement that had to be satisfied by the forecasters was to give support for mission planning and decision making by covering all forecast ranges from medium range (48 -120h), short range (24 - 48h), very short range (6 - 24h) to nowcasting (0 - 6h), and real-time mission support.

3	SUN workstations	Forecast products of National Weather Services
4	PC (Win 98)	Forecast products of MAP data centre
1	color laser printer A4	
1	b/w laser printer A3	
2	PC 's (NT)	Server for MAP data centre products
1	PC (NT)	Support for FSC group
1	PC (Linux)	MAVIS display in Briefing Room
1	PC (NT)	Network watch
1	Laptop	General MOC Operations
1	Fax	
2	Telephones	Forecasters, FSC crew

Table 2.5.1: Forecast Office facilities.

Typical daily schedule (Local Time)

05:00 - 08:00	Forecaster prepare weather report for the Morning Briefing
08:15 - 08:30	Morning Briefing in Briefing Room: Forecaster on duty presents short weather overview for SD, OD, PI's for Day 1 and Day 2
08:45 - 10:15	Forecast team completes report for D3 + D4 and outlook (D5 + D6) Preparation of science proposals
10:30	Main Briefing in Briefing Room for forecaster, scientists and interested people in audio-conference with the POC following: MST Meeting: OD, SD, MST members
14:00 - 21:00	Forecast Late shift monitors weather development and prepares forecast report of next day
~ 20:00	Evening briefing (if deemed necessary by MST): forecaster, PI

For more information on Forecasting Support see Chapter 7 of the MAP Implementation Plan (<http://www.map2.ethz.ch/mip/chap7.pdf>). More details on operations coordination can be obtained from chapter 2 of the MAP Implementation Plan (<http://www.map2.ethz.ch/mip/chap2.pdf>).



Figure 2.5.1: Forecast Office, MAP Operations Centre at Innsbruck airport.

2.6 Financial Funding

The basic funds for the establishment and realization of the Infrastructure for the MOC was granted by the Austrian Federal Ministry of Science and Transport, the Austrian Federal Ministry of Environment, Youth and Family and the regional Governments of Tyrol and Vorarlberg.

	<u>Planned (granted) Costs</u>	<u>Effective Costs</u>
Personel Costs	2.195.000,- ATS	1.913.929,- ATS
Hardware/Material Costs	105.000,- ATS	179.598,- ATS
Telecommunication	230.000,- ATS	400.032,- ATS
Room rental rates	600.000,- ATS	600.205,- ATS
Consumables	50.000,- ATS	167.809,- ATS
Sum	3.180.000,- ATS (231.100,- €)	3.261.573,- ATS (237.028,- €)

The personel costs covered salaries and travel expenses for

MOC Director (Herbert Puempel, partially)
Head of Forecasters (Peter Parson)
MOC Operations Officer (Harald Schellander)
MOC Operations Secretary (Claudia Schmid)
Project Secretary (Barbara Berger)
Facility Status Coordinator (Ingo Steinacker)
Network Specialists (on occasion)
21 Student assistants

The personel costs could be kept lower than planned due to additional fundings of Austro Control.

The Hardware and Material Costs, although higher than planned, could be kept extremely low because most of the expensive hardware like workstations or a laser printer were provided by the Zentralanstalt für Meteorologie und Geodynamik and Austro Control.

Telecommunication cost were estimated rather low, as it was intended to use extensively the internet via the austrian academic Network ACONET. Actually the amount of transfered data was so high that in addition some dedicated telephone lines had to be established, e. g. for the daily life briefings between MOC at Innsbruck and POC at Milano. Fortunately international MAP (Eumetnet) funds were provided (little more than 80.000,- ATS), to lower the full costs for us.

Besides the financial funding of the two Austrian Federal Ministries for Science and Transport and Environment, Youth and Family and the two Regional Governments of Tirol and Vorarlberg we are very grateful for the substantial support and assistance of many agencies, companies and innumerable individuals for the enterprise MOC:

AUSTROCONTROL, Vienna and Innsbruck
Institut für Meteorologie und Geophysik, Universität Innsbruck
Institut für Meteorologie und Geophysik, Universität Wien
ZAMG, Zentralanstalt für Meteorologie und Geodynamik, Vienna and Innsbruck
City of Innsbruck
Computer Centre, University of Innsbruck
ACONET, Computer Centre, University of Vienna
Aichner Gerhard Bürotechnik, Innsbruck
Airport Innsbruck
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Telesystem Tirol, Ges.m.b.H. u. Co. KG, Innsbruck
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