



Executive summary

Columbus User Support & Operations Centre in Erasmus

Problem area

With the launch of Columbus in February 2008, the Columbus User Support and Operations concept was implemented. This concept is based on a distributed responsibility of operations support spread over European User Support and Operations Centres (USOCs). In the Netherlands, the Erasmus USOC has been implemented at ESTEC in Noordwijk. The Erasmus USOC is responsible for the operations with the Columbus European Drawer Rack (EDR) and the European Technology Exposure Facility (EuTEF).

Description of the work:

During the last four years, the specification, design and implementation of the Erasmus USOC have been completed and for the last 18 months the operations preparation and training of

operators were completed. The first few months of operations give an impression of the results.

Results and conclusion:

The implementation of the USO concept is evaluated based on the operations performed in the first 6 weeks after the Columbus launch. The EDR has been activated and checked out. The external EuTEF platform carries 9 experiments. The Principal Investigators (PIs) obtain their experiment results via so-called User Home Bases (UHB) in their laboratory environment and can also control their experiment facility from this UHB.

Applicability:

This paper is applicable for the evaluation of the operational performance of the Erasmus USOC.

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Report classification

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Space

Descriptor(s)

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Operations
User support

Columbus User Support & Operations Centre in Erasmus

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NLR-TP-2008-199

Columbus User Support & Operations Centre in Erasmus

Z. Pronk, P.G.J.P. Dujardin and A.J. Kramer

This report is based on an presentation held at March 28th, 2008, on a NL Micro-Gravity Platform Symposium.
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Summary

With the launch of Columbus and the attachment to the International Space Station (ISS) early February 2008, the Columbus User Support and Operations concept was implemented.

This User Support and Operations (USO) concept is based on a distributed responsibility of operations support spread over European User Support and Operations Centres (USOCs), which concept was already initiated about 20 years ago.

In the Netherlands, the Erasmus USOC has been implemented at ESTEC site in Noordwijk.

The Erasmus USOC is responsible for the operations with the Columbus European Drawer Rack (EDR) and the European Technology Exposure Facility (EuTEF).

The external EuTEF platform carries 9 experiments. The Principal Investigators (PIs) obtain their experiment results via so-called User Home Bases (UHB) in their laboratory environment. They can also control their experiment facility from this UHB. With this concept the PI gets a direct connection with his/her experiment, which was one of the objectives of the USO implementation.

The role of the Erasmus USOC in the concept will be explained.

Samenvatting (in dutch):

Met de lancering van Columbus in februari 2008 is ook het USOC concept operationeel geworden.

Dit USOC concept werd al 20 jaar geleden geïntroduceerd.

Voor Nederland is een USOC opgebouwd in het Erasmus gebouw bij ESTEC, Noordwijk.

De Erasmus USOC is verantwoordelijk voor de operaties met de European Drawer Rack (EDR) en de European Technology Exposure Facility (EuTEF). Het externe EuTEF platform 'draagt' 9 experimenten. De Principal Investigators (PIs) voor de experimenten krijgen hun gegevens via een User Home Base (UHB) op hun laboratorium. Maar ze kunnen ook het experiment besturen. Met dit concept krijgt de PI bijna een directe verbinding met zijn/haar instrument. De rol van de Erasmus USOC en het USOC concept worden toegelicht.

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1 Introduction

At March 28th, 2008, an NL Micro-Gravity Platform Meeting was organised at NIVR, Delft. The objective of the meeting, organised as a symposium, was to exchange information between the various people working in the area of micro-gravity research, investigators/scientists in the areas of Physical science, Biology, and Technology, and people working in User support, policy, and future programmes.

NLR was invited to give a presentation on User Support, based on the experiences obtained from the operations performed in the Erasmus User Centre.

The presentation was prepared by the NLR operations support team, consisting of Paul Dujardin, Arjan Kramer and Zeholy Pronk. The presentation was given by Zeholy Pronk. In appendix A the daily programme is given.

In summary the presentation addressed the following:

With the launch of Columbus in early February 2008, the Columbus User Support and Operations concept was implemented.

This User Support and Operations (USO) concept is based on a distributed responsibility of operations support spread over European User Support and Operations Centres (USOCs), which concept was already initiated about 20 years ago.

In the Netherlands, the Erasmus USOC has been implemented at ESTEC site in Noordwijk. The Erasmus USOC is responsible for the operations with the Columbus European Drawer Rack (EDR) and the European Technology Exposure Facility (EuTEF).

The external EuTEF platform carries 9 experiments. The Principal Investigators (PIs) obtain their experiment results via so-called User Home Bases (UHB) in their laboratory environment. They can also control their experiment facility from this UHB. With this concept the PI gets a direct connection with his/her experiment, which was one of the objectives of the USO implementation.

The role of the Erasmus USOC in the concept will be explained.

The slides of the presentation are given in Appendix B.



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Appendix A Programme NL-Gravity Platform meeting

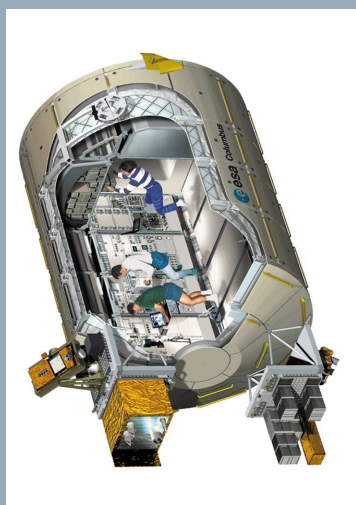
Programma NL- Gravity - Platform meeting. Delft, 28 Maart 2008



	Naam	Korte Title
09:30-09:55		Koffie
09:55-10:00	W. vd. Meulen / J. van Loon SRON / R. de Groot	Welkom Chairman
		Physical Sciences
10:00-10:15	A. Flikweert / G. Kroesen	Metal-halide lamps under varying gravity conditions measured by emission and laser absorption spectroscopy
10:15-10:30	R. Luppés	Sloshsat FLEVO: Experiments And Simulations Compared
		Human Physiology
10:30-10:45	A. Pool-Goudzwaard	Low Back Pain in Micro Gravity
10:45-11:00	E. Groen	The influence of micro- and hypergravity adaptation on the optokinetic system / Desdemonia
11:00-11:15	J. van Loon	A Large Radius Human Centrifuge
11:15-11:30		Koffie
11:30-11:45	L. Breebaart et al.	Crew Assistance for Long-Duration Missions
		Biology
11:45-12:00	J. Krooneman/ I. Dinkla	Bioanalysis
12:00-12:15	M. de Geest / J. Boonstra	Influence of gravity on cellular architecture and dynamics
12:15-12:25	S. van Tongeren	Molecular detection of microbes on the ISS: The SAMPLE experiment.
12:25-12:35	M. de Goffau	Modeling of microbial growth in spacecrafts
12:35-12:50	J. Vos	The Role of Gravity and the Cell Wall in Setting up Cytoskeleton-based Polarity in Plant Cells
12:50-14:00		Lunch
		Biology / Technology / User Support
14:00-14:15	P. Ehrenfreund	Evolution of organic matter studied on the Expose facility onboard ISS
14:15-14:30	E. Langerak	New developments for biological experiment units
14:30-14:45	G. Borst	Fluorescent microscopy on the RPM.
14:45-15:00	B. Pellis	Centrifuge Development for Small Rodent Research Facility (MIS)
15:00-15:15	Z. Pronk	Columbus User Support & Operations Centre in Erasmus
		Policy / Future Programs
15:15-15:30	W. vd Meulen	Roadmap "Netherlands Microgravity Research"
15:30-15:45		Thee / Koffie
15:45-16:15	M. Heppener	ESA's ELIPS-ARISE programme
16:15-16:30	R. de Groot	Microgravity en het Nederlandse ruimtevaartbeleid
16:30-16:45	W. vd. Meulen / J. van Loon	General discussion / Closing
16:45 - ++		Drinks



Appendix B Slides of the presentation



Nationaal Lucht- en Ruimtevaartlaboratorium
National Aerospace Laboratory NLR



Columbus User Support & Operations Center in Erasmus

Zeholy Pronk

NLR, Aerospace Systems & Applications

Space Department

Coordinator projecten Ruimte Utilisatie en Operaties

ERASMUS USOC Increment operations coordinator

28 Maart 2008



Overview**Overzicht**

- **USOC concept**
- **USOC concept applied to ISS Columbus**
- **Erasmus USOC**
- **Erasmus functions and facilities**



ISS Columbus; USO concept

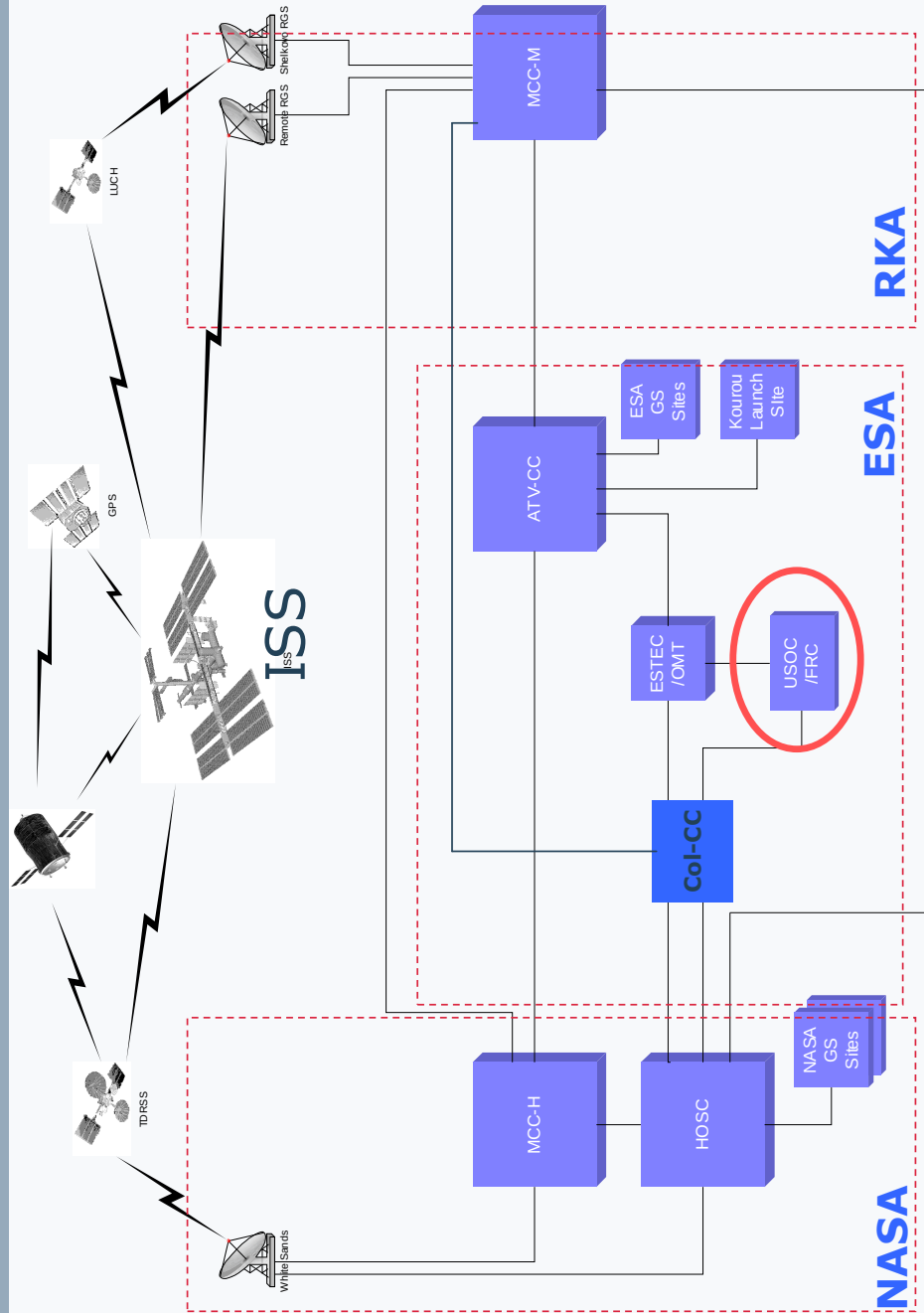
USO concept born +/- 20 years ago:

- large variety of possibilities for micro-g expts
- concept for decentralised utilisation and user support
- all PL/Expt assigned to a USOC

USOC task:

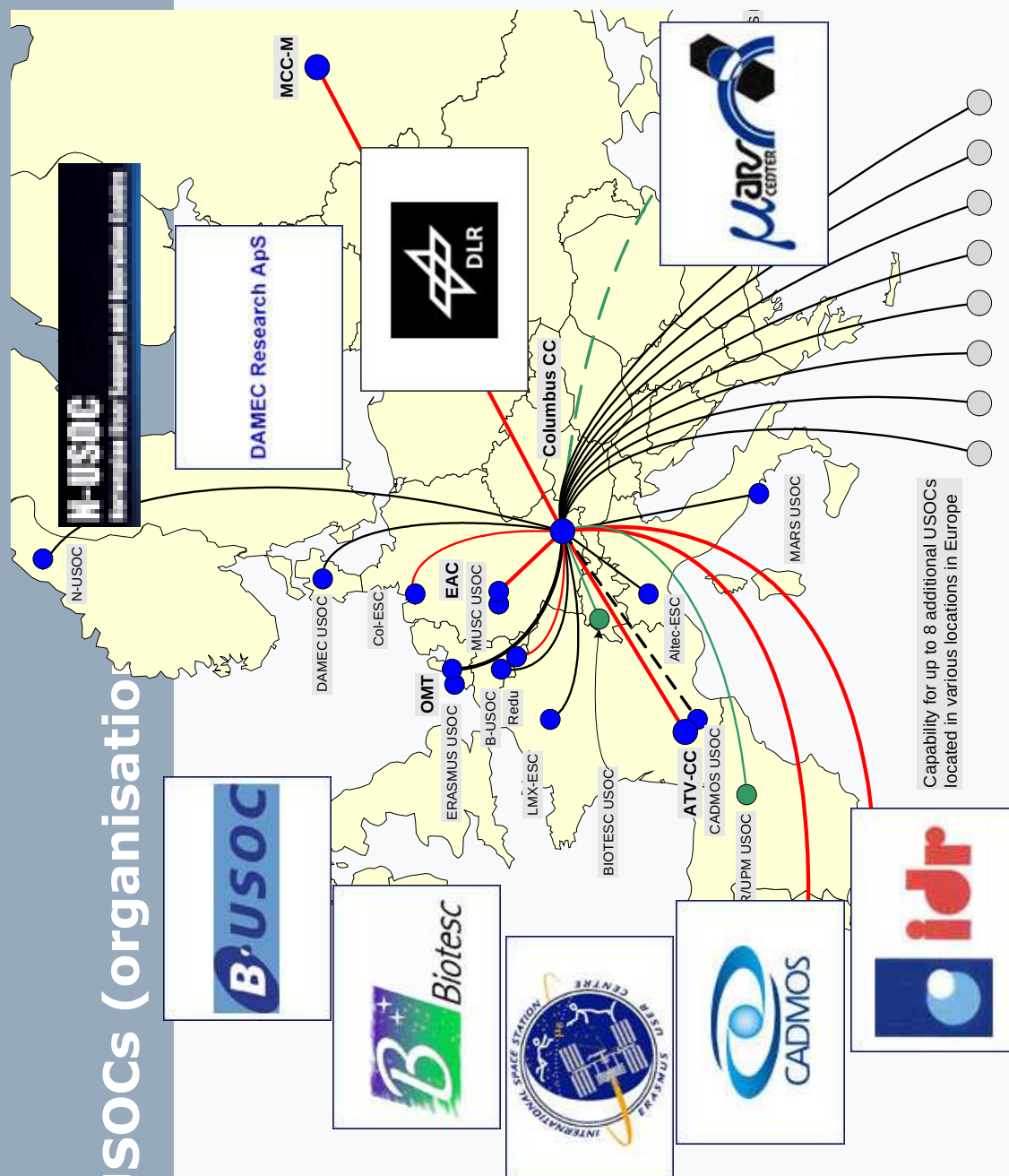
- Strategic and tactical planning
- Payload integration
- Preparation of payload operations
- Training of operations, operators
- RT Planning of payload operations
- Execution of payload operations
- Evaluation of operations
- Payload logistics, maintenance, configuration control

ISS Columbus; Infrastructure



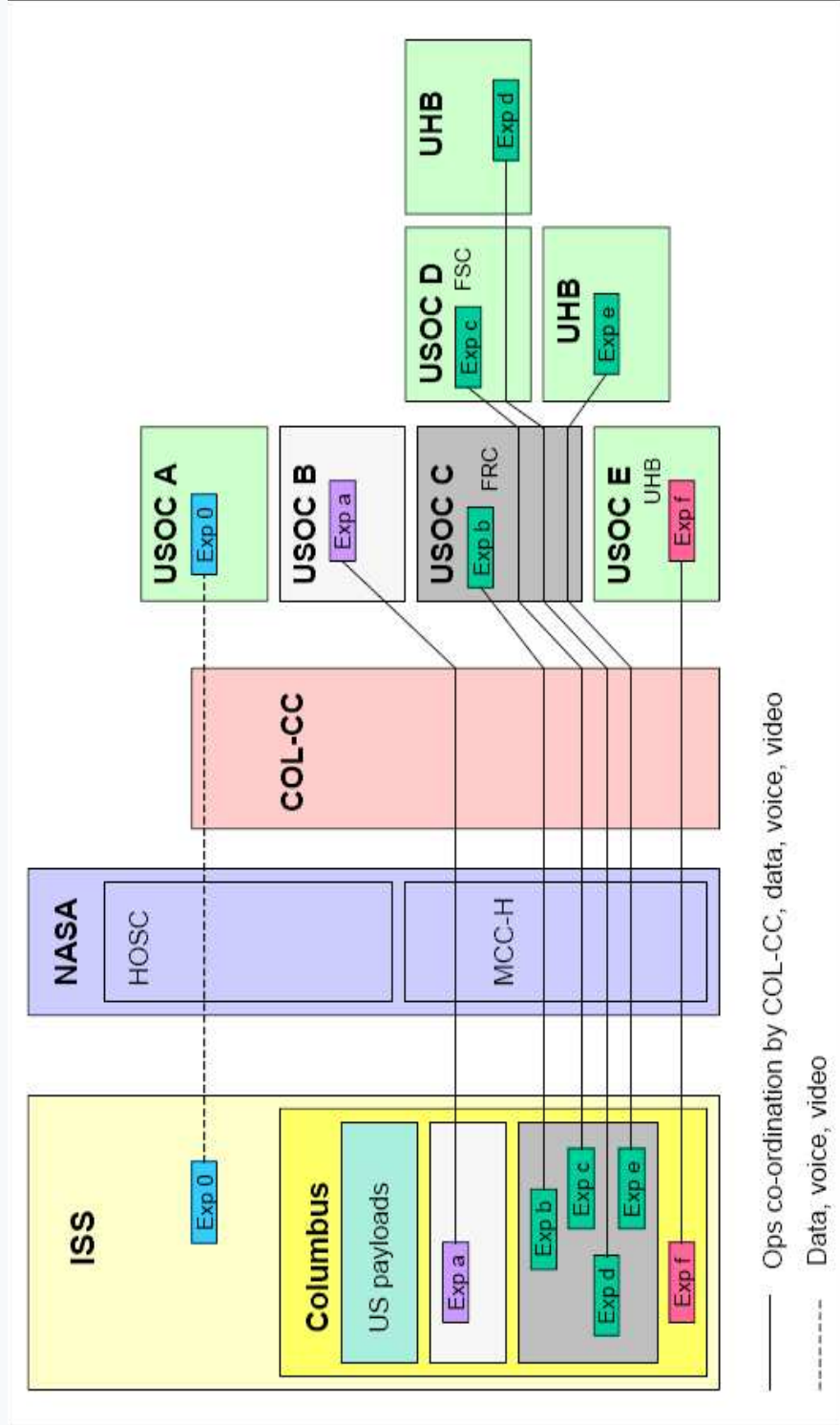
USCS

ISS USOCs (organisations)





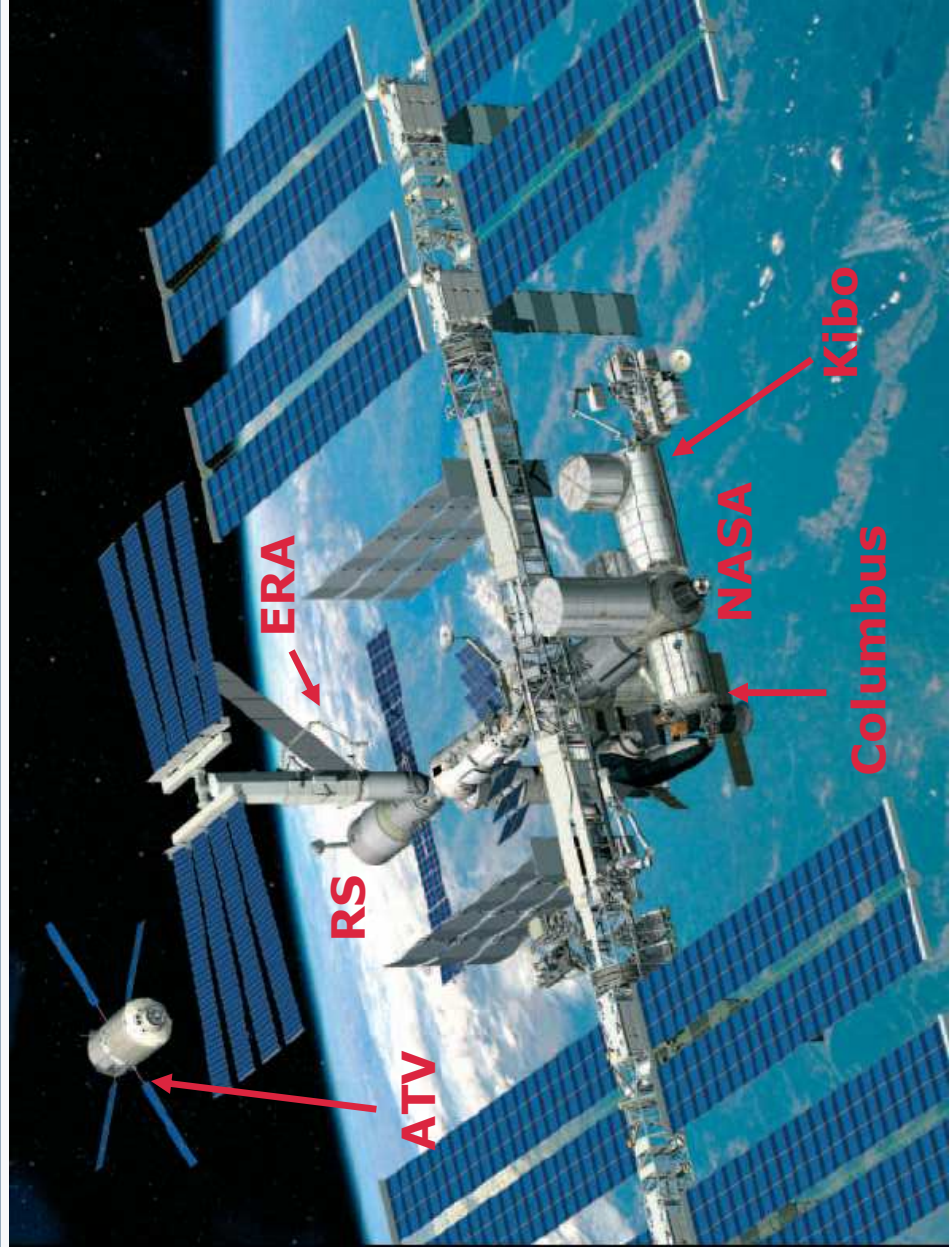
ISS USOCs (Experiment & Payload assignment)





International Space Station (ISS)

SSI



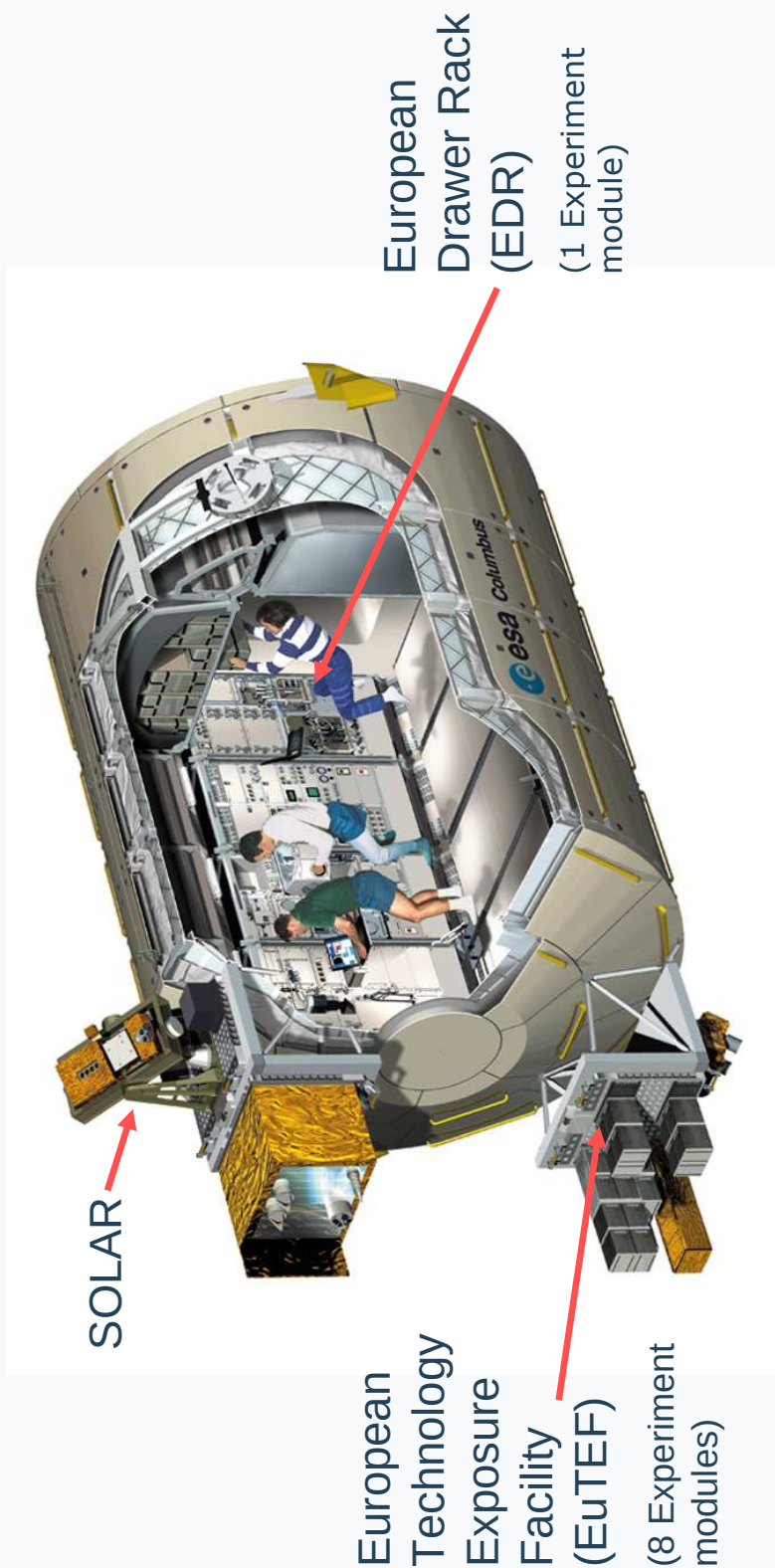
28/03/2008

7

ISS Columbus (launched 07-02-2008)



Columbus: 5 internal racks; 2 external facilities



ISS Columbus



ISS Columbus USOCs

Erasmus USOC is one of the nine European USOCs.

the geographical distribution for support to Micro-gravity research:

- Biology: MUSC (D) + BIOTESC (Zw)
- Physiology: CADMOS (Fr) + DAMEC (DK)
- Fluid physics: MARS (I) + IDR/UPM (Sp)
- Material science : MUSC(D)+CADMOS (Fr)
- Plant researh: N-USOC (No)
- Miscellaneous: B-USOC (B)
- Miscellaneous: **Erasmus USOC** (NL/B)

Erasmus built up and operated by Dutch/Belgium consortium.

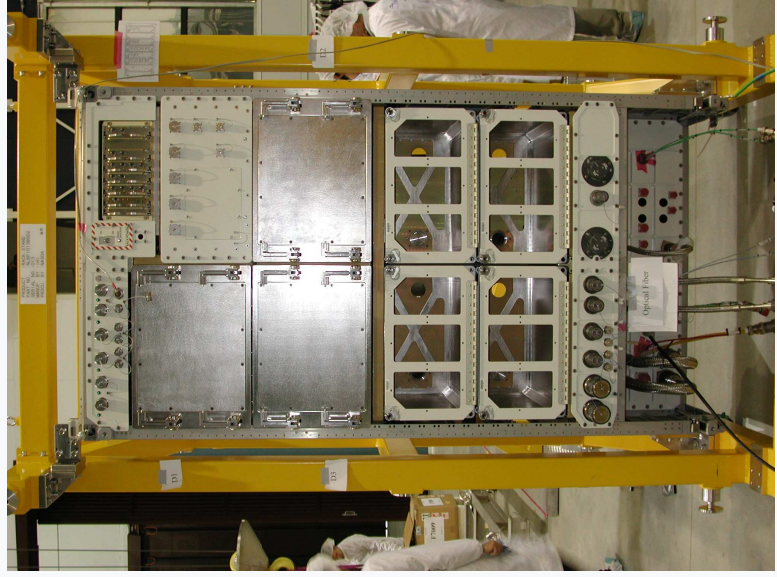
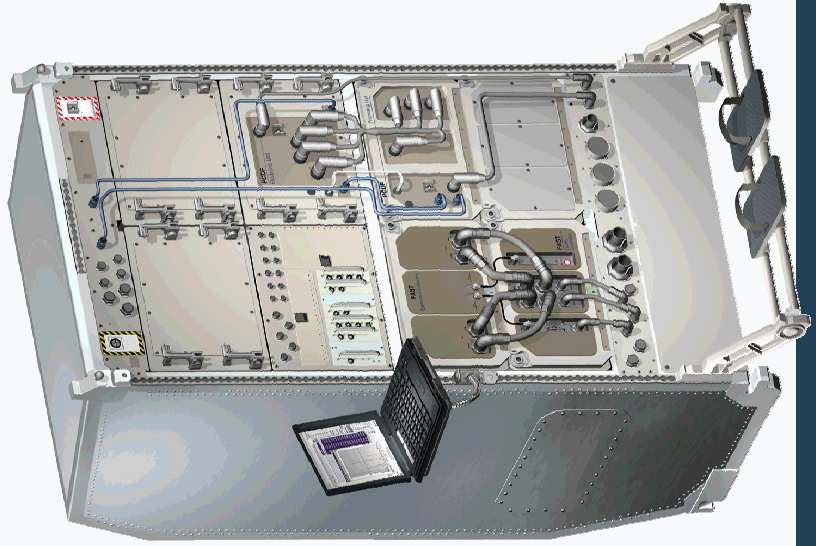


ISS Columbus (European Drawer Rack, EDR)



Experimenten:

- EDR: Protein Crystallization Diagnostic Facility (PCDF)



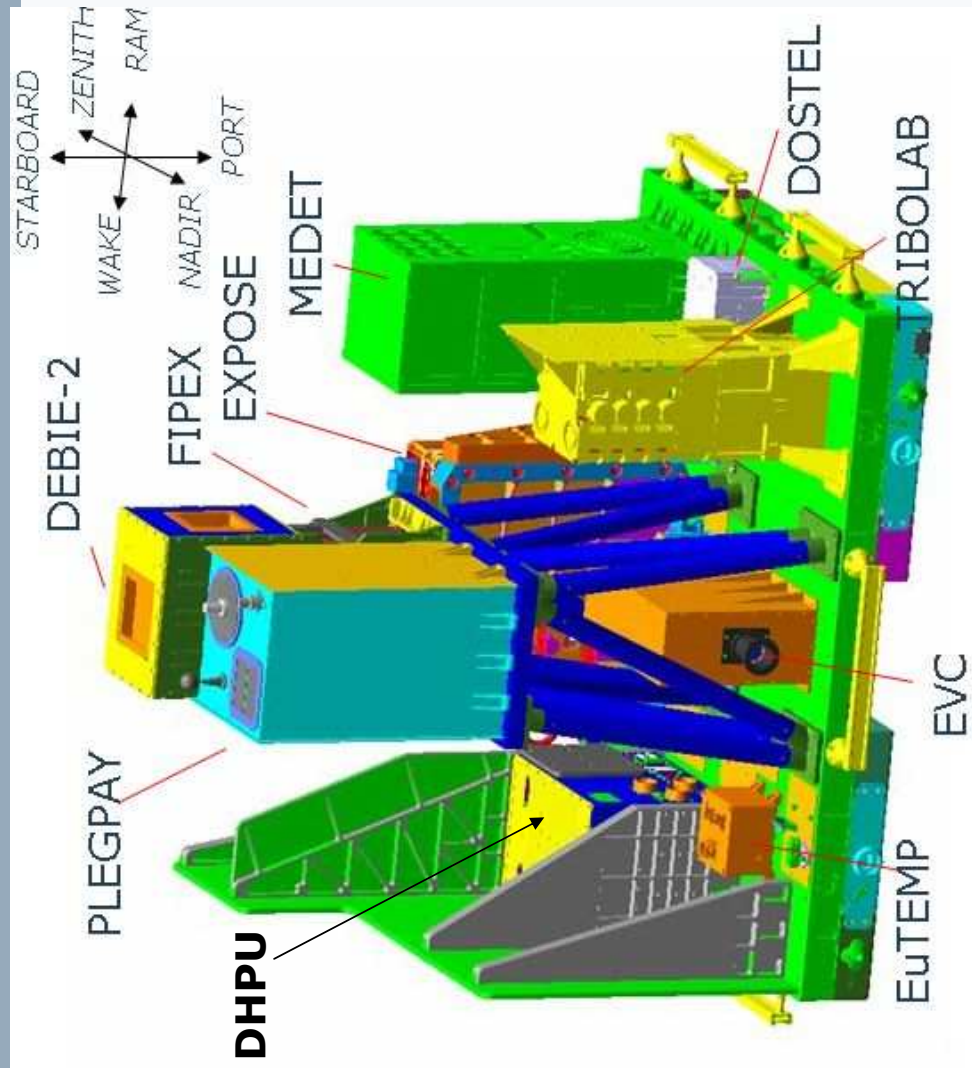
ISS Columbus (EuTEF)

European Technology

Exposure Facility (EuTEF)

Experiments:

- EuTEF: 9 experiments
- Data transfer to PIs
- User Home Bases
- commanding possible from UHB



Erasmus USOC

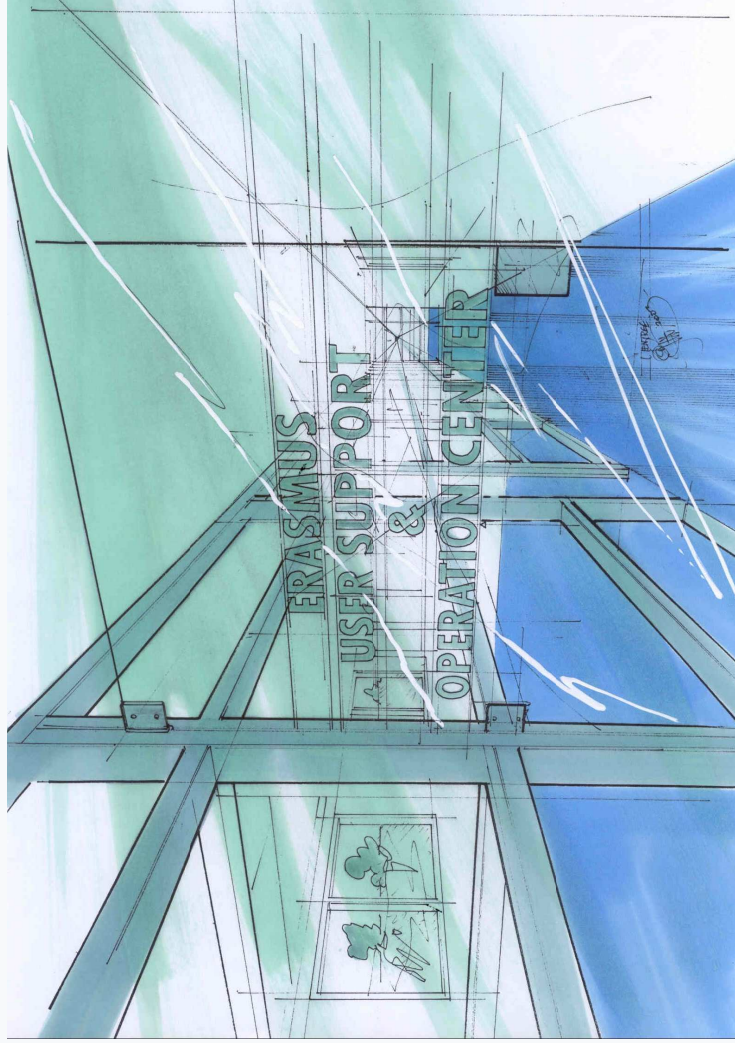
ISS Columbus; Erasmus USOC



Erasmus USOC was built and is operated by:

- **SAS/Belgium**
- **NLR/NL**

Note: already used for operations support in the DELTA mission with Andre Kuipers.





ISS Columbus; Operations room

Erasmus USOC



28/03/2008

14

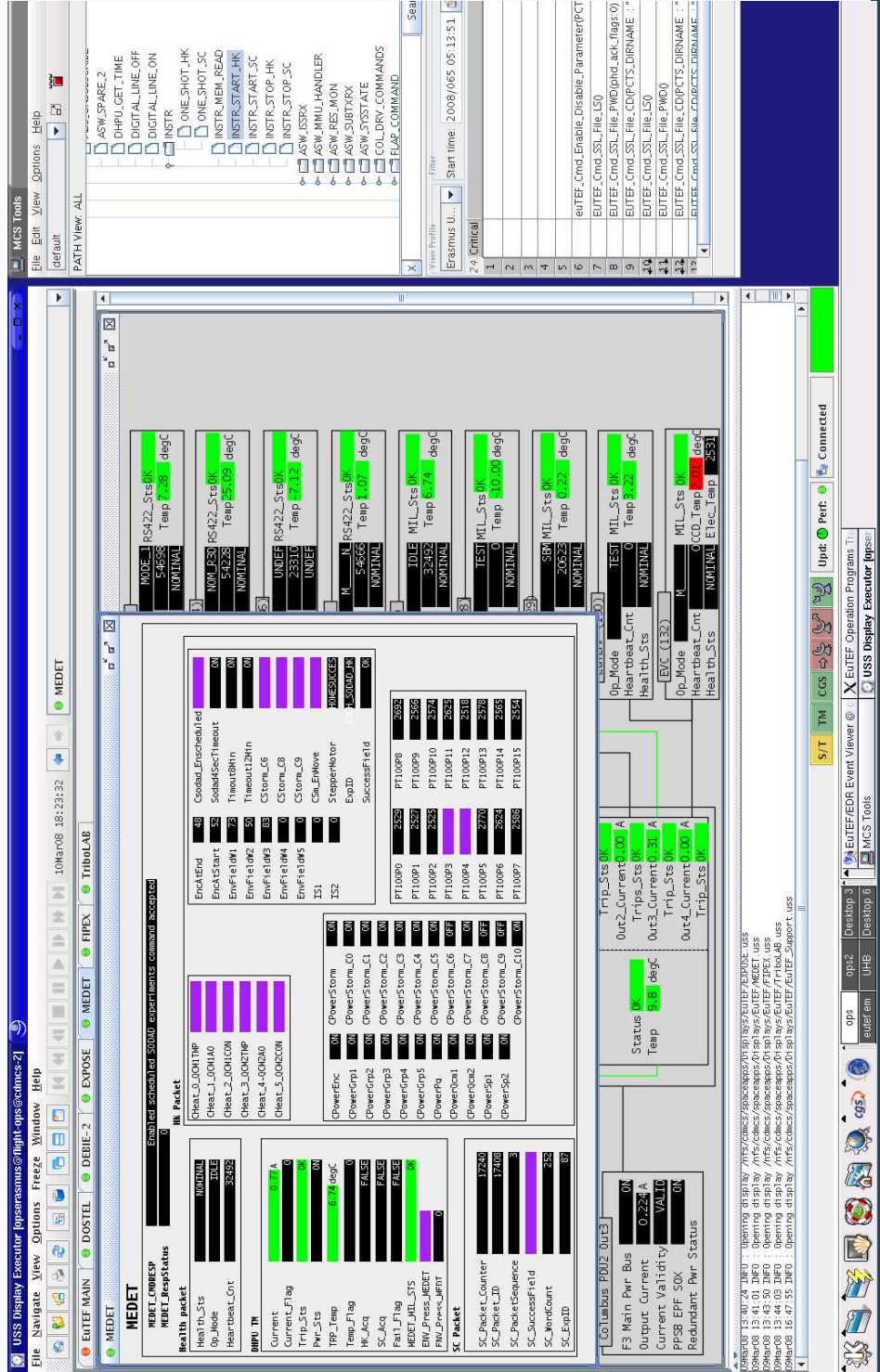
Erasmus
USOC



Erasmus USOC Operators Roles



ISS Columbus/EuTEF Display



MCS Tools
File Edit View Options Help

default View Profile

PATH View: ALL

- ASW_SPARE_2
- DHPU_GET_TIME
- DIGITAL_LINE_OFF
- DIGITAL_LINE_ON
- INSTR
- ONE_SHOT_HK
- ONE_SHOT_SC
- INSTR_MEM_READ
- INSTR_START_HK
- INSTR_START_SC
- INSTR_STOP_HK
- INSTR_STOP_SC
- ASW_ISRXX
- ASW_MMU_HANDLER
- ASW_BES_MON
- ASW_SUBTFRX
- ASW_SYSSTATE
- COLD_DRY_COMMANDS
- FLAP_COMMAND

Stack Control
Enable Send Disable

RT Consistency

Level: 8

Erasmus U. ...

View Profile

Start time: 2008/06/05 05:13:51

Source Host: ...

Filter

View Profile

Erasmus U. ...

2-4 Critical

Stack Status	FSC	FRC	DAS	MCS	A	B	C	D	OB Result	PDF-Acct/EUT-EN
DISABLED									0	2008/070 18:14:30
DISABLED									0	2008/070 18:13:41
DISABLED									0	2008/070 18:12:34
DISABLED									1	2008/070 18:10:30
DISABLED									0	2008/070 18:06:07
									0	2008/070 17:50:42
									0	2008/070 17:50:09
									0	2008/070 17:49:53
									0	2008/070 17:49:39
									0	2008/070 17:47:26
									0	2008/070 17:47:00
									0	2008/070 17:46:44
									0	2008/070 17:45:40

HAZ OPS TMS CCS

View Profile

Start time: 2008/06/05 05:13:51

Source Host: ...

Filter

View Profile

Erasmus U. ...

2-4 Critical

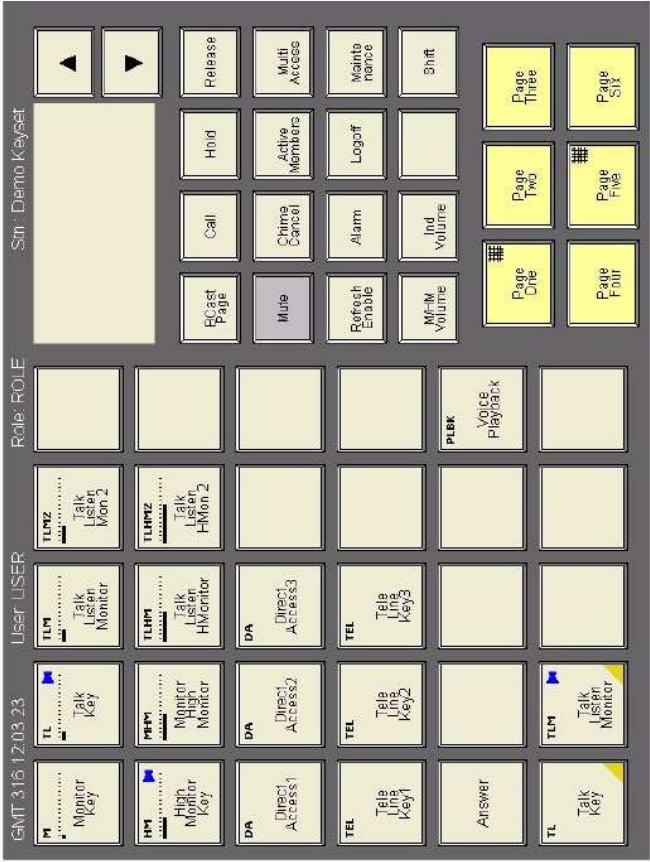
Stack Status	FSC	FRC	DAS	MCS	A	B	C	D	OB Result	PDF-Acct/EUT-EN
DISABLED									0	2008/070 18:14:30
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DISABLED									0	2008/070 18:06:07
									0	2008/070 17:50:42
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									0	2008/070 17:49:53
									0	2008/070 17:49:39
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HAZ OPS TMS CCS

ISS Columbus; Operation support tools



Tools: ➤ Voice keyset

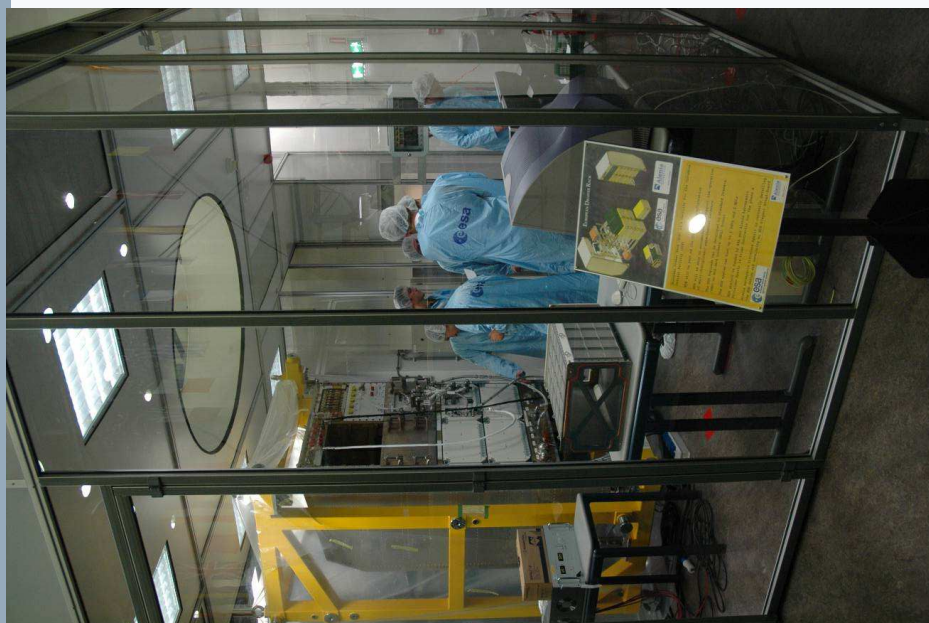


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Role ERASMUS-OPS		Status Current		Version 2.2			
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M	RS ISS VHF-1	M	RS ISS VHF-2	TLM2	TLM2	LIS COORD 1	EUROCOM
M	1 A/G 1	M	1 A/G 2	TLM2	TLM2	CECOF	COL OPS PLNR
TLM2	ERASMUS OPS	M	TRANS RUS/ENG				COL COORD 1
TLM2	ERASMUS SCIENCE			TLM2	TLM2	ESA SCI 1	
TLM2	ERASMUS CONF	TLM2	CAD MOS OPS			ESA SAFETY	
TLM2	ERASMUS GC			TLM2	TLM2	B-USOC OPS	ESA PLAN
ANSW	ANSWER	TLM2	IGS COORD				
		TLM2	IGS PROBLEM COORD				
		TLM2	IGS PLAN COORD				
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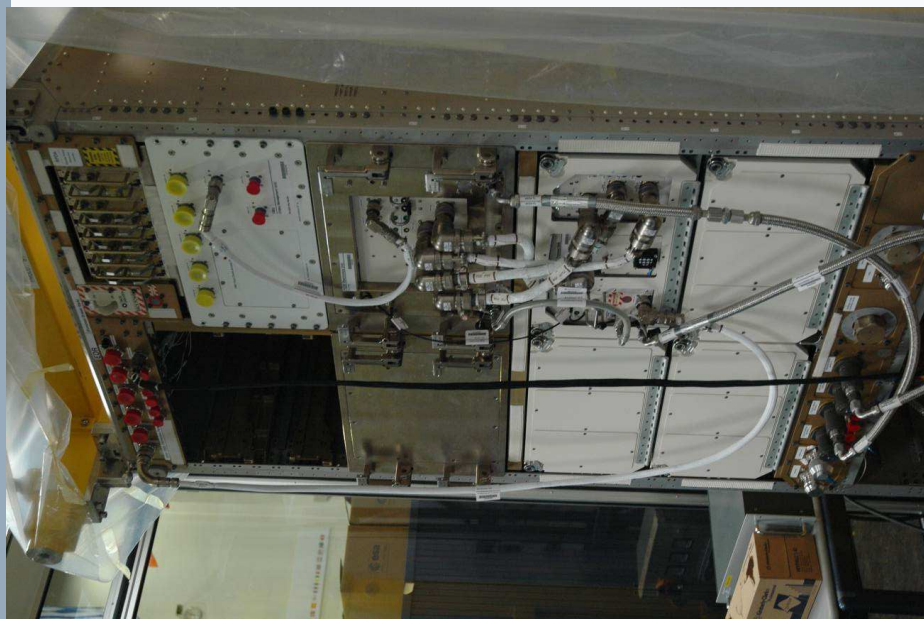
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ISS Columbus; Facilities



Clean room

EDR-EM





Status

Ater launch of Columbus:

- EDR activated and tested; waiting for PCDF (end 2008)
- EuTEF activated and tested
- ETF instruments activated and tested
- running EuTEF science

Future:

- SODI-COLOID (2009)
- FASTER in EDR (2009?)
- FRC for MSG ?

EDR Erasmus USOC is ready as FRC, FSC en UHB to support facility and experiment operations.

Acknowledgement to NLR-Erasmus operators:

- Paul Dujardin
- Arjan Kramer

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