

Instrument Automation and transfer to MOC

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UG#19 (17 May 2018): Last slide from M. Kirsch

future improvements

(after the 2016 Decision by OPS-O and SRE-O to merge the Spacon teams accepting a decrease in science performance on XMM/INT)

- Ground station hand over will be automated via MOIS
-> less conflicts with Gaia
- XMM Antenna hand over will be automated via MOIS
-> less conflicts with Gaia
- **Instrument recoveries might be operated by the SPACON if sufficiently automated or eventually fully automated ...**
(especially important for very long observations during weekends)
-> **potential science re-gain**

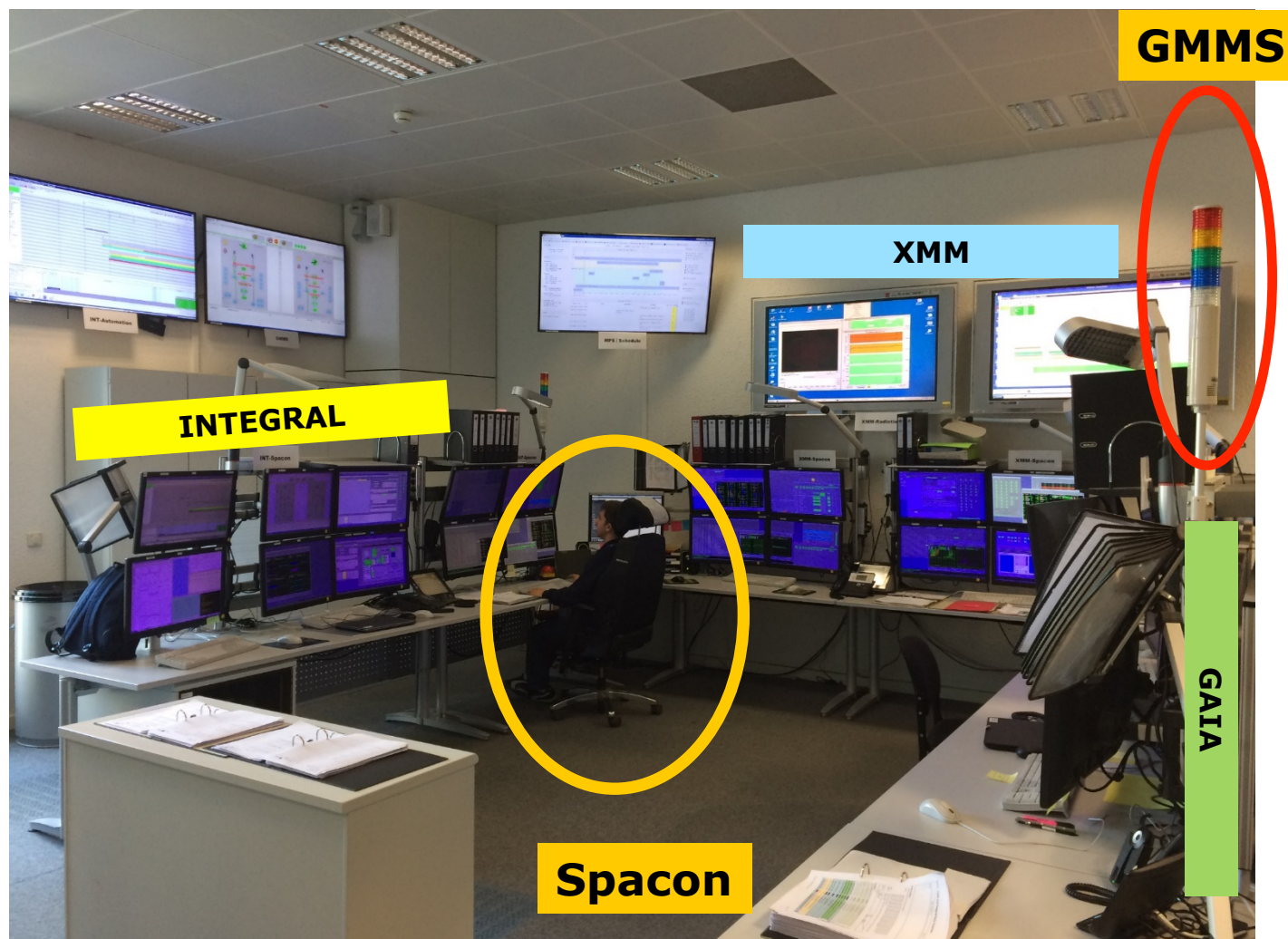
New real time operation scenario



- Since 11th April 2018 a single Spacon carries out the real time operations of Integral, XMM and Gaia (IXG Spacon)
- The Spacon operates the three satellites' platforms.
- In case of overlapping actions, Gaia takes precedence over the other missions, and XMM over Integral, except for some specific situations like eclipses, emergencies, etc.
- The main change for the Instruments is the frequency of the manned support:
 - Safe the instruments still done immediately
 - Recover the instruments and re-join the science may be delayed to the next normal office working time (hours or days)



New real time operation scenario



New real time operation scenario



- Now the Spacons can operate the instruments for safety 24/7, but they are not trained to recover the instruments
- MOC *Operations Analyst* is on call for special/critical observations but for a limited number of days per month (agreed with the SOC)
- 2x0.5 MOC instrument engineers in place as of January 2019 (still being trained on procedures)
- MOC-SOC teams working together on mitigation:
 - 121 new procedures
 - 93 procedures updated
 - 52 Operations Database change requests and 3 releases.
 - 14 new Rules and Constraints Files
 - 7 new MOIS (Manufacturing and Operations Information System)
“**automation** (on ground) **procedures**” to put the instruments back to science mode



Automation (MOIS)



New **MOIS** re-join procedures

Re-join means :

Set the instrument mode to the one scheduled

- The instrument is safe but not synchronised with the planning
- **Applicable only** to standard/well understood cases:
 - High radiation
 - Slew failure
 - Antenna link drop

Automation (MOIS)



In case of an incident, the Spacon has to identify whether it is one of the “standard/well understood cases” and then MOIS automated re-join procedure can be triggered:

1. It is able to perform telemetry readings, send commands and access the revolution schedule.
2. It reads the current instrument status from the telemetry, identifies the planned configuration at that time and commands the instrument to the required mode, checking the result of every command. It can also handle external circumstances as ground station hand-overs etc.
3. It works as a “send and forget” set of commands



Automation (MOIS)



New **MOIS** re-join procedures

- ✓ PN procedure is operational since 20 March 2019 and has been executed by the Spacons several times successfully
- ✓ RGS 1 are on final testing & RGS 2 (a simply adaptation of RGS 1 and hence much less testing required) will go immediately after → Operational mid-end of May
- ✓ MOS 2 is under initial testing & MOS 1 will go immediately after (like RGS 1&2) → Operational in June
- ✓ OM procedure will start as soon as RGS and MOS procedures are operational → There is already a quasi-automatic procedure for OM in which the Spacons can do it manually following a couple of procedures. Already successfully executed.



Instrument R/T Operations transferred to MOC in 2020

- Automatic procedures:
 - MOIS automatic re-join procedures (after the three standard cases) for all X-Rays instruments operational before summer 2019
 - OM automatic re-join procedure will start immediately after
 - New versions of the current procedures are foreseen
- Full plan from May to end of the year to train the MOC SOEs on instruments is in place:
 - By SOC instrument experts
 - By the MOC XMM-Newton Operations Analyst
- On call service will be provided by ESOC (SOC Instrument experts will continue giving support) as of 2020.