INTEGRAL
Operational Cost Reductions – a Reminder

Peter Kretschmar
INTEGRAL Mission Manager

Historical manpower evolution

- Increased pressure on costs with ongoing extensions (like every mission). Major changes:
  - SOC reduced first in 2005, when moving to ESAC (12 → 8.5 FTE).
  - MOC reduced from Jan 2008 by merging with XMM-Newton MOC (about -4 FTE, now ~12.5).
  - Major cost saving plan devised in 2013, **affecting scientific performance** with SOC reduced to 4.5 FTE in 2015 (NB: E. Kuulkers 50% Project Scientist, C. Sanchez planned to be assigned 50% to ASTRO-H).
- Instrument teams and ISDC have also seen reductions, mainly affecting response to anomalies (thankfully few) and software development.

2013 Savings Plan

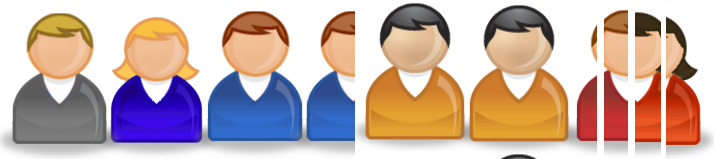
- From 2013 on:
  - Reduced industrial support. Use internet to ISDC, etc.
  - Remove explicit contingency from budget.
  - **No scientific observations while SPI annealing** (*revised later, no real savings*).
  - **No ToO support on weekends and holidays.**
- From 2014 on (additional to the above):
  - Stop industrial support contract.
  - Reduce engineering effort at MOC.
  - Project Scientist support reduced to 50% (E. Kuulkers shares).
  - **Abandon AO's for data rights proposals.**
  - **Freeze INTEGRAL archive development at ESAC** (rely on ISDC).
- From 2015 on (additional to the above):
  - Share SPACONS with Gaia, if possible (TBC when this could be done).
  - **Reduce support for special observations at SOC.**
  - Reduce software support at SOC to 1 FTE.

SOC staff evolution – 2013 to 2015

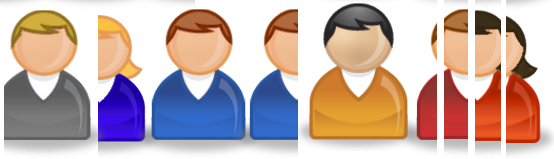
- 1 scientist (MCB) left early July 2013. No replacement sought, due to savings measures.
- EK 50% Project Scientist, 50% Operations Scientist since September 2013.
- Freeze of Archive development since October 2013.
- 1 software engineer left end August 2014, no replacement sought.
- Sharing of 1 scientist for 25% then 50% with ASTRO-H.
  Management 10% occupied with ASTRO-H from 2015.
- Projected savings achieved (even too quickly).

ISOC team & support early 2013

ISOC team & support end 2013



ISOC team & support from 2015



Adaptions in GS to saving exercises

- Small efficiency efforts ongoing almost continuously, like fewer hardware items, shared software licenses, reduced support in various areas etc.
- In 2005 SOC went from development/early operations to routine operations support.
- In 2007/2008 INTEGRAL and XMM-Newton teams at MOC were partially merged. This required large re-training, but was very efficient as SpaCons can be shared well. Main risk is lower priority for INTEGRAL if both satellites affected at the same time.
- Engineering and Flight Dynamics support at MOC has been somewhat reduced compared to past, since operations have become routine.
- 2013-2014 exercise has forced SOC to significantly reduce effort, e.g., by no longer covering weekends & holidays; less effort on AO process; mainly freezing documentation and less support for special observations (complex calibrations, Earth Observations, …). Ongoing process to streamline SOC operations further.
- Further SpaCon savings foreseen, but not yet realized.
- Generally, safety margins (industry contract, leased lines) have been taken out and risk for service interruptions of few days is accepted.

Saving Options from 2013 exercise

- **No science during SPI annealings** (less ground station usage): Short-term effect on budget, as rates for ground stations increased to cover their fixed cost. Also increased effort for operations at MOC.
- **Remove contingency from budget:** Immediate book-keeping reduction.
- **Alternative ground stations:** Explored options in Ireland and Russia, but to no avail. Original investment prohibitive for Ireland. Unclear cost situation for Russia.
- **Reduce engineering effort at MOC:** Slight reduction done
- **Suspend ESA archive development:** done
- **Reduce Project Scientist support:** done (E. Kuulkers 50% replaced C. Winkler 100%)
- **SOC sharing with XMM-Newton:** studied in detail previously, would need also significant change in XMM-Operations to give any savings.
- **INTEGRAL as a Survey Mission:** not done, but reduced SOC manpower for simplified AOs already.
- **Sharing SPACONS with Gaia:** foreseen, but not yet implemented.