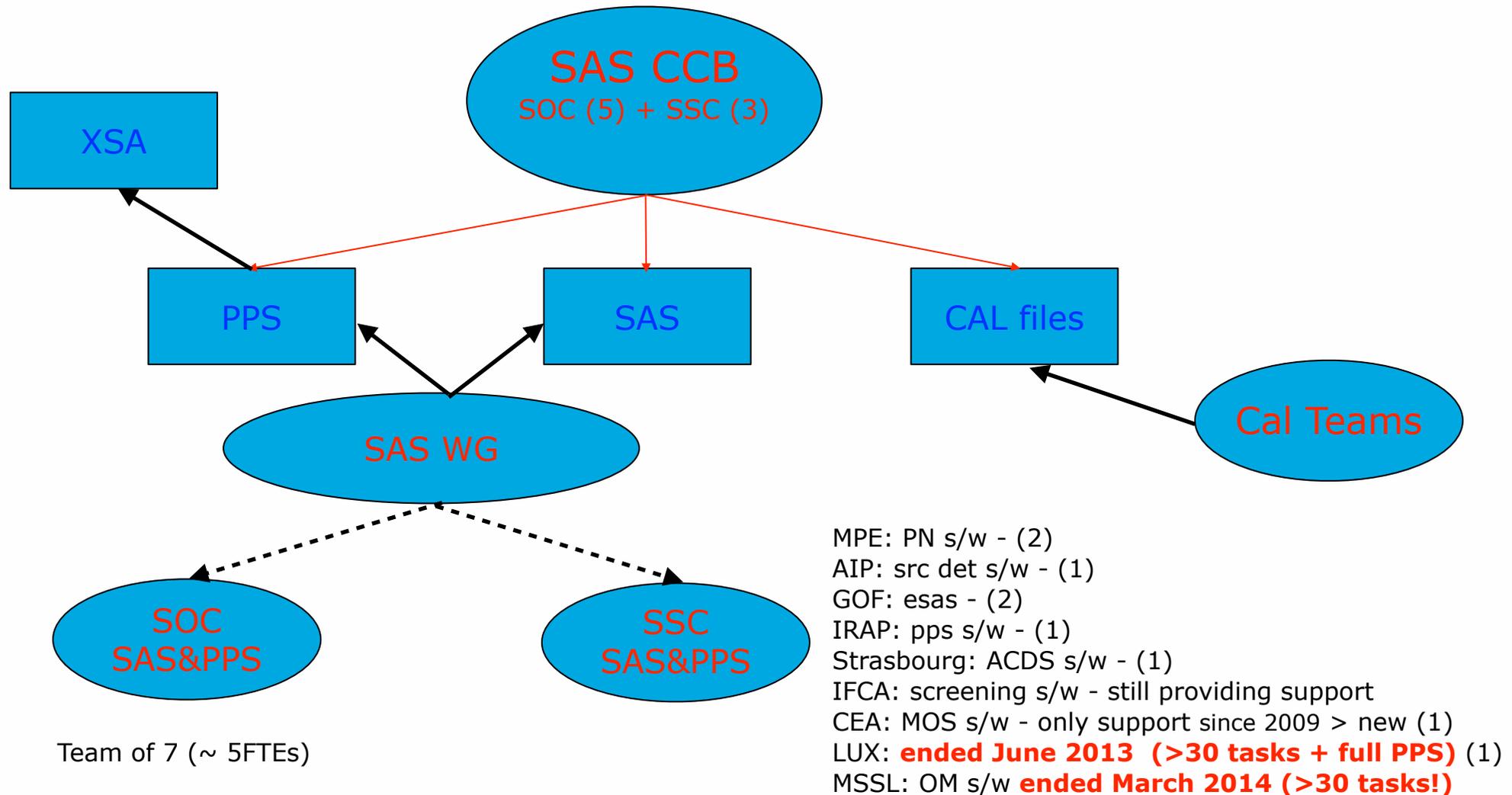


SAS development and maintenance

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XMM-Newton Science Operations Centre – ESAC / ESA

*on behalf of a lot of people (SAS & PPS Team, SAS WG, ...)



SAS 14.0 released on 10/11/14 - Main changes



EPIC

- new task `eimageget /combine` (bck subtr., exp corrected img) > data combination
- new task `eprejectti` > specific pn Timing mode soft flare flagging
- pn energy scale offset correction > solving discrepancy between single and double events
- time dependent line widths in pn spectra > correction function for singles, doubles and S+F RMFs
- pn long term CTI correction - parameter extension > 4th order polynomial instead of 3rd order
- RDPHA default for Timing Mode > better calibration
- *pn quiescent background dependent gain* > use of discarded lines number as indicator (not activated)
- EPIC effective area correction factors > new extension in `XRT[123]_XAREAEFF`
- new `epicproc` parameter: *withdefaultcal* > making user's life easier
- enhancement of `emosaicprep` (usage of `preggti`) > correct separation of single points

RGS

- default wavelength corrections: *heliocentric + S.AspectAngle* > velocities wrt solar rest frame

OM

- whole of the s/w used for OM catalogue production > aligning with catalogue
- fixed several bugs related to 64bit

SAS 14.0 released on 10/11/14 - validation



+ several small bug fixes: 103 tasks upgraded - 273 sub-version changes

+ **New compiler: gcc 4.8.2**

XMM-Newton

Thorough validation necessary (“(4+1)way”):

- standard set through *procs & chains* > IA
- X-cal DB fully reduced > comparisons
- standard set through test PPS (SAS 14 based)
- strict data reduction with the Threads
- +
• dedicated data reduction for new / special S/W

XMM-Newton Science Analysis System 14.0 scientific validation

XMM-SOC-USR-TN-0025 Issue 1.0

C.Gabriel, I. de la Calle, A.Ibarra, R.González-Riestra,
M.Guainazzi, E. Ojero, J.V. Perea, P. Rodríguez,
R.Saxton, M. Smith, M.Stuhlinger, A.Talavera

XMM-Newton Science Operations Centre

13 January 2015

>> several people involved in 6 weeks process

This time, special effort by the EPIC team

+ several calibration release notes

Parameter space = $N_{\text{tasks}} * N_{\text{parameters}} * N_{\text{running-modes}} * N_{\text{platforms}}$

- “(4+1) way” helps with $(N_{\text{tasks}} * N_{\text{parameters}})$
- harness tests are **ESSENTIAL** for $(N_{\text{tasks}} * N_{\text{platforms}})$
 - >> Need for ALL tasks having serious harness testing (and if parameters are tested much better)
- IA work with different running modes

Furthermore some tasks required dedicated scientific validation:

- ESAS does not have harness testing
- eimageget / eimagecombine new

SAS 14 release - binaries



	OS	Kernel	libc
Linux 32:	RHEL 5.8	2.6.18	2.5
	Ubuntu 14.04 LTS	3.13.0	2.19
	Fedora 20	3.11.10	2.18
	SuSE 13.1	3.11.6	2.18
Linux 64:	RHEL 5.8	2.6.18	2.5
	Ubuntu 13.10	3.13.0	2.19
	Fedora 20	3.11.10	2.18
	SuSE 13.1	3.11.6	2.18
MacOS:	MacOS 10.8.3 (M. Lion)	Darwin 12.5.0	169.3.0
	MacOs 10.9 (Maverick)	Darwin 13.5.0	1197.1.1
	MacOS 10.10 (Yosemite)	Darwin 14.0.0	1213.0.0

Already in SAS 13.5

New in SAS 14

+ 2 universal SAS-VMs (32 & 64bits) - OpenSuse 13.1

GENERAL

- fix conversion between image and camera coordinates
- graphical I/F for [xmmextractor](#)
- replacement of PGPLOT by modern package

- > unifying conversion
- > new type of I/F due to special characteristics of task
- > better output quality (same plotting as Chandra?)

EPIC

- [esas](#) general refactoring
- [emosaicproc](#) and [emosaicprep](#) upgrades
- alternative stacked source detection task
- detector map to correct for bad areas in extended sources
- refinement of pile-up corrections (MOS?)

- > re-written in F90 + CAL-DB into normal CCFs
- > make data combination more user friendly
- > better src detection on stacked data
- > extended source analysis
- > optimisation / extension to MOS

RGS

- separate arf/rmf response matrix components
- revise filtering of bright sources (FIFO full)
- optimise bad pixel filtering refinement
- avoid (wrong) attitude filtering
- spatial imaging of emission lines from ext sources

- > work started together with LSF decomposition
- > avoiding (good) data losses
- > criteria for hot pixels / columns wrong for bright sources
- > rounding error causing discarding of data
- > narrow energy range images > less background than EPIC

OM

- NONE

SCR / SPR situation



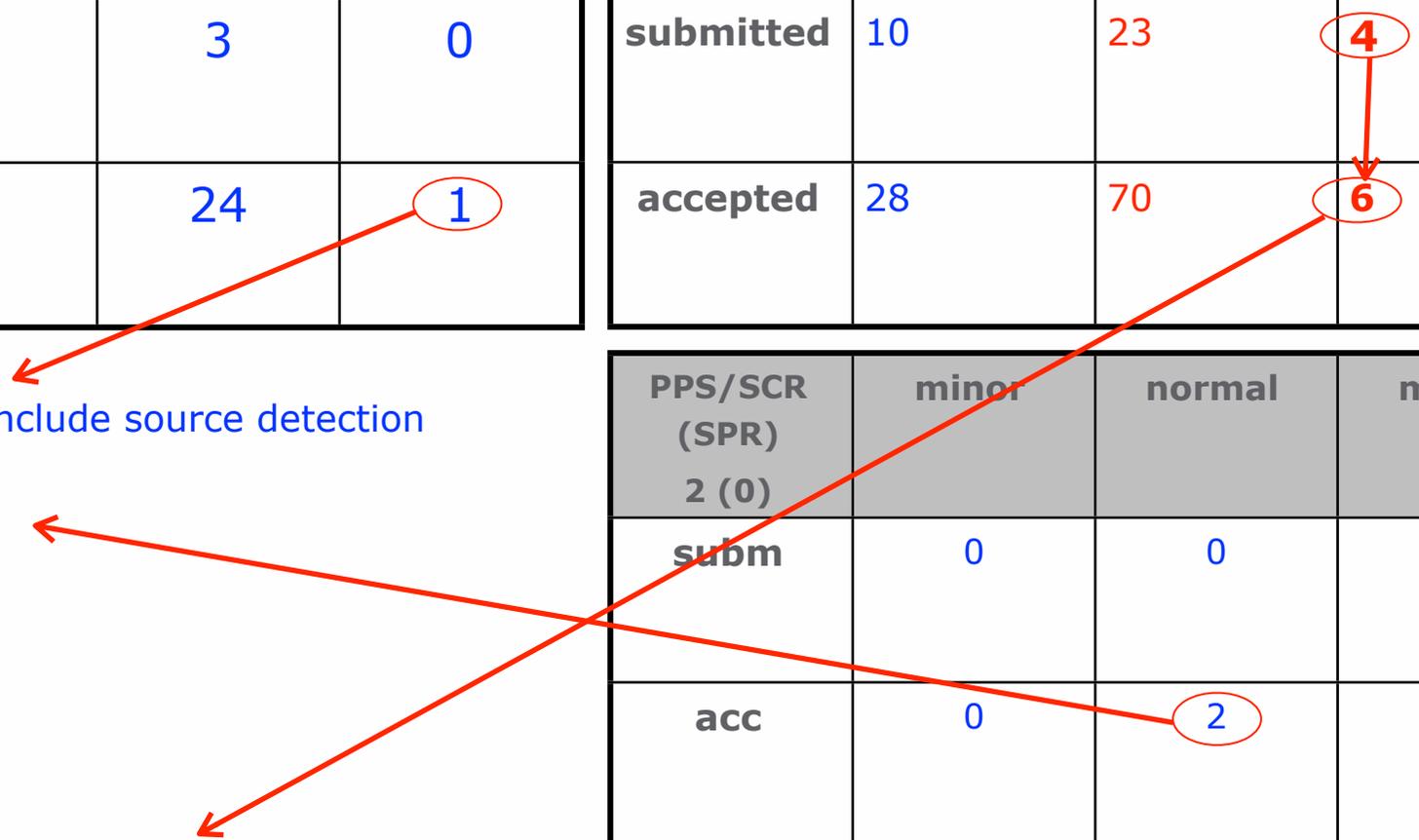
SCR 36	minor	normal	major
submitted	1	3	0
accepted	7	24	1

SPR 141	minor	normal	major
submitted	10	23	4
accepted	28	70	6

PPS/SCR (SPR) 2 (0)	minor	normal	major
subm	0	0	0
acc	0	2	0

Slew pipeline should include source detection

Both on screening



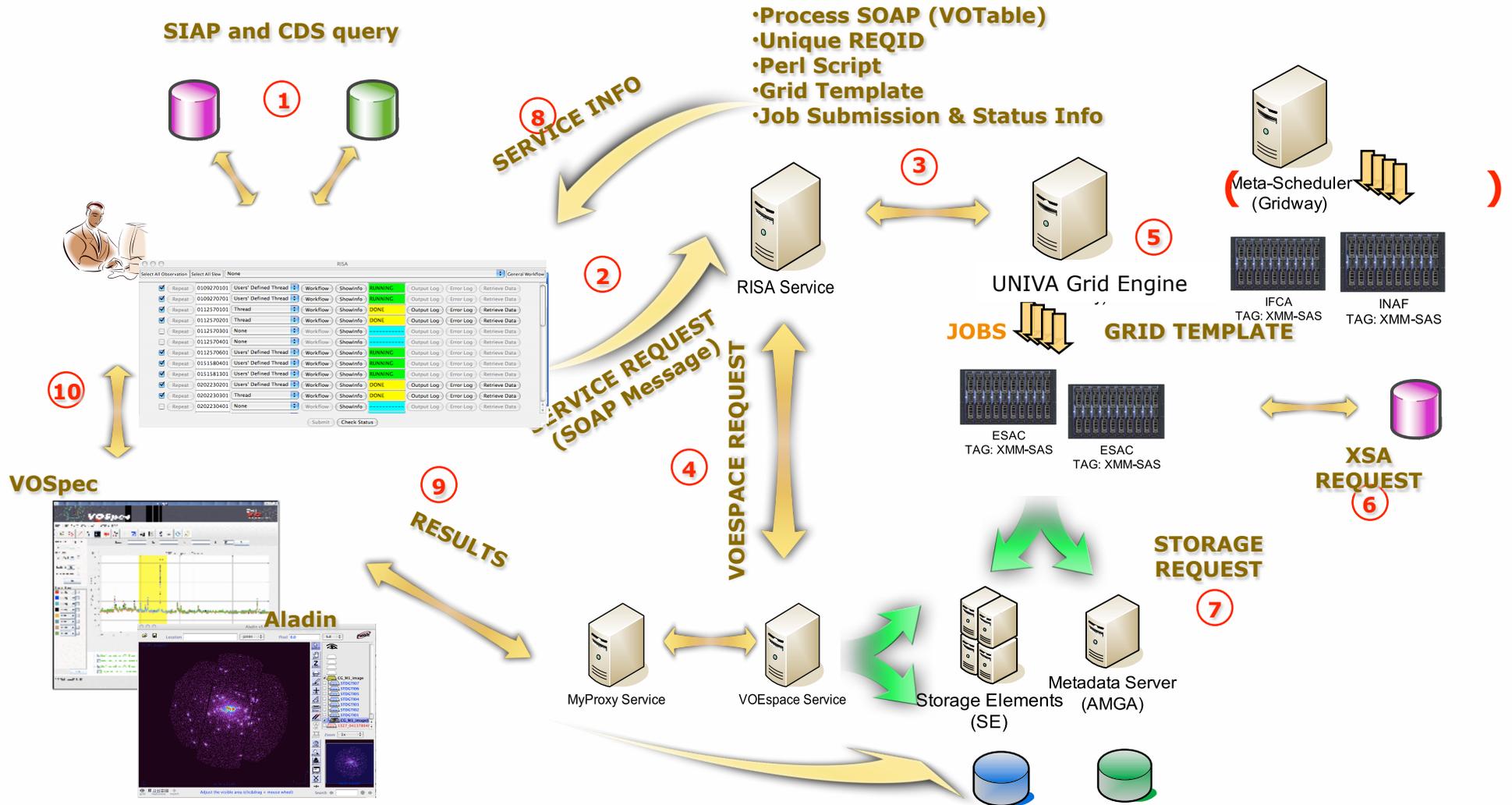
Major SPRs



Viewing Issues (1 - 10 / 10) [[Print Reports](#)] [[CSV Export](#)]

	P	ID	Assigned To	@Due Date@	Category	Severity	#	Updated	Summary
<input type="checkbox"/>		0007274	ssnowden	@Due Date@	esas	major		18-02-15	mos-spectra
<input type="checkbox"/>		0007267	nclerc	@Due Date@	eimagecombine	major		03-02-15	Not running in MacOS due to the usage of function "expr"
<input type="checkbox"/>		0007250	cgabriel	@Due Date@	omsource	major	1	15-01-15	Wrong values in output source list
<input type="checkbox"/>		0007242	bperry	@Due Date@	esas	major	1	23-10-14	espfilt segmentation fault
<input type="checkbox"/>		0006973	aibarra	@Due Date@	badpix	major	1	30-09-14	[old SPR 6669] does not split column correctly
<input type="checkbox"/>		0007211	aibarra	@Due Date@	rgsfluxmodel	major		10-06-14	"rgsfluxmodel" shall create table models with NULL or negative values
<input type="checkbox"/>		0007210	aibarra	@Due Date@	xmmextractor	major		14-05-14	Fails when the the target name includes a slash
<input type="checkbox"/>		0007095	aibarra	@Due Date@	evselect	major		09-05-14	Two 2-d filters with the name POS have been found to different components. Cannot write data subspace.
<input type="checkbox"/>		0007008	rsaxton	@Due Date@	oal	major		03-04-12	[old SPR 6704] OAL does not find HBR offset maps (HDI files)
<input type="checkbox"/>		0006862	aibarra	@Due Date@	rgsproc	major		16-09-09	[old SPR 6558] RGS filter damage to bright emission lines

Remote Interface for Science Analysis (RISA)



RISA = SAS web services (together with ULS, ...)
(to be used ie. by the XMM archive, but not limited to)

- on-the-fly reprocessing
- filtering, re-extraction of products
- light services, like direct extraction of (combined) images, spectra, light curves

Milestones:

- Change Grid-way metascheduler by UNIVA Grid Engine one ✓
- SIAP “house-made” extension does not work with new archive
> to be redone or to find alternatives ✓
- ...
- implement diverse RISA services (ie process whole ODF, filter event list, extract products)
- ...
- extend web services for data combination

Evolution shows:

- still **a lot** of development work coming from calibration (especially EPIC)
 - complex instruments, relatively stable but ageing + contamination + unpredictable events + ...
 - broad range of use, even increasing
 - data combination more and more important for performing science
 - >> flexible, evolving and **maintained** interactive analysis capabilities (ie. SAS) +
 - >> good calibrated **final products** (ie. PPS), offered to the whole community
 - >> **key for keeping high XMM-Newton scientific productivity**
- (UG: ~ “high quality tool ... instrumental in high productivity of XMM”)**

BUT: - reduced manpower level affecting us + loss of expertise

>> more and more tasks end up under SOC responsibility (SAS tasks as of today: 268 at SOC, 46 at SSC)

Mitigation - measures already in place:

- OM SAS “just” in maintenance (we said so...) >> OK as long as no unpredictable events
- EPIC & RGS: minimize S/W changes >> new Cal S/W requests implemented as tables... as much as possible
- one SAS release per year at most
- reduce # of platforms >> 2 less in SAS 14
 - >> monitoring 32bits versions usage for evtl discontinuation... but >> (~10-15% gain & **17% affected today**)
 - >> promote further VM usage for evtl binaries-distro-stop... but >> (~30-40% gain & **90% affected today**)

From now to EoM (end of mission):

SAS:

- + development responding mainly to a) Cal evolution and b) increasing data combination
- + proceed with calibration parametrisation ... possible to a certain extent
- + minimum necessary maintenance according to evolution of OS's, libraries, compilers
- + reducing slowly number of binaries supported ... with care ... on the way to pure VM SAS
- + implement and extend the RISA concept

PPS:

- + follow SAS evolution
- + complete products suite for all observation modes
- + development of concepts for data combination as legacy

While seeing all these activities as essential for a good science return, the quality, response times, etc, depend seriously on to which extent we can keep the level of resources...