SAS development and maintenance

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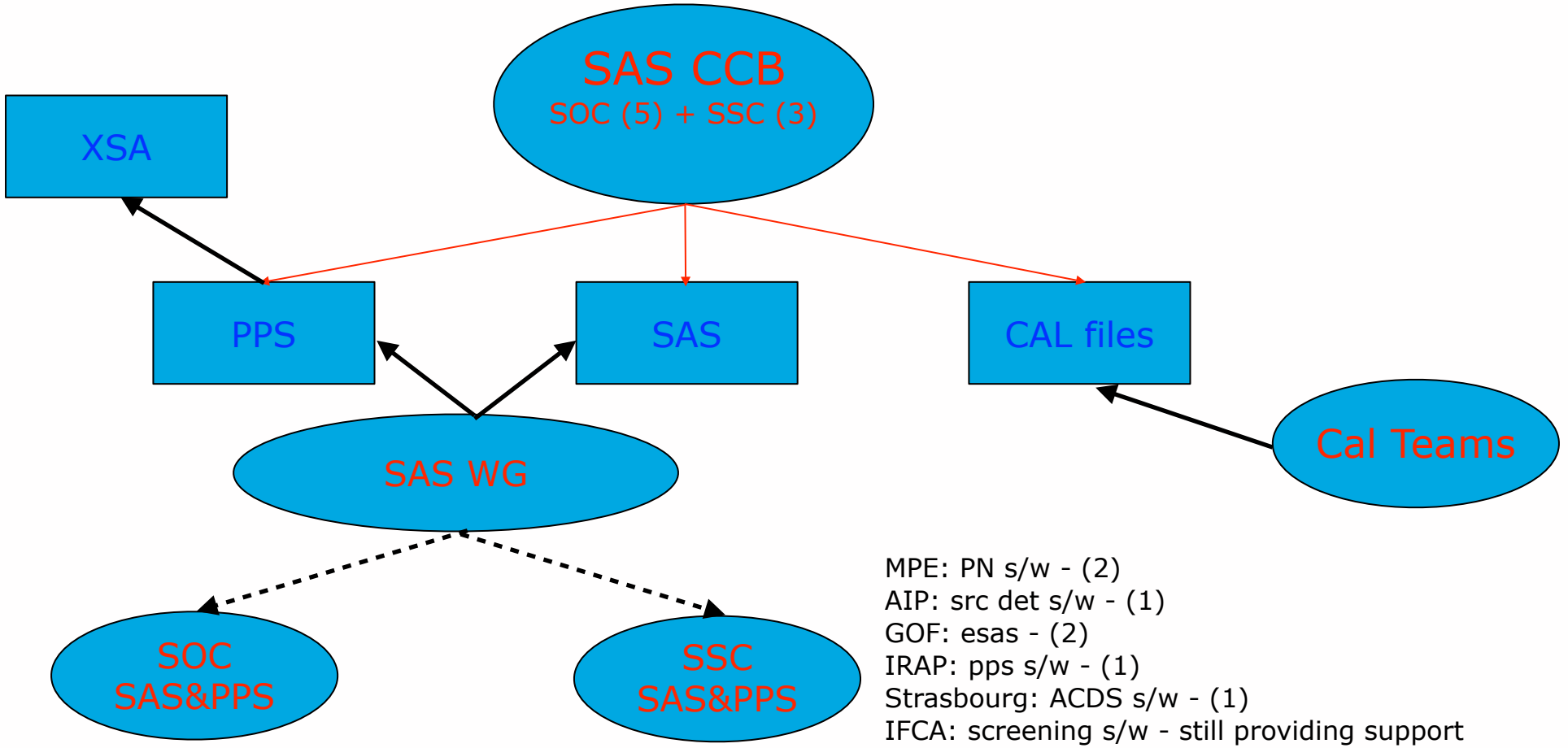
*on behalf of a lot of people (SAS & PPS Team, SAS WG, ...)

SAS & PPS development and maintenance



Team of 7 (~ 5FTEs)

MPE: PN s/w - (2)
AIP: src det s/w - (1)
GOF: esas - (2)
IRAP: pps s/w - (1)
Strasbourg: ACDS s/w - (1)
IFCA: screening s/w - still providing support
CEA: MOS s/w - only support since 2009 > new (1)
LUX: **ended June 2013 (>30 tasks + full PPS)** (1)
MSSL: OM s/w **ended March 2014 (>30 tasks!)**

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 preqgti) > 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

Thorough validation necessary ("(4+1)way"):

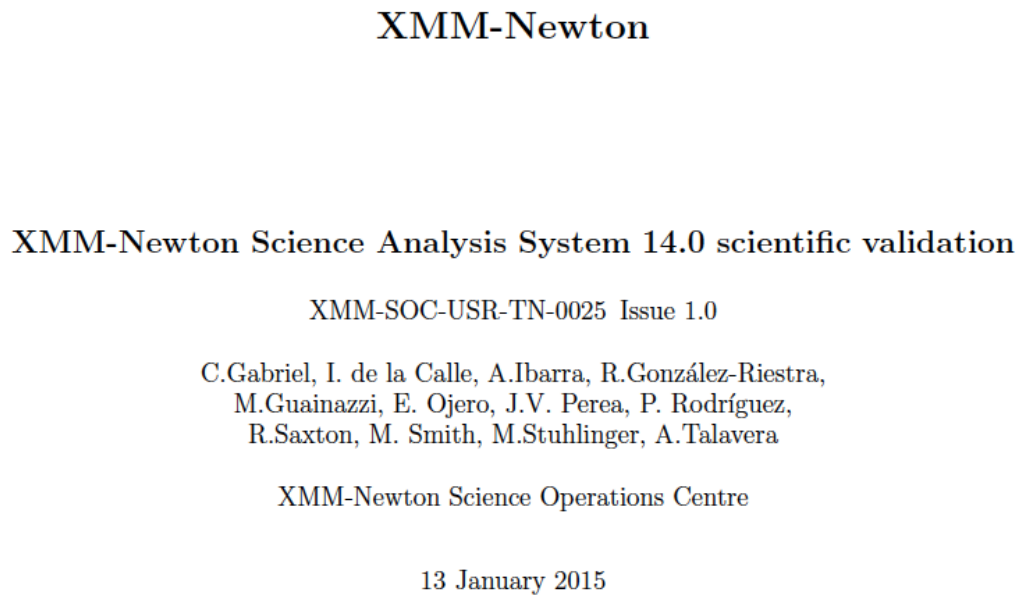
- standard set through *procs* & *chains* > IA
- X-cal DB fully reduced > comparisons
- standard set through test PPS (SAS 14 based)
- strict data reduction with the Threads

+

- dedicated data reduction for new / special S/W

>> several people involved in 6 weeks process

This time, special effort by the EPIC team



XMM-Newton

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,
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XMM-Newton Science Operations Centre

13 January 2015

+ several calibration release notes

SAS validation

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

- "(4+1) way" helps with (N_{tasks} * $N_{parameters}$)
- harness tests are **ESSENTIAL** for (N_{tasks} * $N_{platforms}$)
  >> 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

Future main SAS upgrades

GENERAL

- fix conversion between image and camera coordinates > unifying conversion
- graphical I/F for xmmextractor > new type of I/F due to special characteristics of task
- replacement of PGPLOT by modern package > better output quality (same plotting as Chandra?)

EPIC

- esas general refactoring > re-written in F90 + CAL-DB into normal CCFs
- emosaicproc and emosaicprep upgrades > make data combination more user friendly
- alternative stacked source detection task > better src detection on stacked data
- detector map to correct for bad areas in extended sources > extended source analysis
- refinement of pile-up corrections (MOS?) > optimisation / extension to MOS

RGS

- separate arf/rmf response matrix components > work started together with LSF decomposition
- revise filtering of bright sources (FIFO full) > avoiding (good) data losses
- optimise bad pixel filtering refinement > criteria for hot pixels / columns wrong for bright sources
- avoid (wrong) attitude filtering > rounding error causing discarding of data
- spatial imaging of emission lines from ext sources > 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

Slew pipeline should include source detection

Both on screening

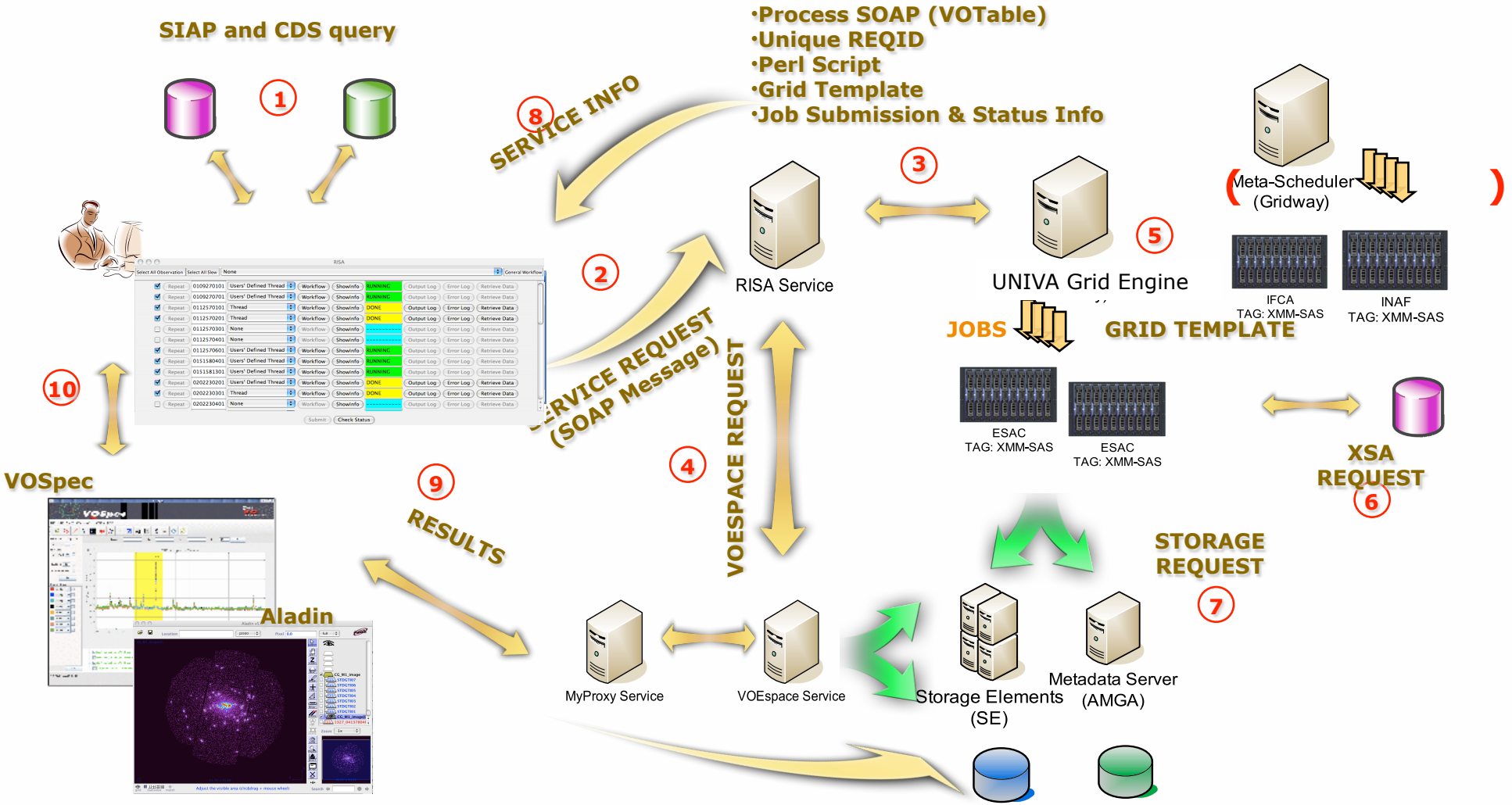
PPS/SCR (SPR) 2 (0)	minor	normal	major
subm	0	0	0
acc	0	2	0

Major SPRs

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

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

Remote Interface for Science Analysis (RISA)



RISA future steps

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

Risks and mitigation

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)

Medium Term perspective

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...