SAS status and development - medium and long term strategy

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On behalf of SOC SAS&PPS & SAS WG teams

19th XMM-Newton Users Group Meeting

2007 March

2008 September

Outlook

- New SAS version: release 17
  - ✦ Main upgrades
  - ✦ GNU Public Licensed (GPL) code
- Medium and long term strategy
  - ✦ Begin of the implementation
  - ✦ Actions related
- UG recommendations - status

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SAS 17 about to be released

xmmextractor - full standard reduction - implementing all main data reduction threads. Introducing **Python GUI**, handling multitude of parameters, graphical responses, etc.

CTI correction - derived from **background level** approximated by PN **discarded lines** counts. PN **"instantaneous"** discarded lines used, average times under testing.

EPIC spectra **backscale** - pixel **resolution increased** for better accuracy.

rgsFrameJumpFix - new task for **solving** problem of **time jumps in RGS** data.

x/y detector maps in **arfgen** - spatial distribution of an extended source through X/Y image for calculating the response

psfgen - task and documentation **rewritten**, output remains the same (PSF images)

Multi-pointing mode - data correctly treated in **arfgen** (*useodfatt=yes*)

eslewchain, **eboxdetect** and **edetect_stack** substantially updated

omatt updated to take the sensitivity depletion into account
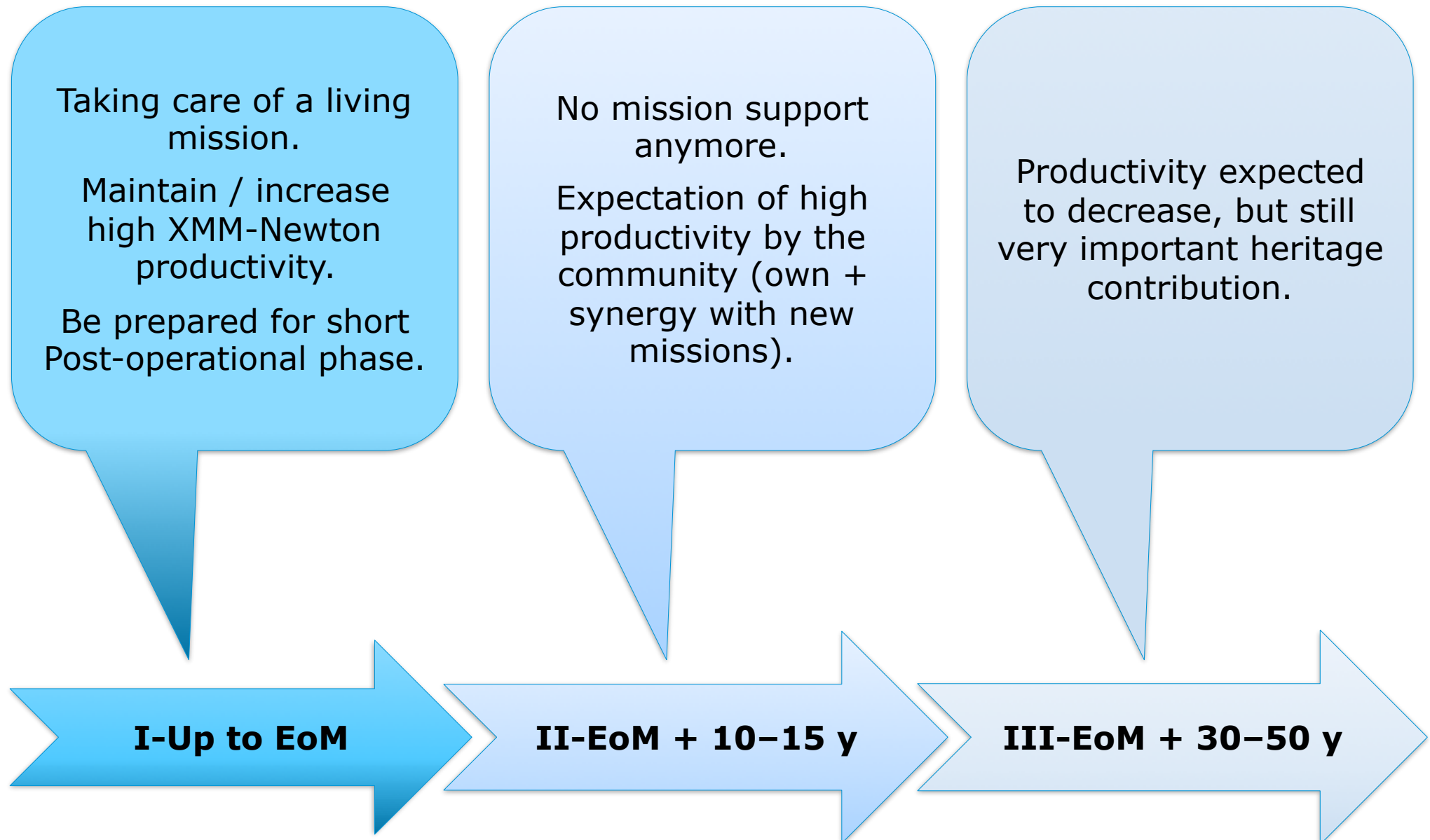
SAS source code fully licensed now

Required by ESA for distributing it… (and pre-requisite for a future SAS compiled by users)

GPL text included in all source code files

>> new version of every single package produced at SOC
>> coordinated action to avoid affecting the still on-going distributed development & maintenance

Source code now ready to be distributed… finally!

XMM-Newton future

Taking care of a living mission.

Maintain / increase high XMM-Newton productivity.

Be prepared for short Post-operational phase.

No mission support anymore.

Expectation of high productivity by the community (own + synergy with new missions).

Productivity expected to decrease, but still very important heritage contribution.

I-Up to EoM

II-EoM + 10–15 y

III-EoM + 30–50 y

Towards a new SAS maintenance model

SAS 16 represented a breakthrough
- few binaries, no 32bit binary versions anymore
- no NAG Fortran compiler dependency anymore

Plan devised last year to:

A- Preserve a running SAS as long as possible after EoM

    SAS VM / Dockers + **R**emote **I**nterface for **S**cience **A**nalysis (RISA)

B - Reduce complexity = Modernising (as to enable community for SAS maintenance)

    1. Compilers: maintaining close correspondence with new compilers

        SAS 17: GNU C/C++&Fortran 7.1   ✓

    2. Migration to Python in 3 areas: graphical, replacing PERL, replacing HEASOFT

        xmmextractor GUI + graphical PPS output   ✓

    3. Documentation: making possible / easy building from source

        Tests + documentation upgrade going on.   ✓

    4. RISA: through XSA... to SAS on the network + VM / Dockers

        Re-processing, filtering, specific products extraction ✓   +dev going on

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TECHNICAL NOTE

XMM-Newton Science Analysis System (SAS): medium and long term strategy

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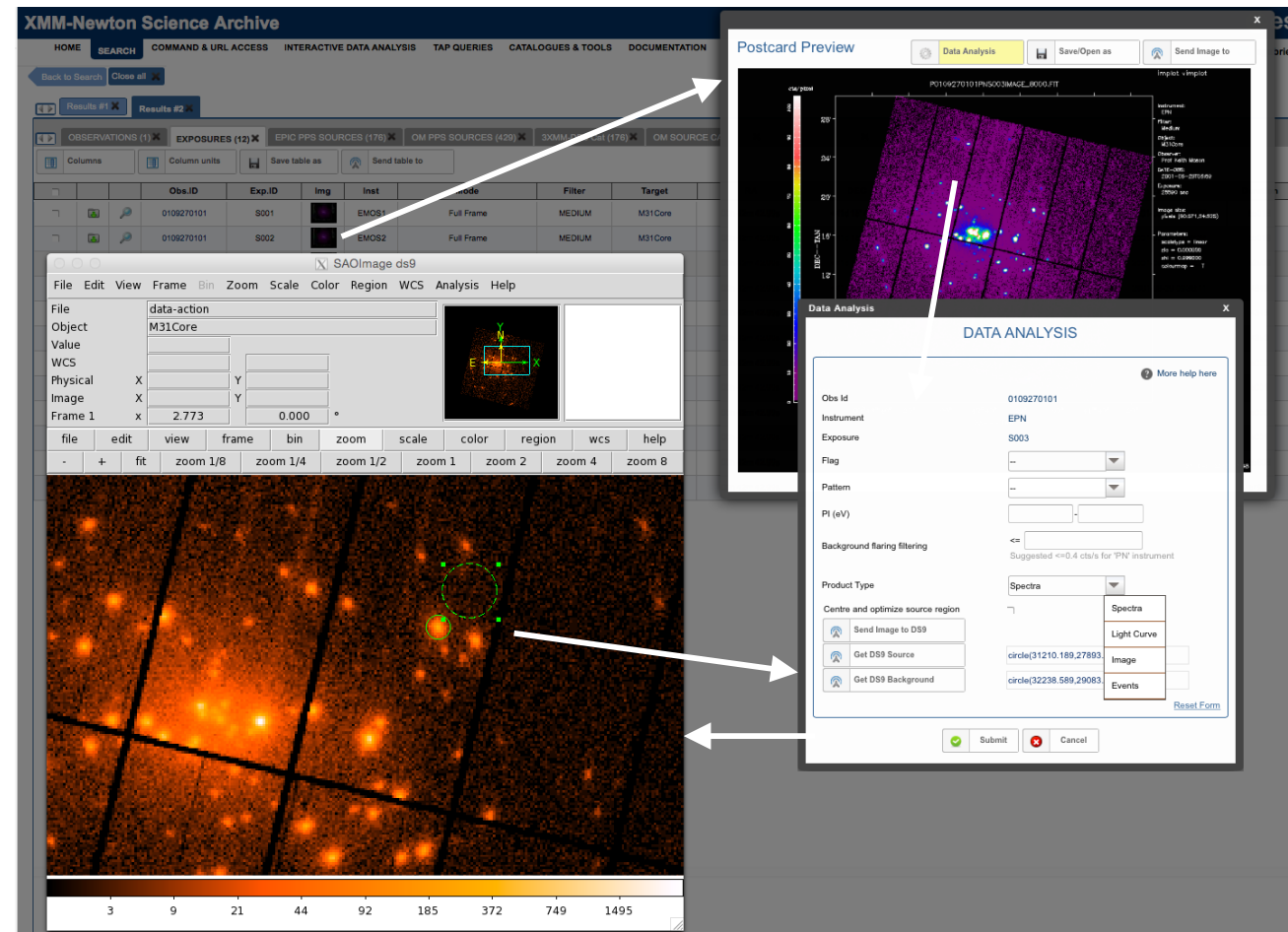# RISA - up and running - callable from XSA

Reprocessing provided Also

- New functionalities
  - User´s defined filtering
  - Flaring background filtering
  - Spectra, light curves, images, filtered event list
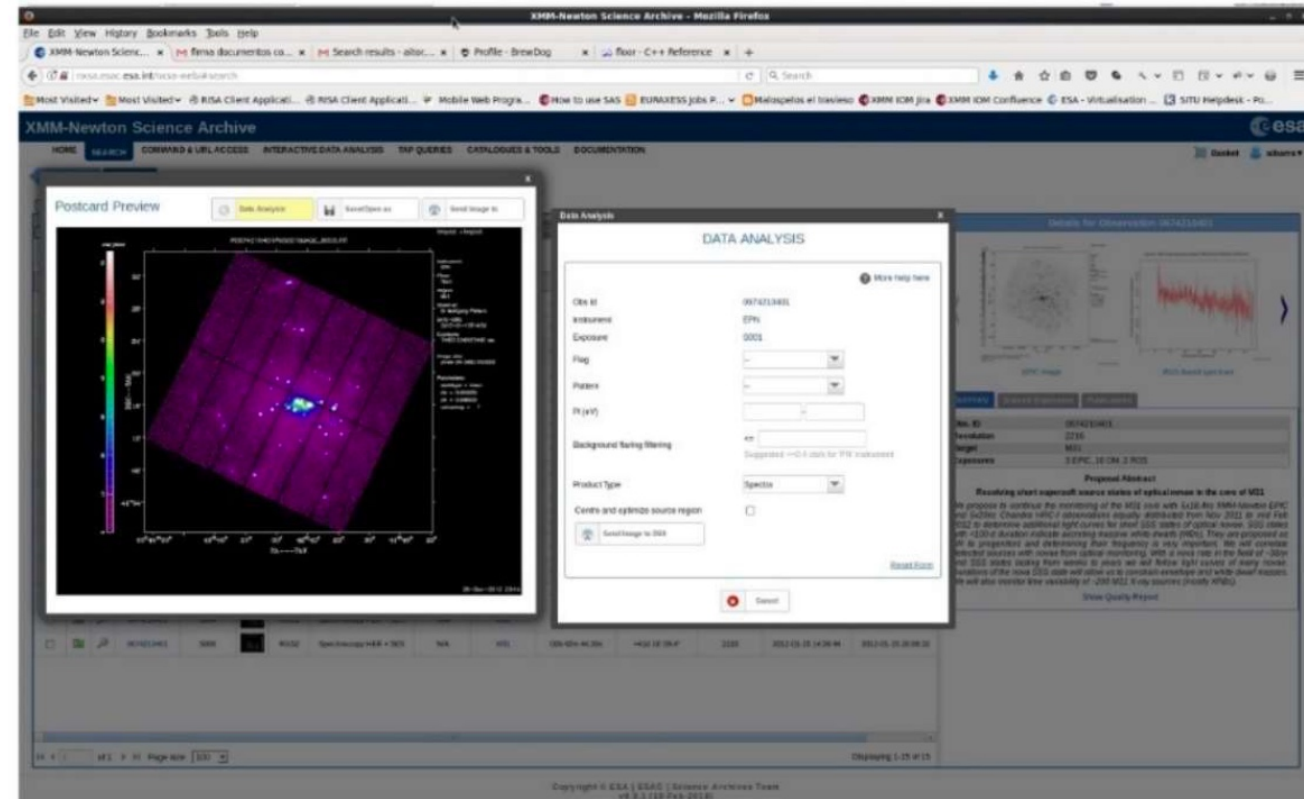
(Near) Future

- Other "light services"
  - GTI generation
  - **Combine observations**

- Open RESTful services to the world?

- Full I/A access through RISA?

Difficulties using SAMP reported by XSA users >> using js9 in near future version

XSA & RISA - statistics

RISA XSA interface

esa

- Useful for automatic processing of multiple observations

- Statistics from may 2017:
  - 92 external users
  - 620 processed obs.
    - 48% reprocessing
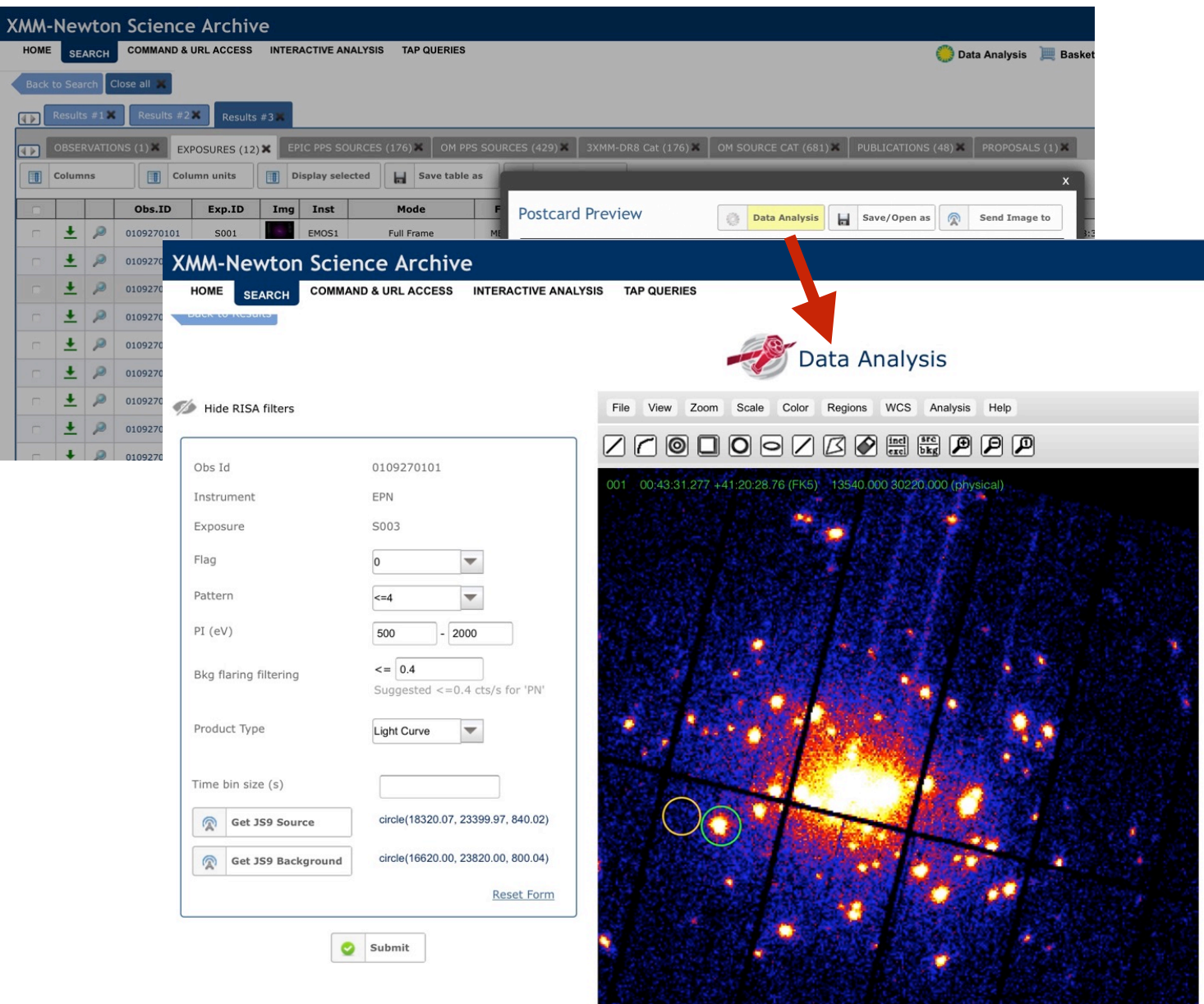   - 24% images
    - 22% spectra
    - 6% light curves

~2 RISA jobs per day

From AI in SAS-WG - 4/18

Carlos Gabriel | SAS status and development - medium and long term strategy | XMM-Newton UG Meeting | 17 May 2018   Slide 8

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XSA & RISA - since yesterday

- New js9 implementation
  - SAMP dependency removed

- New Data Analysis panel

- XSA not longer a passive data visualisation tool, allowing users to interact with images through the js9 app

Actions from medium / long term plan

Compilers:

- Finish the migration to the most advanced C++ / gfortran compilers - *done with SAS16* ✓
- Maintain a close correspondence from now on with the most advanced compilers possible
  Effort: 4 mw every two years – Time of implementation: 2018 - *SAS17 using GNU/GCC 7.1* ✓

RISA:

- Finish the implementation of RISA as the web services provided by the archive for on-the fly reprocessing, filtering and data reduction, Priority 1
  Effort: 4 mw – Time of implementation: first part of 2017 - *Done with XSA - July 2017* ✓
- Maintain / extend usage of RISA in the future, according to requirements and feedback from the community, Priority 2
  Effort: 4 mw / year – Time of implementation: from 2018 on - *New version just released*

Distribution / VM / Dockers:

- Continue the distribution of SAS in as few binaries as SAS 16: two linux and three Mac OS plus a SAS VM, study if even fewer is possible. *SAS 17 in 4 binaries* ✓
- Start investigating the possibility of replacing the VM by Dockers, Priority 2
  Effort: 4 mw – Time of implementation: second half of 2018

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Actions from medium / long term plan

Migration to Python - Start / continue the migration to Python

- implementing requirements mainly for new PPS graphic products (Priority 1)
  Effort: 4 mw – Time of implementation: 2017 - *PPS products based on Python* ✓

- replacing PGPLOT / Grace (Priority 2)
  Effort: 16 mw – Time of implementation: 2018 - working on it…

- encapsulating Python library (Priority 2)
  Effort: 4 mw – Time of implementation: 2018 - *SAS 17 uses Conda* ✓

- replacing scripting done until now by PERL (Priority 3)
  Effort: 63 mw – Time of implementation: 2019/2020

- replacing HEASOFT calls (Priority 4)
  Effort: TBD (needs detailed analysis) – Time of implementation: >2020 TBC

Actions from medium / long term plan

Documentation: building from source / simplify SAS configuration and build:

- Extend the documentation for building SAS (Priority 1)
  Effort: 2 mw – Time of implementation: 2017 ✓

- Make sure it can be built by SAS experts outside ESAC, (Priority 1)
  Effort: 1 mw – Time of implementation: 2017 ✓

- Make sure it can be built by S/W experts (Priority 2)
  Effort: 1-2 mw – Time of implementation: 2018 - *Simplification of procedures on-going*

- Finish full / comprehensive documentation for building SAS (Priority 3)
  Effort: 8 mw – Time of implementation: 2018 / 2019

- Make sure it can be built by "normal" users (Priority 4)
  Effort: 4 mw – Time of implementation: 2019 / 2020

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Actions from medium / long term plan

Documentation: maintenance
Improve internal software documentation to the level of making sure that non-experts can maintain it

- Interface type S/W, OAL, CAL, DAL (Priority 2)
  Effort: 8 mw – Time of implementation: 2018 - *should start soon*

- S/W dealing with processes starting at calibrated event list level and beyond (Priority 3)
  Effort: 16 mw – Time of implementation: 2019

- Rest of the S/W (Priority 4)
  Effort: 20 mw – Time of implementation: 2020

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Recommendations from UG

On the Scientific Analysis System (SAS)

Endorsement 2017-05-11/02 The SAS long term and post-operations survival strategy rests on three pillars:

(1) SAS running on a virtual machine platform,

(2) RISA and

(3) provision of a public source code

The UG endorses this strategy and recommends its implementation as far as resources permit, i.e. maintaining current SOC activities as recommended last year (see Recommendation 2016-06-08/03)

- ✓

On the Remote Interface for Scientific Analysis (RISA)

Recommendation 2017-05-11/04: The UG noted that RISA is both a current resource, as well as providing the basis for the long-term preservation of the Scientific Analysis System (SAS). The UG endorses RISA and recommends its further development. Since RISA is still in its early phase, the UG strongly encourages XMM-Newton users, particularly those already familiar with the SAS, to test the RISA in terms of its functionality, and with attention to its key role in maintaining the legacy of XMM-Newton observations. The UG recommends using the feedback from these users and from the UG, to ensure the best possible provision for the post-mission phase.

- ✓

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