JEM-X ISSW ADD6.3:
Changes proposed for version 7.0

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The vast majority of the propose changes do not affect the architectural design of the JEM-X ISSW, but have to do with making the software self-consistent across all components developped by the different members of SDAST. In this sense the changes should not concern the CCB. All contentious or wide-reaching changes will be discussed in a review meeting to include both CCB and SDAST personnel, which will be held some time before mid-March. It is hoped that the updated document will be ready by the end of March 2002.

- Throughout: All component descriptions to be updated to include the parameter indexing command *parref* which is used as follows:

  ```
  \parref{name-of-parameter}
  ```

  Which produces output: inSWG p.,138
  at the place the parref command appears and also adds the entry to the index:
  inSWG, input to j_cor_gain, 65 This allows us to check that all input parameters are used consistently throughout the ISSW. A similar referencing/indexing mechanism is already in place for input and output data structures and should be used consistently by developers using
  `\initem{data structure name}\verb`
  and `\outitem{data structure name} \verb`

- Parameter lists in component descriptions are generally incomplete: if you take a SWG as input that needs a data structure, also every SWG data structure you use from the SWG needs an override DOL parameter. Auxilliary data (-ATTI-, -ORBI- etc.) generally seem to be forgotten about. Every component using the instrument model group needs an instMod input parameter. Agreed upon parameter names should be used uniformly across ALL components so that naive users will not be stranded in a forest of inconsistent names and uses. This should apply for scripts as well.

- It was also generally agreed that under 'Subordinate components' a list of delivered functions would be added for each executable, using the 'child' command to ensure proper referencing and indexing.

- In DDD section: need NJW to add a piece about how spectral data are handled and the data structures so arranged as to be compatible with XSPEC, esp. the response files

- Descriptions of V3 interactive tools are still incomplete and can be expected to change quite a bit in the coming months though their general functionality is quite well defined. Implementation is however still uncertain until the first delivery of each. Updated descriptions should however indicate where straightforward executables could be used instead of full-blown GUIs and how the design is split up into separate functions.

- p.1 JMXx-****-*** should be changed to JMXx-ABCD-EFG for better legibilty

- p.3 isdcRoot should be added to list of ISDC support software libraries with reference to manual in bibliography

- p.4,5 Acronyms/abbreviatioins to add to list: FITS, V1, V2, V3, FULL, REST, RATE, SPEC, SPTI, TIME, IROS

- p.7 j_ical_energy should be j_ical_gain in requirement 18.5.1. 18.7.2: j_ical_frss does interactive monitoring of the FRSS spectra and their derived gain parameters. 18.7.3: j_ical_collimator is used to check position corrections INTERACTIVELY. 18.7.5: add "....and to a limited extent by j_ical_collimator

- p.8 18.10.7 "All three executables" should read "Both executables" since j_cor_gain_events and j_cor_gain_spec have been merged into j_cor_gain. 18.10.4: j_ical_energy should be j_ical_gain.

- p.9 18.18.2 JXMi-SKY.-IMA-IDX should be JMXi-SKY.-IMA-IDX, which would allow it to be correctly referenced in the data dictionary

- p.10 18.20.3: The generic ISDC tool for mosaicing images should be given a reference. 18.19.5: is fulfilled by the Iterative Removal Of Sources (IROS) which is part of j_ima_refined_recon. However a residual shadowgram is returned, not a residual image.

- p.11 Add to text for requirement 18.26:"....and other available analysis packages such as XSPEC. Response matrix and spectral data formats have been deliberately chosen to make them compatible with XSPEC".

- p.11 Add to the list of extra software requirements monitoring of ADC linearity, which is performed by j_calib_adc. Add as a change to the SRD that residual shadowgrams of the data with all found sources removed are returned, not sky images, because it makes no sense to make a sky image from a shadowgram which will largely contain instrument noise.

- p.12 OSM, should have a reference document number

- p.13 First reference to QLA should be CAT and should have a reference document number. Second reference to QLA should also have a reference document number from the bibliography

- p.13 ISDC mosaicing tool and source selection tool need document references.

- pp.13, 25 'j-data-preparation' must be changed to 'Science Window and Revolution File Pipelines' since there is no longer a j-data-preparation script.

- p.14 Last sentence in section 3.2 should read: SDAST has chosen to use C (not fortran90) as the sole programming language for pipeline executables; C/C++ and ROOT are used to write interactive tools.

- pp.14–18 Paragraph beginning "Pipeline applications will use....." should be removed and a complete new section provided by Peter Kretschmar will be inserted instead, describing the pipeline scripts Three new sections must be added here which describe Peter's pipeline jemx_obs_analysis, jemx_science_analysis and jemx_scw_analysis, in detail. Each section has its own figure. The scripts section was missed out of version 6.3 by mistake.

- p.17 j_known-source-calib should be j_ical

- p.18 "....where this will avoid needless repetition [add:], though this has not been done so far". "The times given in the output data structures..." should read "The OBTs given in the output data structures..."

- p.19 "BIN_I: Binning of event data [add: into shadowgrams] for Imaging

- p.21 Last bulleted point should not be in italics

- p.22 The two circular illustrations of the spatial models should be reversed so that the diffuse background contains the regular (mask-modulated) pattern and the instrument background is strongest at the edges.

- p.25 Last item with a bullet should be removed: ISDC is writing the User Manual.

- p.26 and elsewhere. j_cor_gain and j_cor_position are now in ISDC V2. All components j_******_lc are now part of V3. Add gti_attitude and gti_data_gaps to j_gti.

- pp.26, 27 Remove j_prp_performance from figure and overview description

- p.26 Add ISDCLEVL=PRP under 'Rev.filePipeline'. Figure should be split into V1 and V2, each with their own figure to improve readability and include ISDC Preprocessing as input to V1

- p.26 Add j_data_preparation script just to right of ScW Pipeline if this is still part of the AD. Are these j_prp**** components called by the script or directly by the Pipeline? Is j_prp_frss called by j_data_preparation despite being in another pipeline?

- p.27 must be updated to include the new interactive tool j_ical_frss. Also a new executable j_perf_collect_data has to be added to j_performance. Subordinate components of j-bkg-interactive must be removed: this is a single GUI now. Names of generic ISDC tools for scientific analysis formatting must be added. j_ical_energy should be j_ical_gain.

- p.27 Remove '(CAL)' at bottom of page: no longer a CAL level in system

- pp. 27–33 Every executable briefly described should have a page ref for its full component description
- p.28 Section beginning "Using this STATUS flag......" to the end of the paragraph should be replace with "See section 4.3, Event Evaluation, for further details". j_ical in bottom line should be j_ical_collimator
- p.29 Add short descriptions of j_gti_attitude and j_gti_data_gaps. CAT_I is part of ISDC V2.
- p.30 At bottom of page add "Includes iterative removal of found sources"
- p.31 "j_bin_evts_spectra Bins data in [add: FULL, REST and] SPTI format into spectra". "j_bin_evts_lc Bins JEM-X eventd data [add: FULL, REST, SPTI formats] into lightcurves. "j_bin_rate_lc Bins JEM-X [correct: 'event' to 'countrate'] data.....". "j_bin_bkg_lc Bins background [add: ',empty field,'] model data to [correct: 'spectra' to 'lightcurves']. Levels BIN_T and LCR are part of ISDC V3, not V2.
- p.32 add j-perf-collect-data description to section 3.7.14. Section 3.7.15 should begin: "This application groups together a number of different tools to be used by the instrument team (not general users) to perform interactive calibration of the instruments so that instrument model tables can be updated where necessary."
- p.33 Add short description of j_ical_frss to section 3.7.15. 'j_bkg_int-model' should be 'j_bkg-interactive'
- p.34 Add reference to IBAS documents for second bulleted item. Remove last bulleted item since this functionality is covered by generic ISDC tools.
- p.36 Add alrtLevel parameter used by j_prp_verify; add parameters for j_calib_adc: ecalRaw, ecalPrp, alrtOffset, alrtSlope, alrtBoth, alrtOther and alrtZero. Add script parameters: swgDOL, IC_Group, and IC_Alias. 'chatty' should be 'chatter'. Add other parameters: bgrMethod, backCorr, deadCorr, gtiNames.
- p.36, p.37 Parameters inCAL and outCAL must be changed to index table DOLs for the data structures given, not the data structures themselves since j_calib_gain_fitting now takes in groups of data input structures not just single instances
- p.37 add parameters: lcRes, maxNumTrials, minDist, minDetLev, numPixelSubDiv, ogDol, precisionLevel, outBkgSpec, outSrcSpec, outSrcArf, outBkgLC, outSrcLC, outSrcArf, rowSelect, shdType, vignCorr.
- p.40 '3–100KeV' should be '3–75KeV'. Should add a short piece to section 4.3 about the various reasons why gain determination might be poor

- p.41,42 Error code assignment list needs to be updated to extend range of j_calib_gain_fitting errors (-302,100 to -302,299), and add the most recent j_ical tool, j_ical_frss

- pp.42,43 Section 4.5 must be changed to describe how the JMXi-CORX-MOD and JMXi-CORY-MOD tables will hold the absolute coordinate value in mm from detector centre for each raw pixel, and not just the correction in fractions of a pixel.

- p.44 Add here a section on OBTs: note that all event and spectral OBTs are prepared by j_data_preparation executables that put the calculated OBTs into JMXi-****-PRP data structures (where **** can be FULL, REST, SPTI, TIME, RATE or SPEC). Times of FRSS calibration spectra are put directly into the JMXi-GAIN-CAL data structure that will hold the detector gain parameters after spectral fitting with j_calib_gain_fitting (i.e. no JMXi-FRSS-PRP data structure); also note that OBT_ACQ is in middle of each spectral integration period.

- p.45 Last two sentences describing and application should be removed and another added: "An application may also be a GUI invoked from the command line and used for interactive analysis after the pipelines have finished (V3)"

- p.45 "Executables get all their...." should read "All pipeline executables must get their......."

- p.46 Add after 'Resources' heading:" List of the resources required to run the component: memory used for data and code; CPU time used to process a particular number of events; how CPU time and memory requirements scale with data quantity. Also all special resources..."

- p.46 Add to 'processing' description:"...or diagram indicating program flow, control and user options for a GUI application"

- p.46,60,64,67,71,74 Remove "Completion Status" and "Prototyping status" sections since these are no longer applicable this far into the developement

- p.47 Put in full component descriptions of the JEM-X processing pipeline scripts jemx_obs_analysis, jemx_science_analysis, jemx_scw_analysis and their figures. These were left out of ADD6.3 by mistake.

- p.47 Is figure missing j_prp_frss_obt and the Rev. File Pipeline? Does j_data_preparation handle j_prp_frss_obt or not? How can j_data_preparation belong to two pipelines?

- p.48,49 j_verify should be j_prp_verify. Is j_prp_frss_obt called by j_data_preparation? At end of 'ISDC context' add:"....in Science Window Pipeline [and Revolution File Pipeline]". Last part only needed if j_prp_frss is called by this script.

- p.48,49 Use parref command and describe the input parameter a little more fully. Need some firm numbers in ‘Resources’. There must be some applicable delivery date for this component

- p.50 add ”....in FULL, REST, SPTI and TIME formats” to ‘Function’ description.

- pp.50,52,54,56 Use parref command on parameters. Isn’t ‘chatter’ also a required input parameter for j_prp_evts_obt?

- p.51,53,55,56 ‘Subordinate components’ should include a list of delivered functions.Remove ‘Completion Status’ section (and ‘Prototyping’ section). Under ‘ISDC Context’ should read ”Data Preparation in Science Window Pipeline”

- pp.51,53,55,56 Under ‘Dependancies from other components’ add: ”Preprocessing must have run first to provide unpacked telemetry for raw science data and packet data”

- p.56 Under ‘Design Remarks’ explain whether OBT_ACQ refers to beginning, end or middle of the spectral integration period.

- p.57 Under ‘ISDC Context’ add ”.....in Revolution File Pipeline”

- p.62 GNRL-SEG1-GRP should be GNRL-SCWG-GRP. JMXi-DETE-GRP should be JMXi-DETE-MOD

- p.64 Add to design remarks that an alert level (alrtLevel) of zero turns off all alerts. Log messages only produced.

- p.65 Description of j_calib_gain_fitting must be updated to include new interface demanded by ISDC: I/O DOLs are to INDEX tables of JMXi-FRSS-CRW (input) and JMXi-GAIN-CAL (output) rather than to individual instances of these data extensions

- p.65 Figure 5.3 must be updated to include index tables, and should be re-labelled ‘j-calib-gain-fitting’ instead of ‘j-calib-auto’

- p.65 Correct ‘Interfaces’ point 3): the master gain calibration history table JMXi-GAIN-CAL-IDX will cover the entire mission and is NOT the same table as the input index table for j_calib_gain_fitting though they will have the same name

- p.66 ‘Parameters’ must be updated so I/O DOLs are for INDEX tables

- p.66–67 ‘Processing’ must be updated to include loop over members of input index table

- p.68 Update delivery date for version 5.1

- p.73 Use Parref on every on of the first parameters which are common to all executables. Wouldn't it be easier to call j_cor_both_**** and j_cor_gain_**** by their common parameter names, i.e. fullRaw, sptiRaw etc. etc. since there is no conflict between say, a parameter called j_cor_both_fullRaw and another one called j_cor_gain_fullRaw, according to this table? swgDOL should be either inSWG or outSWG.
- p.74 Add page references for the two subordinate components
- p.75 JMXi-GAIN-CAL-IDX is stored as one master table for the entire mission. AUXL-TCOR-SNA is now AUXL-TCOR-NRT, and should be added to the data dictionary.
- p.82 Remove 'Pending TBDs' section: position corrections can best be determined for the lowest energies and there is no reason to believe after calibration that these differ significantly at higher energies in comparison to the poorer position resolution at the higher energies.
- p.83 Purpose should have SRD number 8.10.5 which is a Requirement for OSM, not JEM-X. Remove 'Not foreseen in SRD'
- p.84 What is meant by 'Specific GTI for different reason'??? Need proper resource estimate. Update processing to include j_gti_attitude and j_gti_data_gaps which appear in figure on previous page.
- p.85 for ISDC Context add ".../OSM"
- p.86 Wouldn't input parameters j_dead_time_calc_**** be better as simply csswHrw and csswCnv, since these are already defined and in use? Use parref for all parameters.
- p.87 Requires a proper resource estimate. What for example, is the overhead for having script j_dead_time run j_dead_time_calc, instead of having the pipeline call j_dead_time_calc directly?
- p.89 Need proper resource estimate here.
- p.90 Remove this TBD: input model table has been formatted to handle changes in dead time with event count rates. ISDC Context should be: "ISDC standard analysis pipeline j_sci_analysis (p.nn)"
- p.91 Was this really not forseen in the entire SRD? Inputs should be "AUXL-ATTI-NRT or AUXL-ATTI-HIS" since these are in the Data Dictionary or see how it was done on page 94.
- p.92 Use parref for common paramters. Under design remarks add reference to documents where cat-extract and q_flag_srcs are described.

- p.95 use parref. Proper resource estimate?
- p.97,99,101 Inputs: Which file contains the SWG mentioned with first input data structure and first input parameter? Use command parref for each input parameter. Where are the input parameters for AUXL-ORBI-*** and AUXL-ATTI-xxx? These are not in the SWG. Do you use both AUXL-ATTI-NRT and AUXL-ATTI-HIS, or just one of these? Ditto for AUXL-ORBI-NRT/HIS. Use parref on all input parameters.
- p.98,100,102 List delivered functions that make up component under 'Subordinate components'. Also lacking dependancies and ISDC context. Are these TBDs still outstanding - haven't we worked out how to update these catalogues? Shouldn't they be part of the instrument model?
- p.101 Missing input parameters for input data structures JMxI-CSSW-***. Are both of these used or just one? NB. common parameter names csswHrw and csswCnv are already defined and ready for use.
- p.107 Input parameter 'timeEnd' should be 'timeStop' to remain consistent with other ISSW usage. Use parref. Are not parameter names j_ima_shadowgram_**** rather cumbersome? Why not just fullPrp etc.? Need proper resource estimate and design remarks.
- p.109 Need input data structure with the SWG in it. Also in 'Inputs' indicate which data structures come from SWG, which from IMOD-GRP etc.
- p.110 Where are all the override parameter DOLs for SWG data structures? Need proper resources estimate. use parref on all parameters. timeEnd should be timeStop as agreed for all ISSW.
- p.111 Needs a proper delivery date: surely this has been delivered at least once.
- p.112 Figure 5.13: Where's j_ima_refined_recon? If it doesn't belong here where does it belong? Function listed here belongs to j_image_bin not j_imaging.
- p.113 Full resource estimate required. Processing and subordinate components: where's refined image reconstruction? Use parref on all input parameters. Where are override DOL parameters for SWG data structures? Other missing input parameters: imodGrp; auxlAtti;
- p.114 Use parref command on all parameters. Need an override DOL parameter for JMXi-EVTS-SHD. chatty should be 'chatter'. Needs a proper resource estimate.
- p.115 Is the TBD still undecided? Need a proper delivery date. Which version is currently described here?
- p.116 Use parref. Chatter not chatty. Need input parameter for AUXL-ATTI-HIS, need override DOL parameters for most other data structures.

- p.117 Really no design remarks? Needs a proper delivery date.
- p.118 Is this an obsolete description that slipped in by mistake? JMXi-VIGN-MOD is no longer part of -IMOD-GRP, or has it been reinstated? The actual dead times for each 8sec. interval are in JMXi-DEAD-STA, not JMXi-DEAD-MOD which is the detector deadtime model from which j_dead-time-cal determines the actual deadtime at any point in time. Chatty→chatter. Missing parameters: jmxI-srcl-res override, JMXi-DEAD-STA override; clobber. Needs proper resource estimate.
- p.119 Needs a proper delivery date and version number.
- p.120 All the same comments as for j_ima_cor_intensity.
- p.122 What SWG input data structure?
- p.123 If the spectra catalogues aren't in the SWG where are they?
- p.124 Background catalogues not in the SWG need their own input parameter DOL (else how are they to be found?) and not override DOLs. If the -RAW data structures have an override DOL they should also be listed as input data structures. JMXi-INST-STA needs and override DOL. A fuller resource estimate would be good.
- p.125 Add to 'Dependencies': all of data preparation must already have run.
- p.127,131,135,138 inSWG and outSWG are the agreed parameter names for the SWG DOLs.
- p.127,131 Should there be both gtiNames and goodTime parameters. Wouldn't it be better to have one parameter that points to what you actually want? Shouldn't there be override parameter DOLs for each output data structure too?
- p.128,131 JMXi-DEAD-STA should be listed as an input data structure.
- p.134 Which SWG data structure is input? Should JMXi-DEAD-STA also be an input data structure?
- p.135 Missing parameters: deadTime, instStat. Use parref.
- p.137 Should JMXi-IMOD-GRP be an input data structure if none of its children are? Is JMXi-IMOD-GRP needed in the figure? Should JMXi-DEAD-STA also be an input data structure? If so, add it to the figure.
- p.138 Use parref. Every I/O data structure in SWG needs an override parameter. All data structures not in the SWG need their own DOL parameter. If JMXi-IMOD-GRP is in fact an input data structure, imodGrp is missing. If there's a deadCorr parameter, there needs to

be a deadTime parameter for the JMXi-DEAD-STA override DOL. Where will vignetting corrections come from? No input data structure or parameter for this correction.

- p.140 SWG input data structure? Is JMXi_IMOD-GRP actually needed if none of its children are used?

- p.141 Use parref command on all input parameters. Every input data structure in the SWG must have an override parameter, so missing parameters: Chatty→chatter. Do you need both goodTime parameter and gtiNames parameter? If vignetting corrections should be performed, where does vignetting model data come from? There should be a full description of the resources used in running this executable. Under processing: 'Read instrument model', but which bit of the instrument model?

- p.143 Needs an ISDC Context

- p.144 What is input SWG data structure? Data structure lists should note which data structures come from the SWG and which come from other places.

- p.145 Missing deadtime status table from input data structures. inSWG/outSWG is agreed name for input/output SWG parameter. Every SWG data structure should have an override DOL (this was at list done with all the earlier scripts). Proper resource estimate needed.

- p.146 Proper delivery date and version number needed for prototype delivery.

- p.147 inSWG/outSWG is agreed name for input/output SWG parameter. Use parref command. For which output data structure is lcRes the override DOL?

- p.148 Need proper resource estimate. Under 'Subordinate components' should be a list of delivered functions.

- p.149 Function should read: Bin JEM-X countrate (RATE) data to lightcurves. Input data structures should include JMXi-DEAD-STA. What is input SWG data structure? Use inSWG/outSWG parameters. If timeStep is used, should timeStart and timeStop also be used? Resource estimate needed.

- p.150 Need a list of delivered functions: use 'child' command to get proper indexing.

- pp.151,152 Pretty much the same remarks as for pages 149 and 150. PLUS: agreed names for instrument background override parameters are bkgSpecCat, bkgSpecMap, bkgSpatial, bkgScale, not ibg*****. Should input data structures JMXi-SPEC-DBG and JMXi-SPEC-BKG be JMXi-SCAT-DBG and JMXi-SCAT-BKG? lcRes has completely different meaning here than it did on pp.149 and 147. Which data structure override does backRes refer to since there are 4 possiblities?

- p.152 There must surely be some design remarks. A list of delivered functions should be supplied under 'Subordinate components'.
- p.154–156 Same remarks concerning data structures and input parameters as above. Missing JMXi-DEAD-STA as input data structure. Also missing from figure 5.17
- p.157 Should instrument model be an input data structure if none of its children are used for input? List SWG input data structure.
- p.158 Every input and output data structure in SWG should have an override DOL parameter. chatty $\rightarrow$ chatter. Use parref command to get every parameter referenced properly. Give a proper resource estimate. 'Read instrument model': which bit gets read, which child?
- p.160 Needs an ISDC context.
- pp.161–183 Generally more complete and concrete descriptions of the interactive V3 tools can be expected after the first delivery of each.
- p.161 Need a template of proposed data structure JMXi-PERF-TBL to make and entry in the Data Dictionary. Outputs: don't use 'outitem' command for something that isn't referenceable- just describe the outputs: screen display of graphs, logfile?, screen display of lists?, alerts?, etc. Shouldn't JMXi-PERF-TBL be listed as an output data structure not an input one? Input from where? Use 'outitem' command for this data structure.
- p.162 'outFile' is a terribly generic, meaningless name. 'perfTable' or similar would be better and indicate which data structure it actually points to i.e. JMXi-PERF-TBL. This description is probably obsolete now and should be updated. It's not clear whether j_perf_collect_data is a function within j_performance, or an executable that should be run before it to provide the master performance table.
- p.163 Inputs/outputs and parameters must fit together. If ogDOL is listed must have an input OG data structure as input. Every SWG data structure must have an override. A greatly improved description of all of j_performance is expected at the time of the first delivery of this tool.
- p.165. Figure 5.18 must have j_perf_collect_data added to it. Figure as a whole is obsolete.
- p.166 Need a component description for j_ical which brings together the various interactive calibration tools and can be refered to throughout ADD.
- p.184 Last part of last sentence on page is missing. Remove sentence beginning: The following is partially taken.....

- p.185 There are actually 5 different classes of raw data used in the ISSW: Calibration Raw and HK Raw should each have a description added.
- p.186 Section 6.1.7 needs to be expanded with a description of each data-taking mode and it's different data structures (some have -SRW data, most have -COR data etc. etc.)
- p.189 Add JMXi-ECAL-MOD to data dictionary
- p.191, 200 Add JMXi-ECAL-MOD as member of JMXi-IMOD-GRP; add note to see full description of JMXi-IMOD-GRP on p.200.
- p.192 Add JMXi-PERF-TBL data structure.
- p.195 Do JMXi-SPEC-DBG and JMXi-SPEC-BKG need to be added here, or should they have been JMXi-SCAT-BKG/DBG on page 151 (j_bin_bkg_lc)?
- p.199 Add data structures AUXL-ORBI-NRT, AUXL-TCOR-NRT/SHA, GNRL-SCWG-GRP and GNRL-MODE-STA
- p.200 Add JMXi-ECAL-MOD to instrument model description
- pp.201,202 Remove the deliverable completion status table since there are only a handful of V3 deliverables that have yet to be delivered for the first time.
- p.204 Add ISDCroot user manual to bibliography