Baseline Design Change

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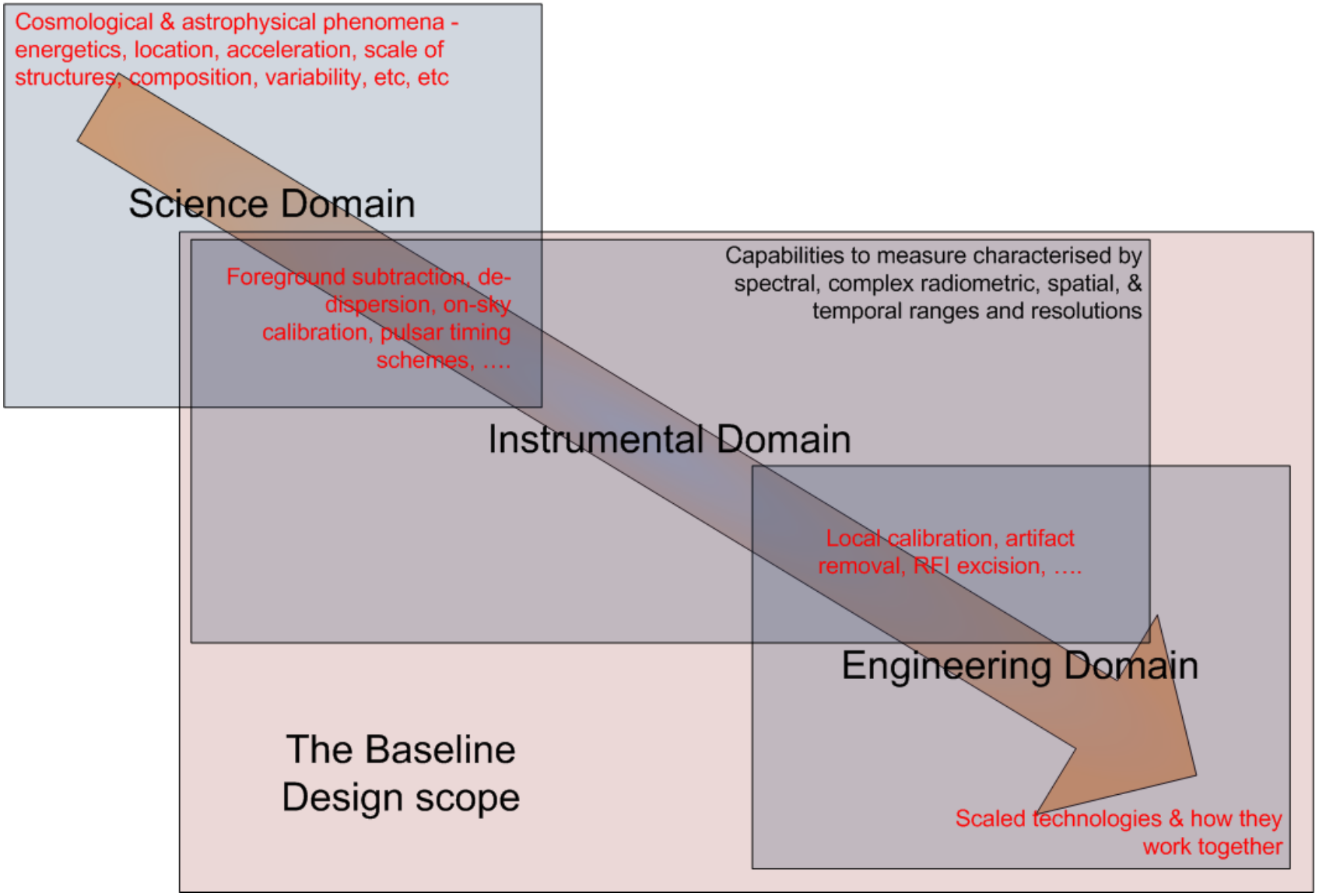
Summary

- The Baseline Design will not change until:
  - A – Responses to the RfP are received and the bid clarification process is over, AND
  - B – The cost of an SKA1 conforming to the Baseline Design has been presented to the Board, AND
  - C – Changes have been proposed, supported by evidence, analysed for risk, cost and schedule, and approved
- Errors (factual, numerical and grammatical) will be corrected and published as soon as they are detected

Change

- Change is expected and is usually necessary
- Programmatic considerations must play a major part
  - Resistance to change increases monotonically with time
  - Evidence in support of decisions also increases over time
- The principal criterion for assessing change is cost
  - A benefit value system is required
- Change management is a ‘top down’ function

Baseline Design scope

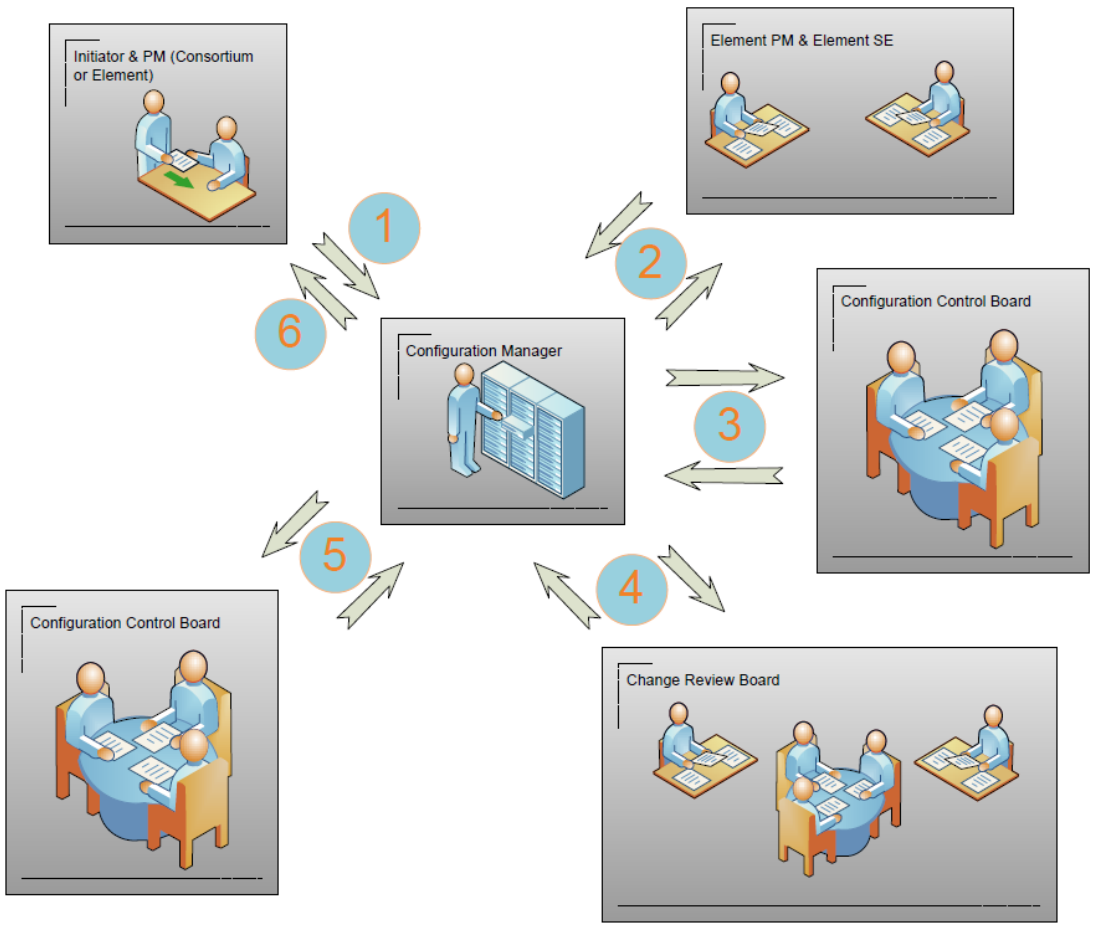


The Baseline Design as a baseline

- The Baseline Design is an engineering document fully under the **control** of the SKA Office
  - It is therefore subject to Engineering Change Management
- The design is being costed and also analysed in terms of its potential science return
  - Costing and analyses take significant time
- Thus the BD is to be held unchanged to allow this work to conclude

Control - method

- Engineering Change Management Procedure SKA-TEL.SE.CONF-SKO-PR-001
  - All steps documented
  - Time constrained
  - Executed at DSci/PM/SKAA/HoP /D-G level
  - Involves appropriate consultation



Control - timetable

Milestone number	Short description	Latest date	Location	Comment
1	Kick-off meeting	T0	Consortium premises	
	Progress meetings	T0+4 weeks	Telecon or Consortium premises	
2	Requirements Review - Finalisation of TBC's and TBD's in specification and setting of target cost for element.	T0+12 weeks	Consortium premises or SKA offices	
3	Submission of stage 1 (PDR) data package	T0+52 weeks	N/A	
4	stage 1 review meeting (SRR & PDR)	T0+60 weeks	Office of the SKA or consortium offices.	
6	Closure of stage 1	T0+68 weeks	N/A	Start of stage 2

Cases for change – SKA1_Low

- Lower frequency limit change
  - Existing constraints, plus widespread impacts
- Peak sensitivity frequency change
  - Widespread impacts
- Number of beams/beam size/station size
  - Programmatic tension between increasing resistance to change vs improving rationale for change
    - Experience with aperture array instruments

Swift XRT Engineering Change example

In 302-3041 - We are trying to get accurate (5'') GRB positions to the ground very quickly for optical follow up. The onboard SW was taking an image and then finding the source in the image, centroiding and sending the centroid position to the ground via TDRSS in seconds. The actual image was coming down later (90 minutes) via the Malindi downlinks from the solid state recorder. However, some bursts were not nearly as bright as expected and so in the longer 2.5 s exposure there were frequently cosmic rays or sometimes only cosmic rays that screwed up the position. However, the image wasn't being reported quickly only the position. This would send the ground observers on a wild goose chase. What we were asking for is to send the image with the position through TDRSS so it could be vetted for cosmic rays before the position went to the GRB community.

Courtesy - Joe Hill, GSFC

Swift Configuration Change Request (CCR)

CCR NO.:	CCR TYPE:	TITLE OF CHANGE:	CCR DATE: (dd.MMM.yyyy)
	☒ Operations ☐ Project	XRT Image Mode Data through TDRSS (Patch F)	16.Jan.2006

SYSTEM:	SUBSYSTEM (Select All That Apply):	PRIORITY:
☒ Observatory ☐ Ground ☐ Document ☐ Procedure	SC Bus ☐ HW ☐ FSW MOC ☐ HW ☐ SW BAT ☐ HW ☐ FSW Facility ☐ HW ☐ SW UVOT ☐ HW ☐ FSW Network ☐ HW ☐ SW XRT ☐ HW ☒ FSW FoM ☐ FSW	☐ **Emergency:** Immediate SC Health & Safety ☐ **Urgent:** Non-Emergency Scheduled ASAP ☒ **Routine:** Nominal Update/ Reconfiguration Scheduled as Time Permits

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PROPOSED CHANGE (Attach additional pages as required):

Send XRT Image Mode frames to ground through TDRSS. This data report is already being produced by the XRT FSW and is being sent to the SSR. The change requested here is to format the same data report for transmittal through TDRSS and to send it down to the ground through TDRSS. This would occur just after the S/C settles on a new GRB, at about the same time as the XRT Postage Stamp Image message. This change was originally proposed in a CCR dated 19 September 2005. Approval was granted for code development, with a 2nd CCR to follow before implementation. The code has now been developed and tested, and we are proposing to upload it as Patch F to the XRT.

In addition, Patch F corrects an error (ECR-304) in which pixel values in the Postage Stamp image are incorrect for gain values > 1.

See accompanying documentation for details.

JUSTIFICATION:

This will provide much better diagnostics in cases where XRT centroids on a cosmic ray or does not centroid at all. It may allow for ground-processed centroids in some cases where the on-board centroid algorithm fails. It would therefore provide better information during the GRB teleconference when we are trying to decide on the reality of a burst and on the location of the XRT afterglow.

OPERATIONAL IMPACT AND CONSTRAINTS:

Increased load on TDRSS bandwidth following new GRB. Typical telemetry size is expected to be about 5Kbytes per frame, with 1-2 frames sent down for each GRB. The TDRSS transmission would take about 20-25 s per frame. This feature can be turned on or off via telecommand. Ground software must be modified to process 3 of these images through TDRSS (ApID

IMPLEMENTATION PLAN (Include testing required or performed and corresponding results expected or achieved):

FSW mods were written and tested by SwRI. Patch was then tested on the Hot Bench to verify that the behavior was as designed/desired/expected. We have verified that the S/W behaves as previous versions when the new patch is not enabled, and produces the new telemetry reports when the patch is enabled.