ATHENA - Phase A Study Overview

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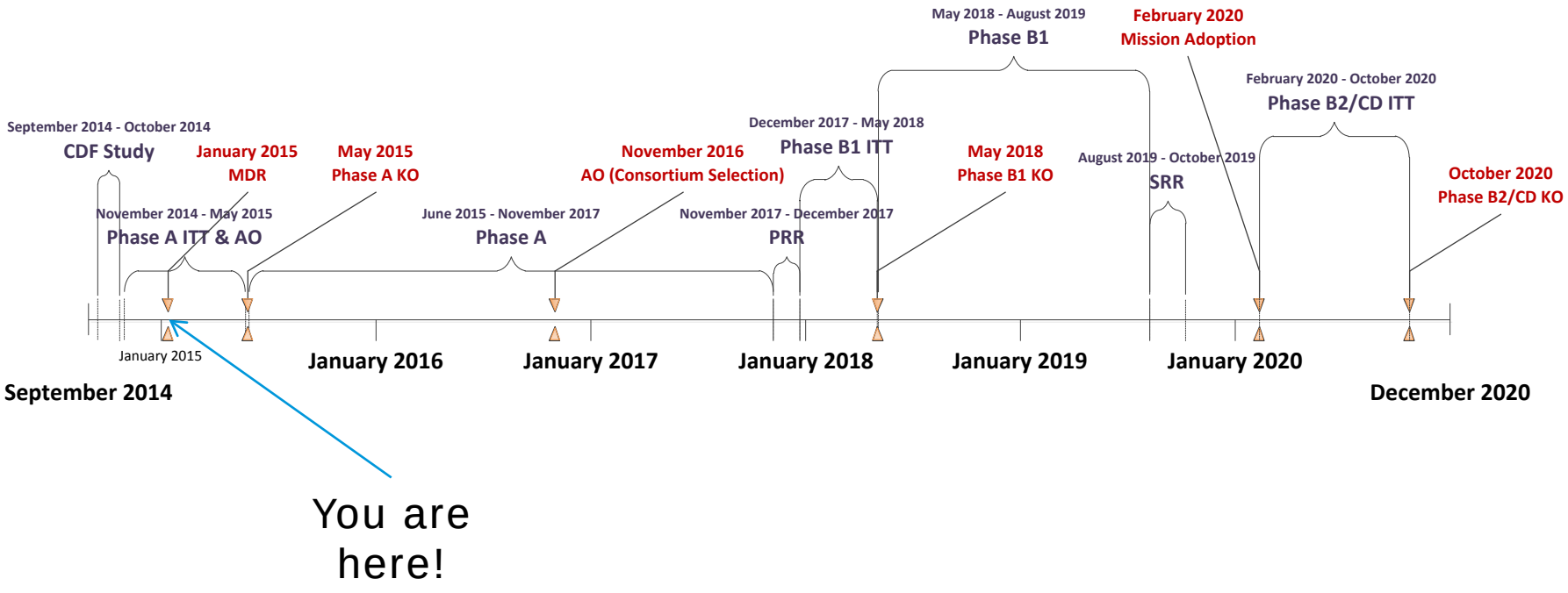
Issue/Revision: 1.0
Reference:
Status: Issued

ATHENA – Phase A Study Background

ATHENA – Overall Schedule until Adoption

- See ATHENA – Baseline schedule document in zip pack



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- Preliminary baseline configuration established in CDF study (1.37m^2 A_eff @ 1 keV, 1mm rib-spacing), in response to L2 CaC boundary conditions (1M€ 2013), but still needs confirmation
- Consolidation needed:
  - Industrial studies are needed to consolidate the SC costings from the CDF
  - International collaboration
    - JAXA involvement already well-consolidated
    - NASA less-so (clear desire to participate on core optics – but does not appear to be a good money-saver for ESA)
  - MS ability to fund PL items still needs consolidation
- No strong position on the actual A_eff we can achieve/afford
- Recent CMIN A6 decision and significant price-per-flight reduction should help us on our way

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- A couple of suggestions were made at ASST#4
- [1] Essentially move specification higher-up as was the case for GAIA, i.e. effectively stop SciRD at L1, repeat L1 requirements in MRD and let industry come up with the best way to achieve those requirements
- GAIA was a survey-mission (more-or-less single objective) with an industry-provided Payload: clearly not an equivalent scenario to ATHENA – propose not to do this - ASST mandate is to map the science objectives to the L2 parameters (let industry concentrate on their bit)
- [2] Produce a second design-point for the payloads on the basis of what would be selected if the 1.37m^2 A_eff (and associated vignetting function) was the eventual baseline
- Understand this is tricky – but will be useful to have some 'scaling' type information so we all understand what would happen to the PL designs as a f(vf) – WFI only, see later slide

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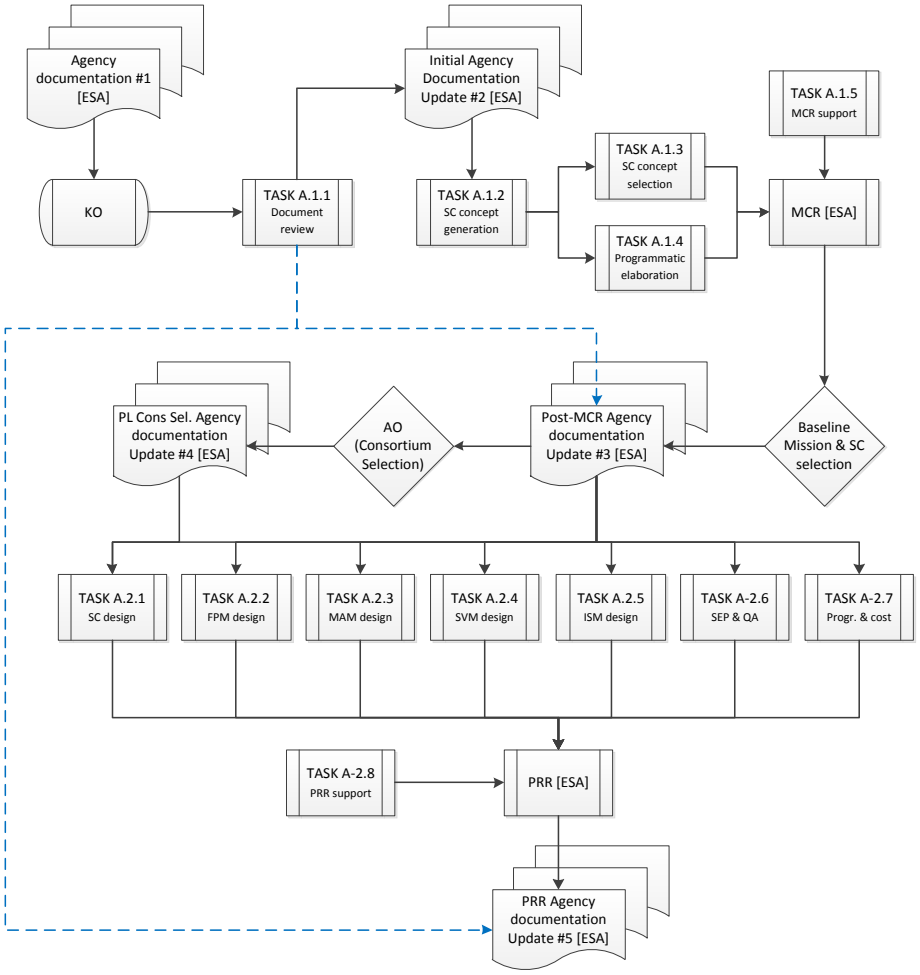
- **Phase A.1:** Mission Architecture and SC T/Os, ending with a baseline selection
- Two SC design points to be evaluated – corresponding to the (1.37m^2 and 2m^2 effective areas)
- The instrument definition is handled by the instrument teams
- Contributions of JAXA and NASA to be refined
- MCR: A baseline (what we can afford) is selected at the end of Phase A.1
- **Phase A.2** is devoted to the Consolidation of the Mission Baseline
- Technical consolidation
- Programmatic consolidation
- Partnership consolidation
- Ends with PRR
- **Diagram on right is industry workflow (does not include PL/ESA work)**



ATHENA – Phase A Study Timeline

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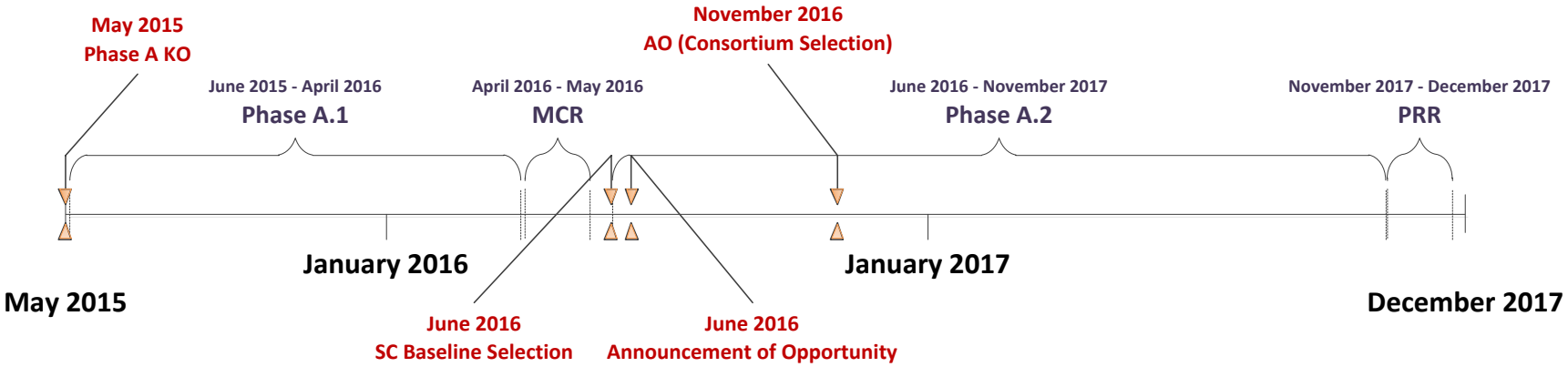

ATHENA – Phase A Study Outlook

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- Because AO has shifted back ~year, no formal consortium will exist until then
- However, there will be a need for some input to the MCR from the PL-teams
- Martin is going to rework the DRL to include the MCR (not happened yet – coming days…)
- Also, if possible PL CAD and (reduced) FEM/TMM/GMM mathematical models should be produced for delivery to the Primes at KO as an annex to the PDD (~May 2015) – can the PL providers do this in the next few months?

ATHENA – A_eff and VF Specification

ATHENA – Specifying Effective Area (A_eff) & Vignetting Function (VF)

- Working hypothesis: the X-IFU design (5') won't change with either A_eff or VF
- Working hypothesis: the WFI design (40') won't change with A_eff, but will change with VF (smaller FoV)
- **Example used is for the Goal SC, but following applies also to Baseline:**
- If we specify 2m^2 for the goal A_eff with 1mm rib-spacing, then we are asking industry to accommodate 20 MM rows (see telescope reference design document)
- cf Dick Willingdale supporting paper, 2m^2 with 3mm rib-spacing = 19 rows, so 1 extra row compared to what is needed with 3mm
- The SC they are being asked to design is not logically consistent (but is bounding both for Mirror size and WFI resources); difference is 1 row – objective of the study is anyway to select a # of rows that can be accommodated, so OK
- We definitely need to have WFI design & resources as f(VF) as an input into Phase A.1, such that the WFI selection can be made in tandem with the MM technology baseline (note: probably not at MCR, but adoption)

ATHENA – WFI Thumbnails

- Identify VF (rib-spacing) break-points at which different FoV designs for the main chip would apply - e.g. example below gives 3 designs, including the baseline
- Produce thumbnail resource-envelope estimates for these designs and also be prepared to 'fall-back' to these! (could also be forced back by MS-funding constraints anyway?)