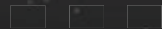
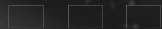
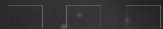


The background of the slide is a dark, star-filled space. In the center, there is a black hole with two event horizons. Concentric, wavy lines radiate outwards from the black hole, representing gravitational waves. The overall scene is rendered in shades of gray and black, with small white dots representing distant stars.

lisa

→ OBSERVING GRAVITATIONAL WAVES FROM SPACE



LISA Mission Update @ Joint NLST/SST



lisa

Martin Gehler

28/08/2018

ESA UNCLASSIFIED - For Official Use



ESA/ESRSC Joint Mission Agency

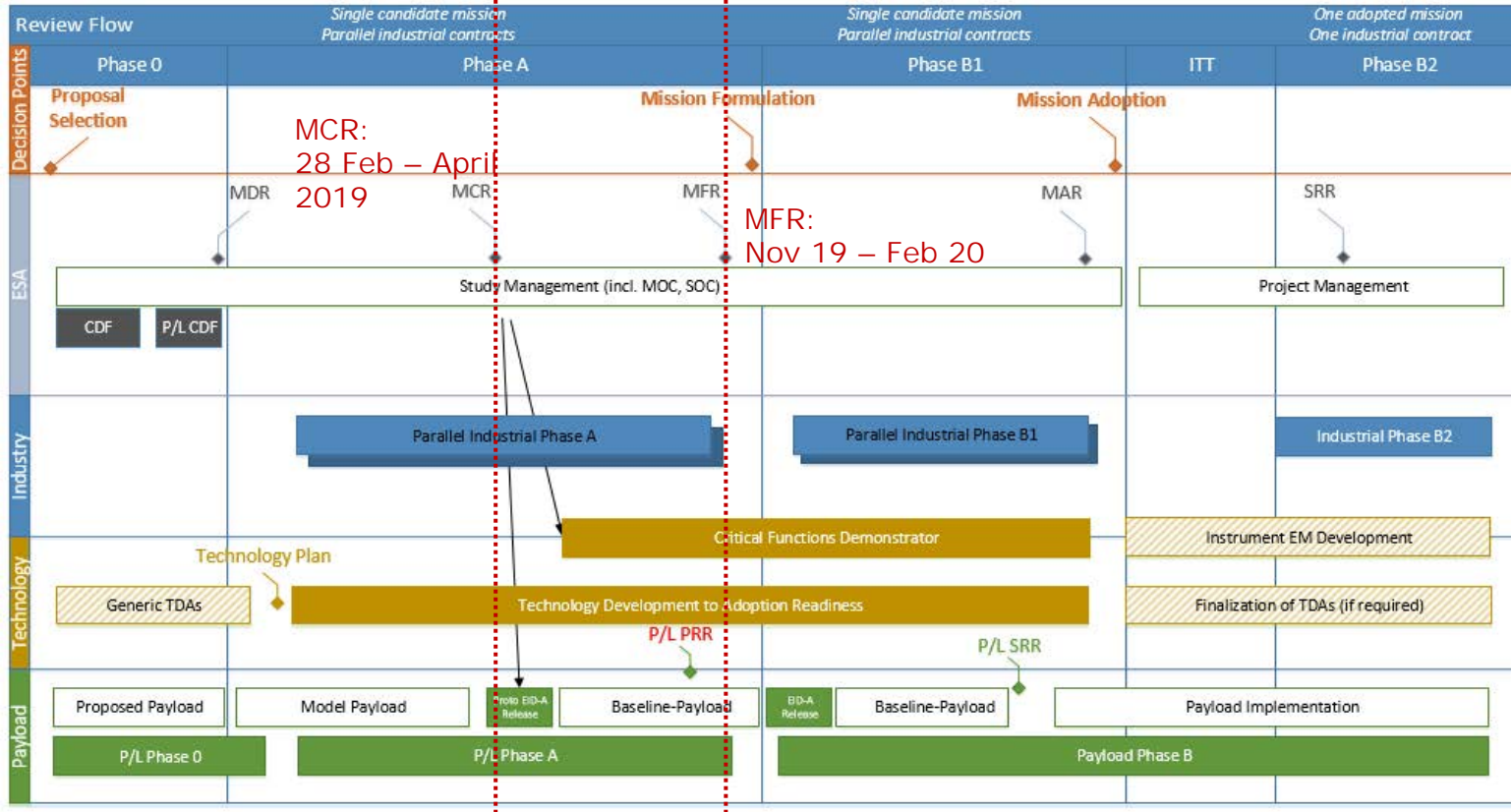
Timeline



- October 2013: Selection of “The Gravitational Universe” as science theme for the 3rd ESA flagship mission (L3)
- October 2016: Call for mission proposals for L3
- June 2017: Selection of LISA as L3 with an anticipated 2034 launch date
- May 2018: Phase A Kick-Off
- 2018/2019: Mission Phase A
- November 2019: Mission Formulation Review (end Phase A)
- >2020: Mission Phase B1
- <2024: Mission Adoption
- >Adoption: Mission Implementation (Phase B2/C/D)
- <2034: Launch
- >Launch: 6.5 years operations (+6 years potential extension)



ESA Definition Phases - Process



Roles and Responsibilities (as per Aug 2018)



❑ ESA (mission lead):

- Overall mission definition (“architect”), management, and mission performance responsibility
- Space Segment, Operational Ground Segment and Science Operations Centre development, Launch

❑ Member States:

- Development and provision of nationally funded contributions (MOSA, subsystems) under LISA Consortium umbrella, provision of data processing
- Nationally funded Phase A activities

❑ NASA:

- Development and provision of NASA contributions to space segment, ground segment, science ground segment, and to Consortium provided items

Goals of Phase A



► Establish preliminary mission design in order to verify whether the candidate mission can be implemented within cost and schedule and to provide sufficient information to enable transition into phase B1.

Work in Phase A:

- Review and refinement of top-level requirements
- Investigation of alternative architectures, trade-offs, mission analysis and operations
- Identification and verification of design drivers and critical elements (especially those that have no or little heritage) with a corresponding mitigation plan (e.g. new technology developments)
- Identification of a feasible mission design and baseline definition
- Identification of suitable launcher(s)
- Definition, execution, review of technology developments
- Programmatics (cost, schedule, risk)
- Refine split of responsibilities and provisions by member states and international partners that should be endorsed at the end of Phase A (note: MoU/MLA comes later at adoption)

Status of Phase A Activities – Industrial



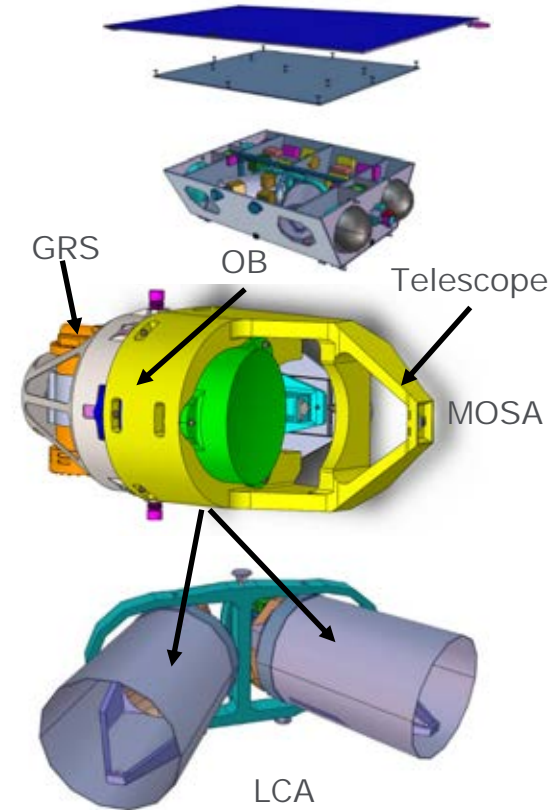
- ❑ Two parallel industrial contracts for “LISA System Phase A Study”
 - 2.7 MEUR each
 - Awarded to Airbus Defence and Space GmbH and to Thales Alenia Space S.p.A.
- ❑ Status: Kicked-off in mid-May 2018, running on schedule, 2nd progress meetings in Sept.
- ❑ Scope of Work:
 - Review of Requirements, Trade-offs and baseline selection, mission architecture definition, payload interface definition
 - Spacecraft design and analysis, System Engineering Plan, ground segment and operations definition support, programmatic assessment
 - Support of Agency Reviews
 - LISA specific engineering tasks: Performance budget, telescope shadow preliminary design and engineering, DFACS, STOP analysis, laser system architecture support, EMC and gravitational disturbances analysis and control, SEO activity support, mission AIV

Current System Status (Phase A kick-off)



Item	Mass
Platform dry mass	860 kg
Payload dry mass	504 kg
Payload system level margin (20%)	101 kg
Total dry mass / spacecraft	1465 kg
System margin (20%)	293 kg
Total dry mass / spacecraft incl system margin	1758 kg
Transfer Propellant (Xe)	169 kg
Cold Gas	242 kg
Total wet mass / spacecraft	2169 kg
Launch Adapter/Dispenser estimate	1000 kg
Total	7507 kg
Launcher Capacity	7000 kg

Note: Per spacecraft 169 kg over target, many conservative assumptions
Main increase vs CDF came from payload.



Status of Phase A Activities – Instrument



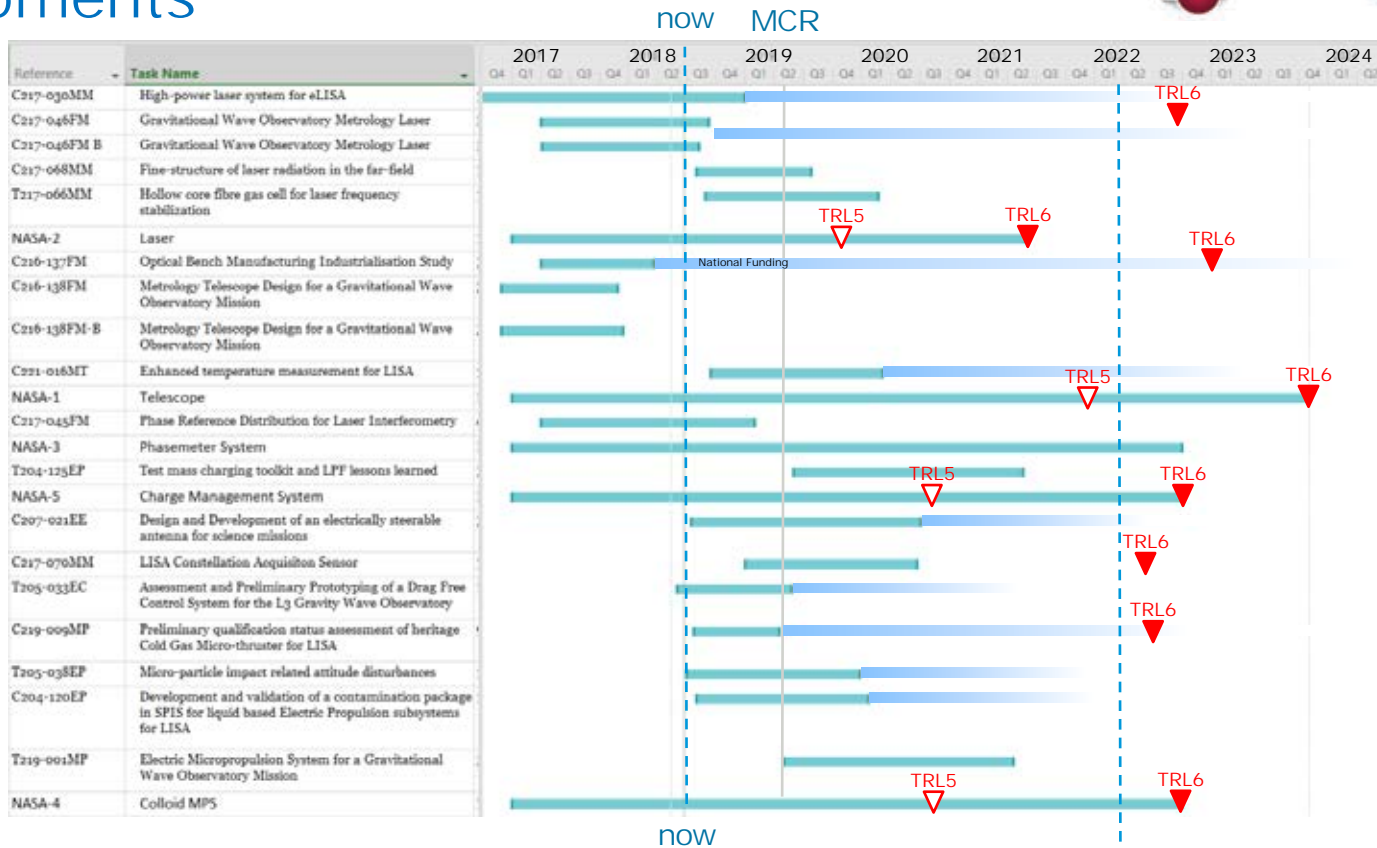
❑ ESA-funded:

- One contract in direct negotiation with the Consortium (represented by AEI)
- 1 MEUR target firm fixed price
- Status: In negotiation with AEI, delayed.

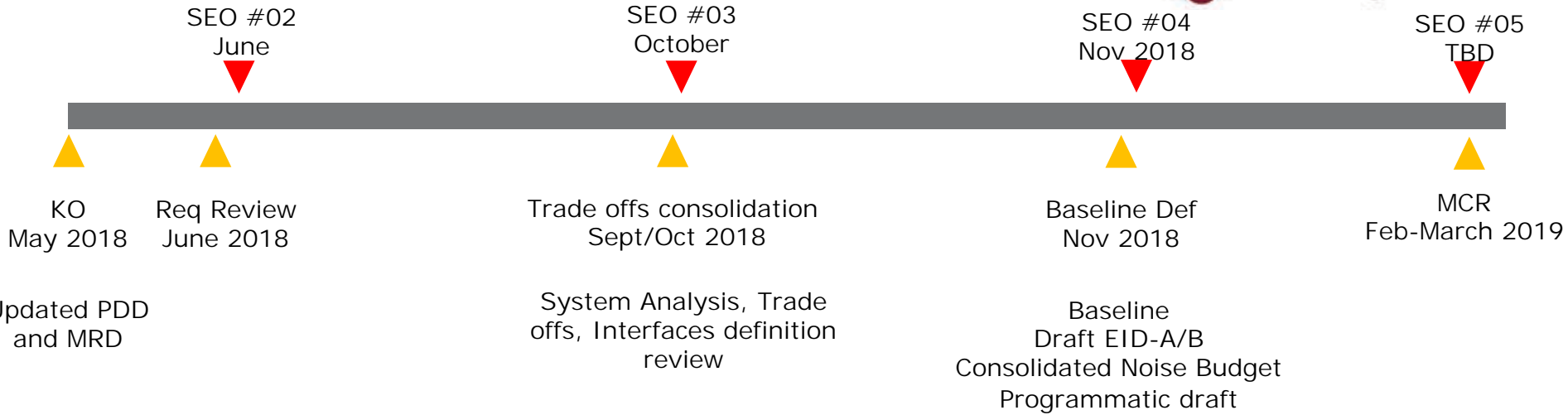
❑ Nationally Funded:

- Activities officially kicked-off in June 2018
- Industrial support to Consortium Lead (AEI) provided by Airbus GmbH (instrument architect role) with AIV/T under CNES responsibility
- Dedicated activities on provisions within member states (e.g. Phasemeter, Data & Diagnostics, GRS, Optical Bench, DPC)

Status of Activities – Technology Developments



Timeline to MCR



Updated PDD and MRD

System Analysis, Trade offs, Interfaces definition review

Baseline Draft EID-A/B
Consolidated Noise Budget
Programmatic draft

Meeting	Main focus
SEO #01	KO meeting
SEO #02	Requirements Review (aligned with Phase A ind req review), Iteration on Noise Budget, System analysis
SEO #03	System level analysis and trade offs in support to baseline definition, Noise Budget iteration, interfaces iteration - US
SEO #04	Baseline definition prior to MCR, first draft of EID-A, consolidated Noise Budget, programmatic assesment
SEO #05	MCR results analysis (or earlier for MCR preparation if needed)

