

# M5 Mission Selection Process

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Paul McNamara  
Astronomy and Astrophysics Mission Coordinator

Theseus Conference 2021



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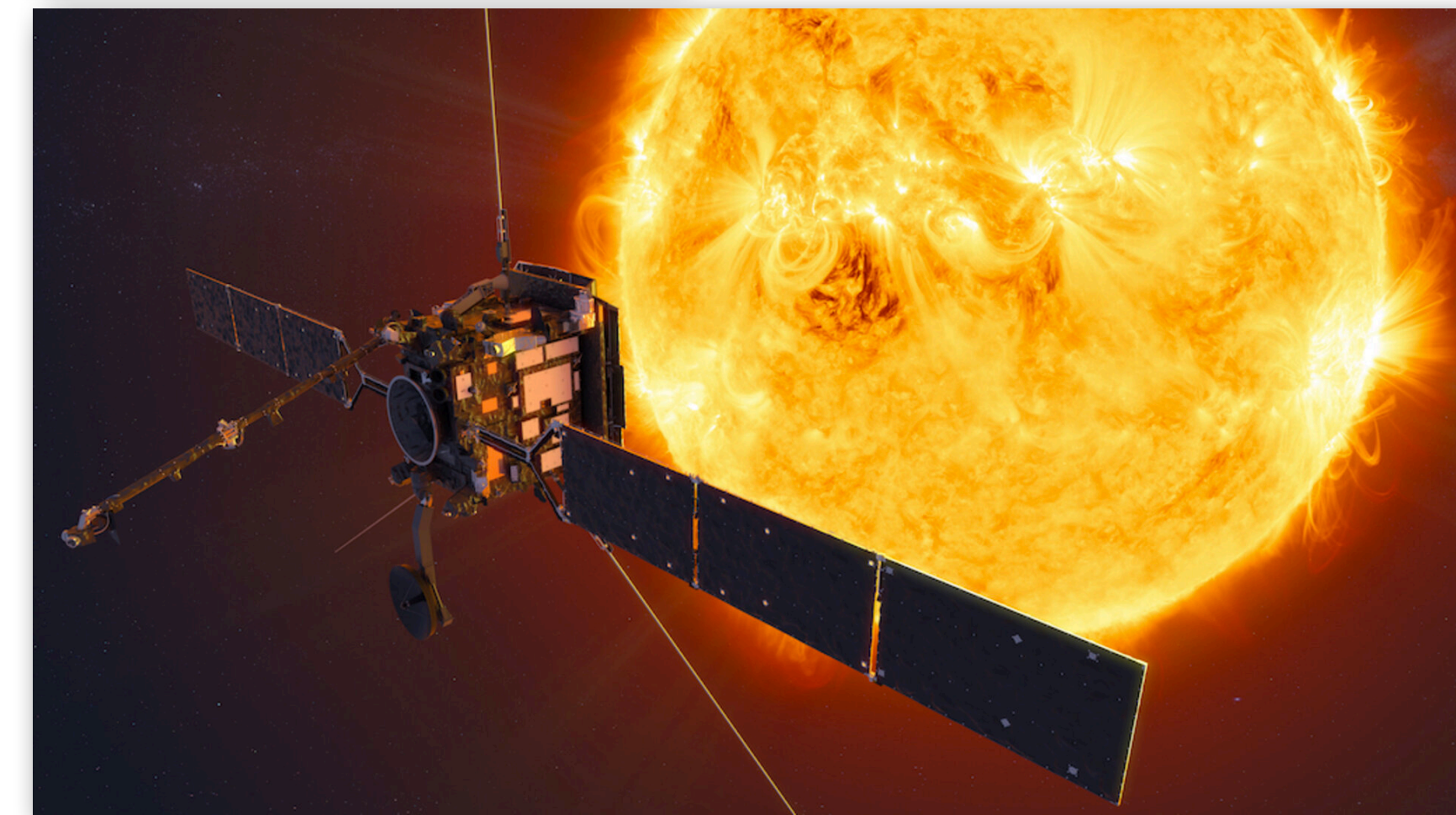
🌐 Some numbers:

- 36 missions launched
  - 14 still in operation
  - 22 in legacy phase
- 15 missions selected and in study or development phase
- 2 missions in competition



← COS-B (1975)

↓ Solar Orbiter (2020)





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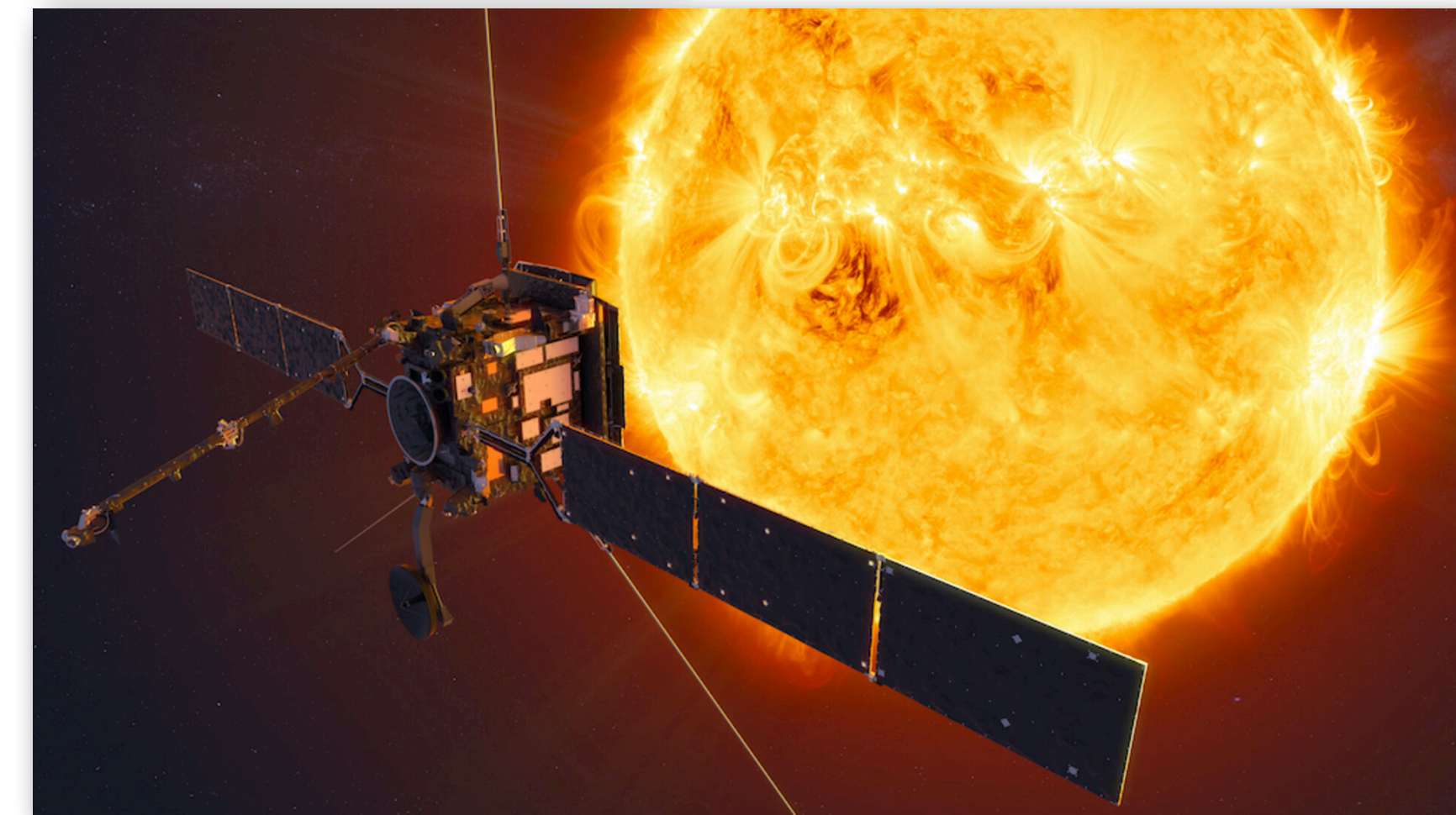
🌐 Missions are characterised into the following types:

- Large missions ( $\sim 2 \times$  yearly science programme budget =  $\sim \text{€}1.1\text{B}$ )
- Medium missions ( $\sim 1 \times$  yearly science programme budget =  $\sim \text{€}550\text{M}$ )
- Small/Fast missions ( $\sim \text{€}150\text{M}$ )
- Missions of Opportunity (max  $\text{€}50\text{M}$ )



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# COSMIC OBSERVERS



CONCEPTS

IN DEVELOPMENT

ACTIVE

microwaves

sub-millimetre

infrared

optical

ultraviolet

x-rays

gamma rays

gravitational waves

LEGACY

**planck**  
(2009–2013)

**herschel**  
(2009–2013)

**iso**  
(1995–1998)

**akari**  
(2006–2011)

**hipparcos**  
(1989–1993)

**corot**  
(2006–2014)

**iue**  
(1978–1996)

**exosat**  
(1983–1986)

**hitomi**  
(2016)

**suzaku**  
(2005–2015)

**cos-b**  
(1975–1982)

**lisa pathfinder**  
(2015–2017)

**microscope**  
(2016–2018)

**webb**  
(2021)

**ariel**  
(2028)

**roman**  
(2020s)

**euclid**  
(2022)

**plato**  
(2026)

**xrism**  
(2021)

**einstein probe**  
(2022)

**athena**  
(2031)

**theseus**

**lisa**  
(2034)

**hubble**  
(1990–)

**gaia**  
(2013–)

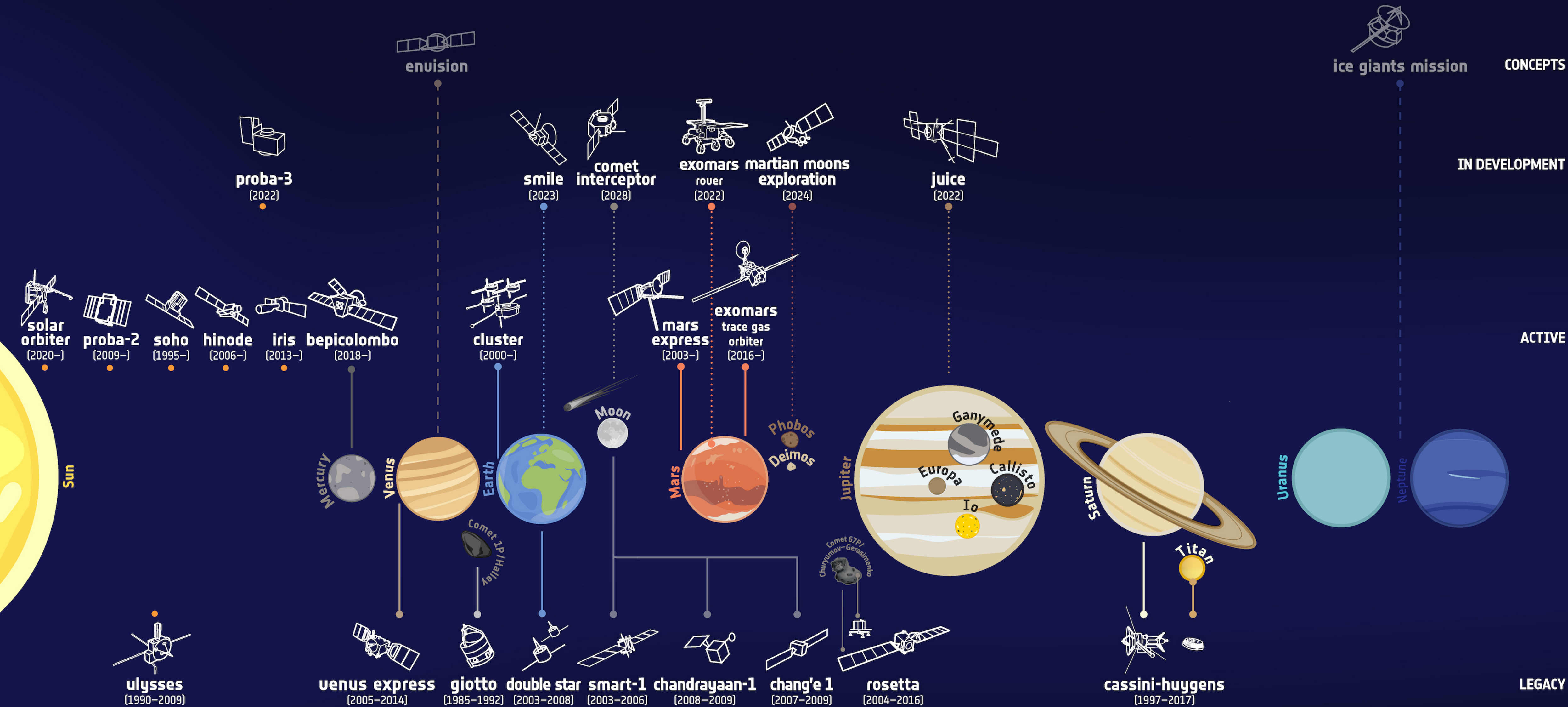
**cheops**  
(2019–)

**xmm-newton**  
(1999–)

**integral**  
(2002–)



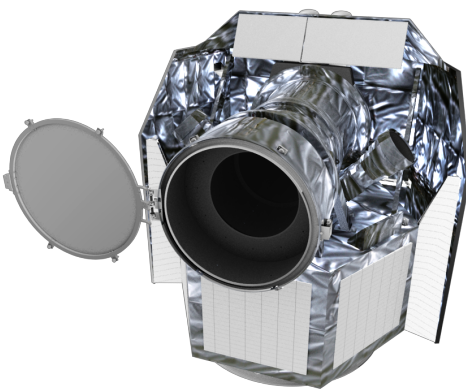
→ SOLAR SYSTEM EXPLORERS



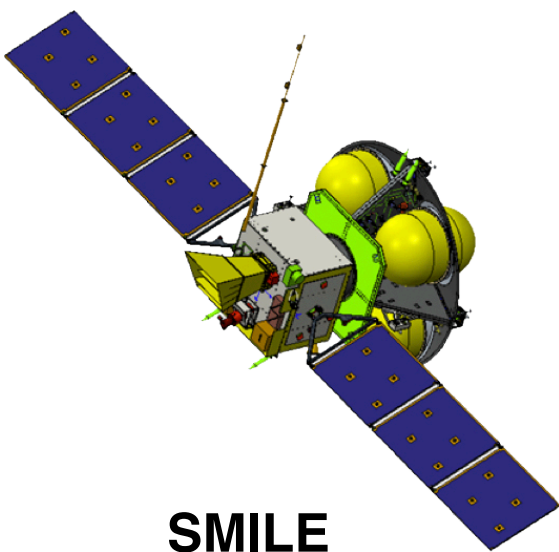




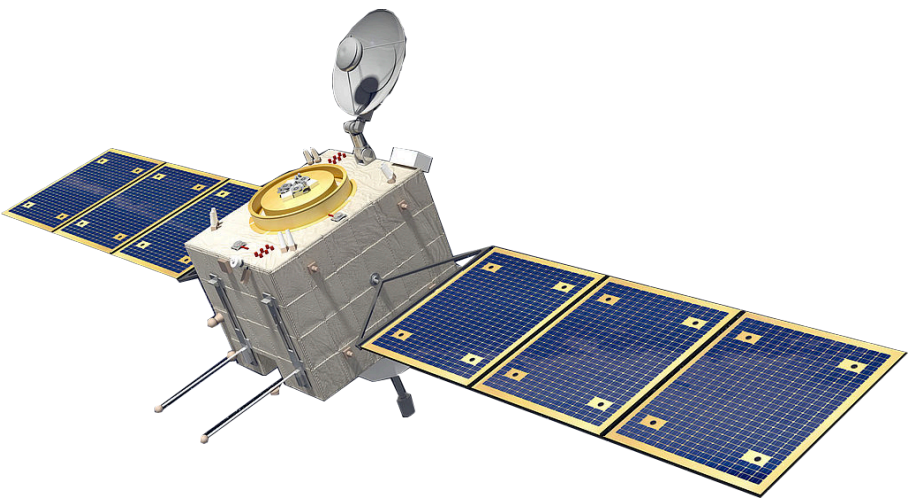




S1: CHEOPS



SMILE



F1: Comet Interceptor

F2: ?

## Small and Fast Missions

ESA UNCLASSIFIED - For Official Use



## Medium-class Missions

M1: Solar Orbiter

M2: Euclid

M3: PLATO

M4: Ariel

M5: ?

## Small and Fast Missions

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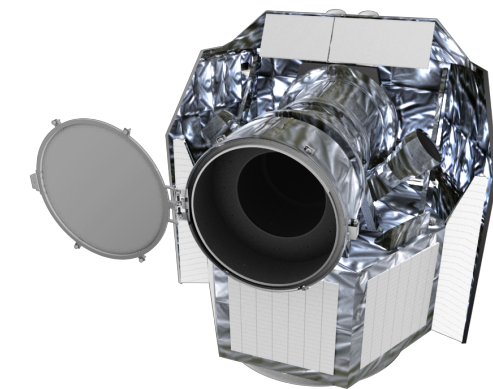
# Cosmic Vision Programme



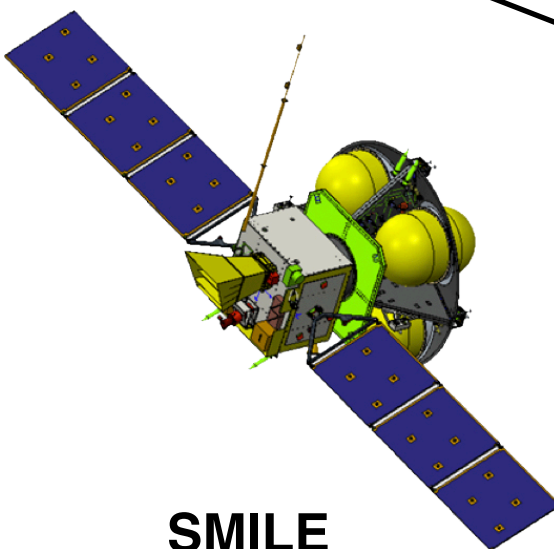
## Medium-class Missions



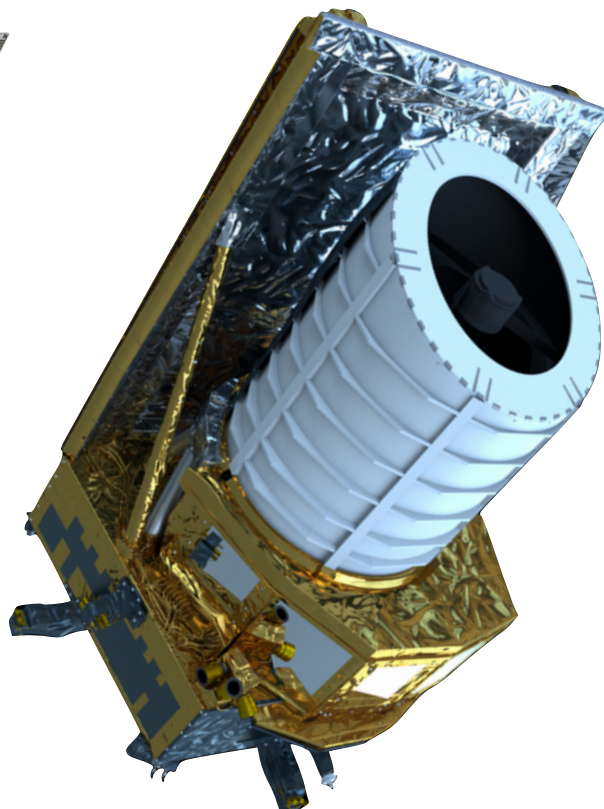
M1: Solar Orbiter



S1: CHEOPS



SMILE



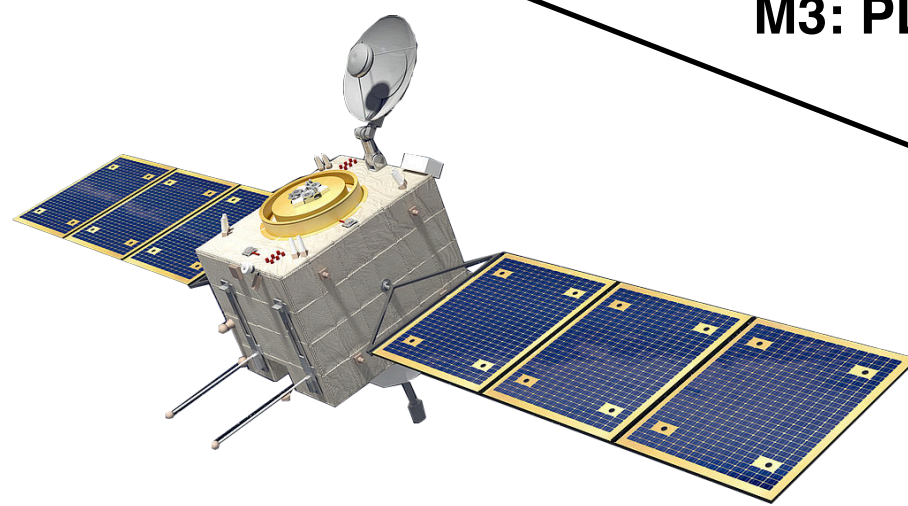
M2: Euclid



M3: PLATO

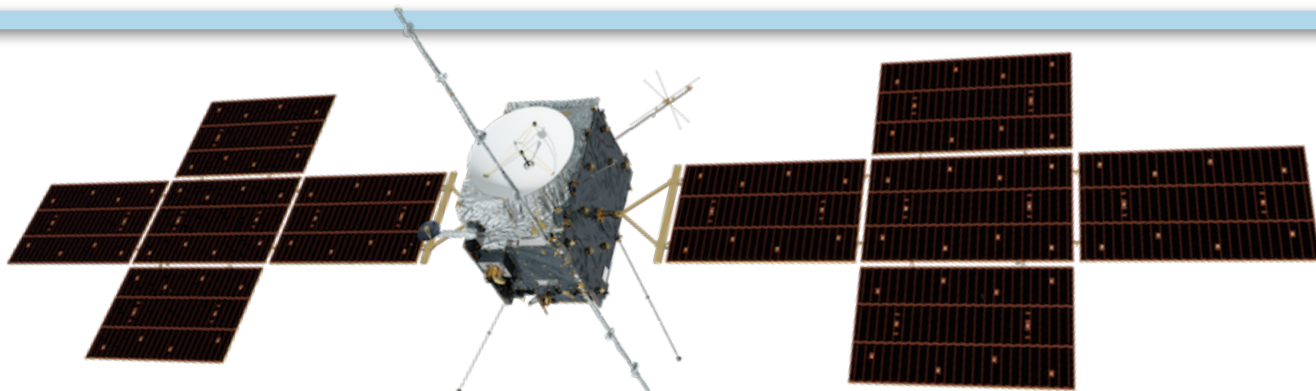


M4: Ariel

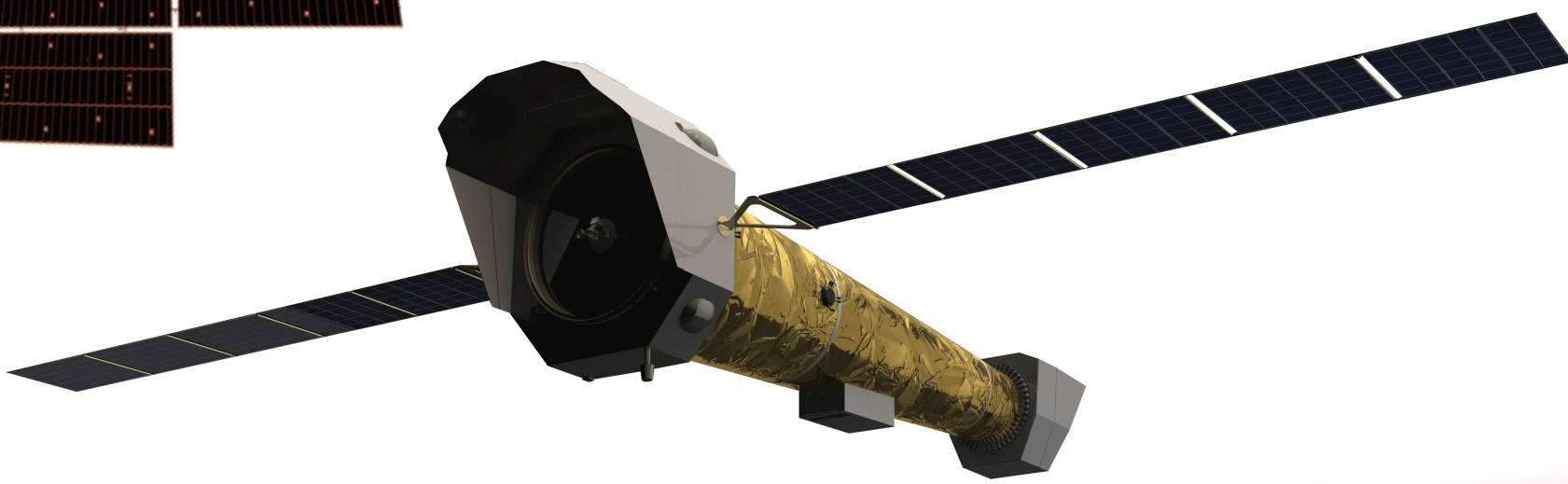


F1: Comet Interceptor

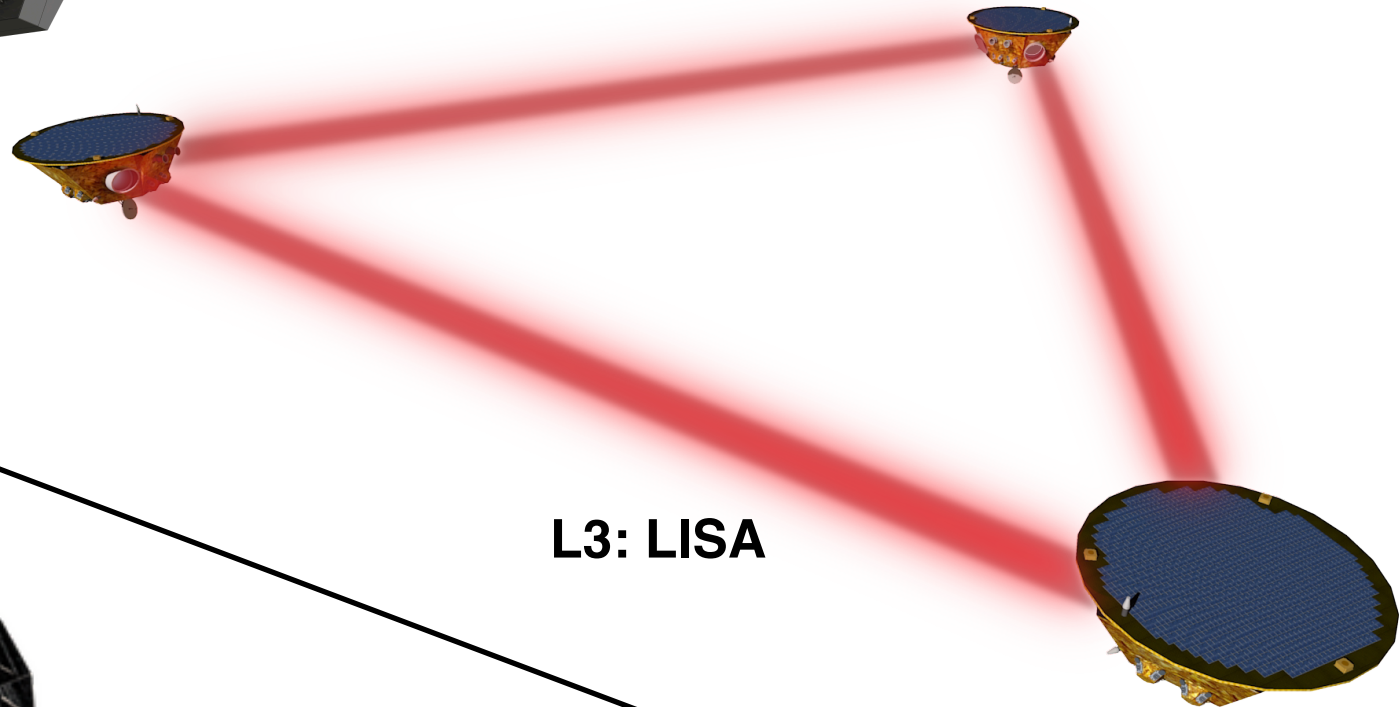
F2: ?



L1: JUICE



L2: Athena



L3: LISA

M5: ?

## Large-class Missions

## Small and Fast Missions

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Theseus Conference 2021 | 23-03-2021 | Slide 5





# M5 Timeline



- Release of call for M5 mission
- Proposal Submission deadline
- Selection of missions for study

April 2016  
October 2016  
April 2018

Call for the “M5 Mission”

April 2016

**Call for a Medium-size mission opportunity  
in ESA’s Science Programme (M5)**

**1 INTRODUCTION**

The ESA Science Programme is based on long-term planning of scientific goals. The Cosmic Vision plan (available as ESA BR-247) was established in 2005 on the basis of a bottom-up process that started with a consultation of the broad scientific community and contains the wide-ranging and ambitious scientific questions to be addressed by missions in the ESA Science Programme.

The definition of the actual space missions that will address the science themes in question is based on the competitive, peer-reviewed selection of Large (L) and Medium (M) missions.

Through the present Call for Missions the Director of Science solicits from the broad scientific community proposals for the competitive selection of mission concepts to be candidate for the implementation of the “M5” Medium mission. The present Call is open to missions in all areas of Space Science.

**2 BOUNDARY CONDITIONS**

The proposals submitted in response to the present “M5 Call” for mission concepts must be compatible with the boundary conditions spelled out in the present section.

**2.1 Cost and schedule**

The present “M5 Call” solicits proposals for a mission with a cap to the ESA Cost at Completion (CaC) of 550 M€. Proposals with a cost below this cap would be considered with no prejudice, both for stand-alone missions and for contributions to partner-led missions. Proposals with a cost to ESA exceeding the cap would be considered as non-feasible.

The CaC cap includes the cost of the mission’s nominal operations and can include a contribution to the payload, including the case of a mission with payload fully funded by ESA (à la Gaia).

The development schedule and therefore the launch date will be driven by the mission's complexity (and, in case of international partnerships, by the partner's schedule). It is

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European Space Agency  
Agence spatiale européenne

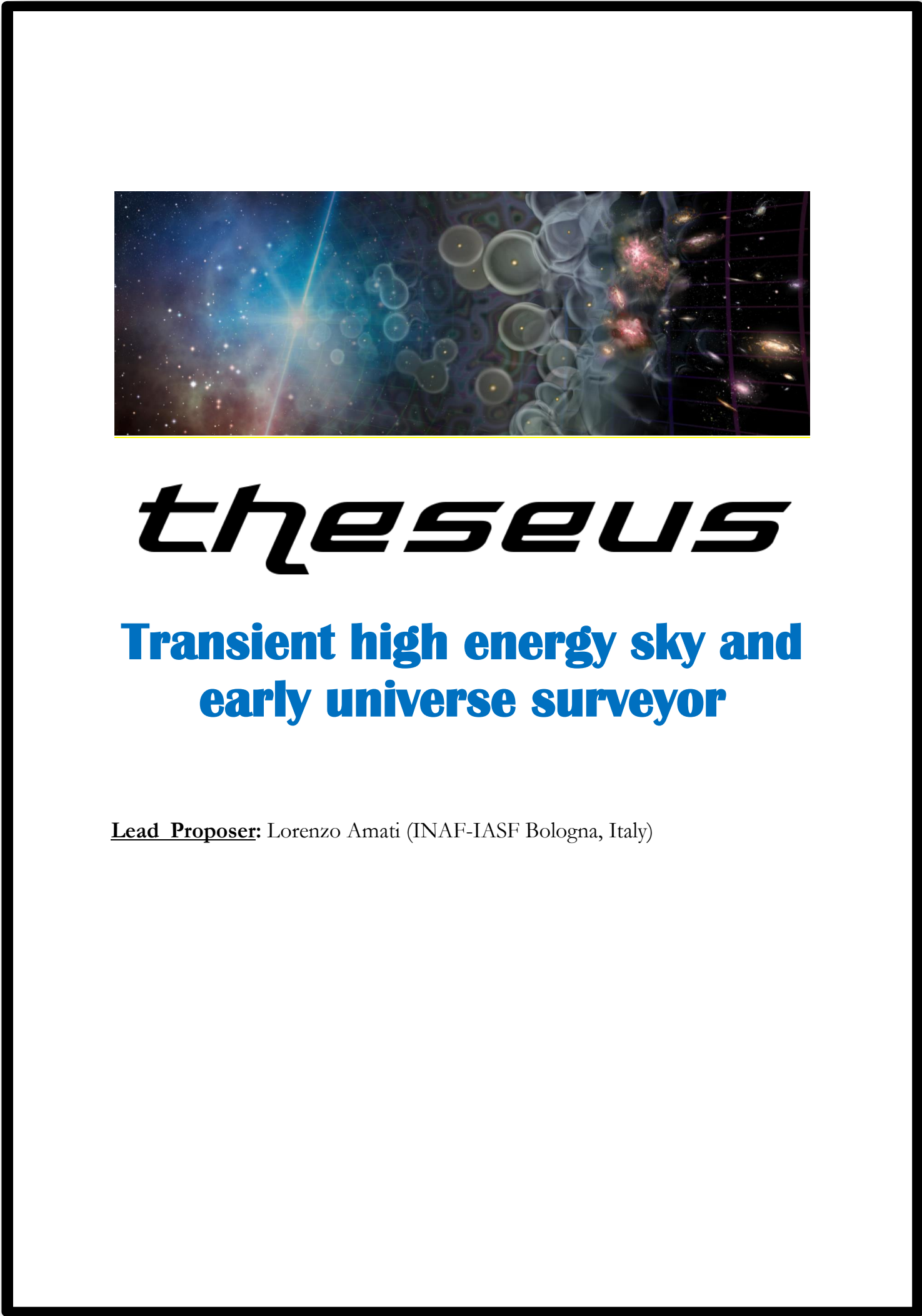






**SPICA**  
*Unveiling the  
obscured  
Universe*

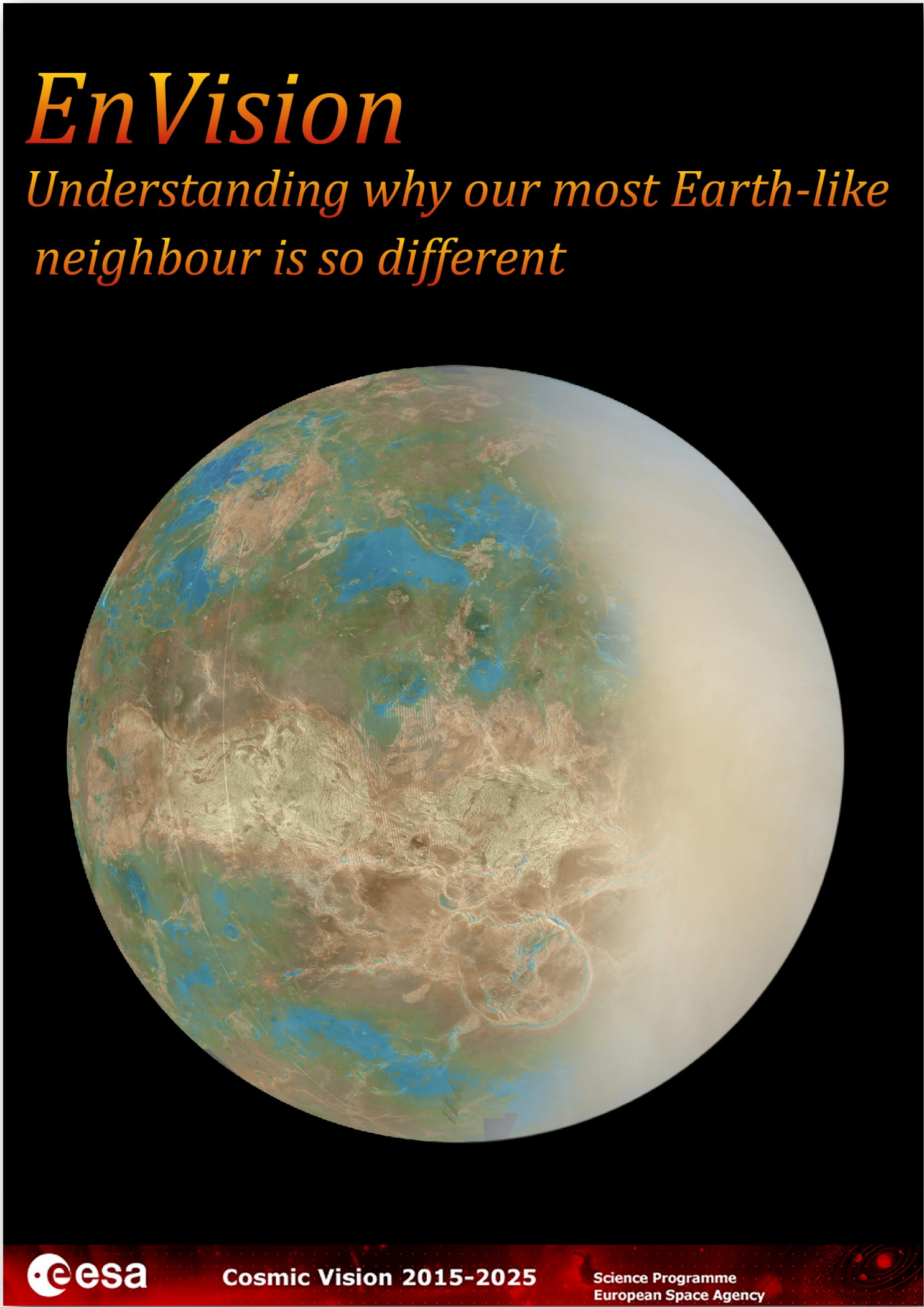
Dr. P. R. Roelfsema  
*On behalf of the international  
SPICA consortium*



**theseus**

**Transient high energy sky and  
early universe surveyor**

Lead Proposer: Lorenzo Amati (INAF-IASF Bologna, Italy)



**EnVision**  
*Understanding why our most Earth-like  
neighbour is so different*

**esa** Cosmic Vision 2015-2025 Science Programme  
European Space Agency



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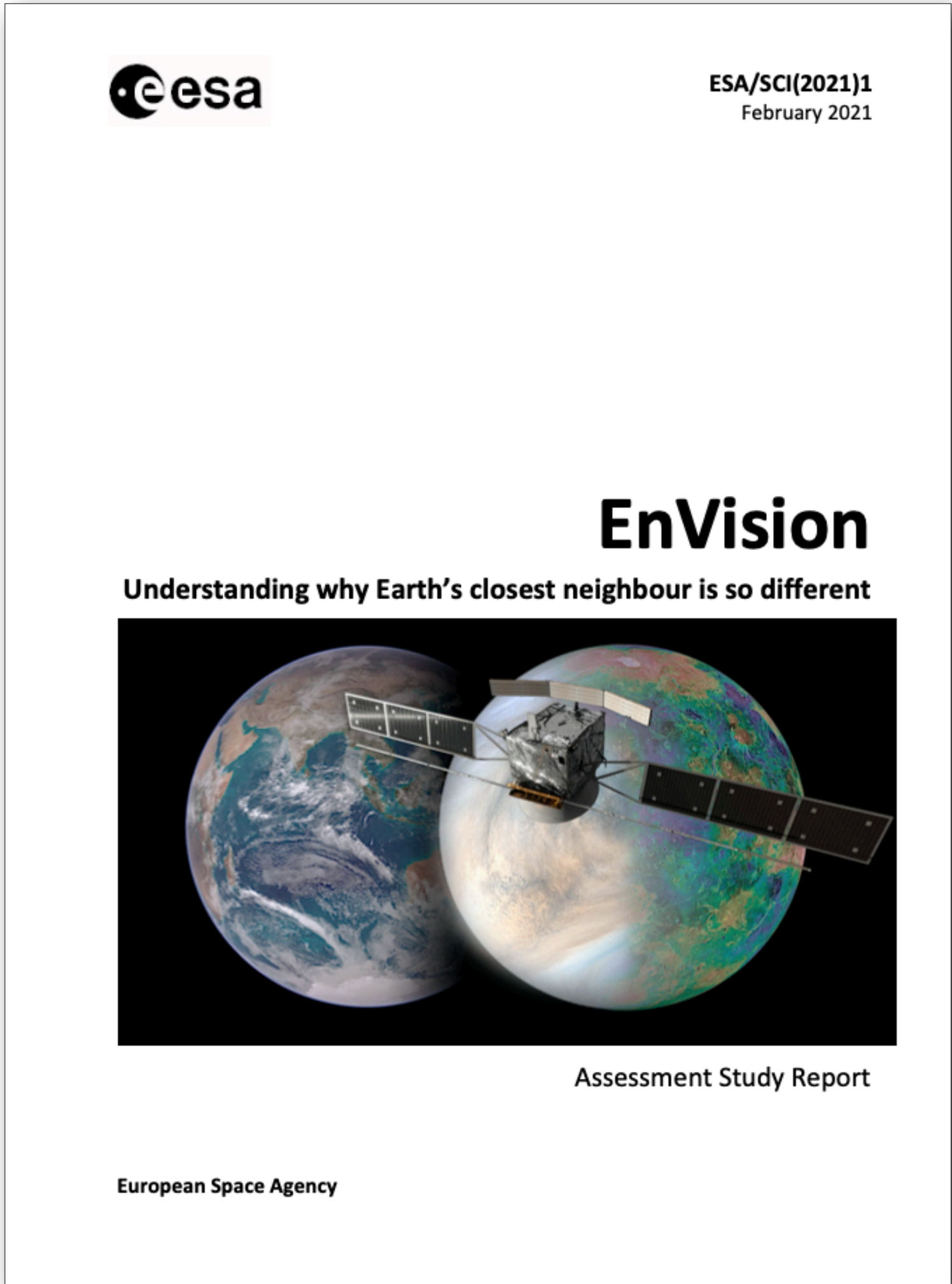
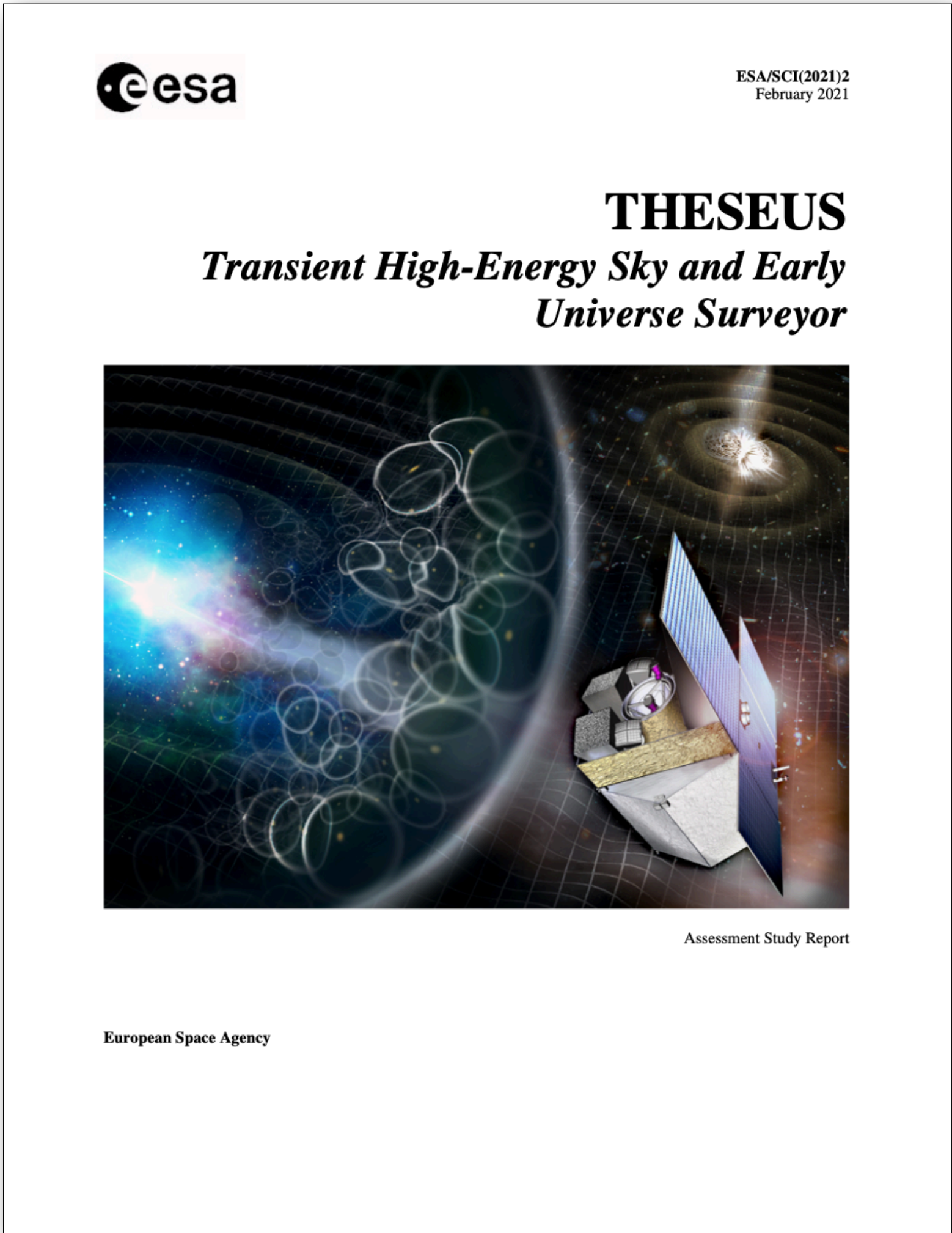


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- 🌐 **SPC Selection of M5 Mission 9-10 June 2021**

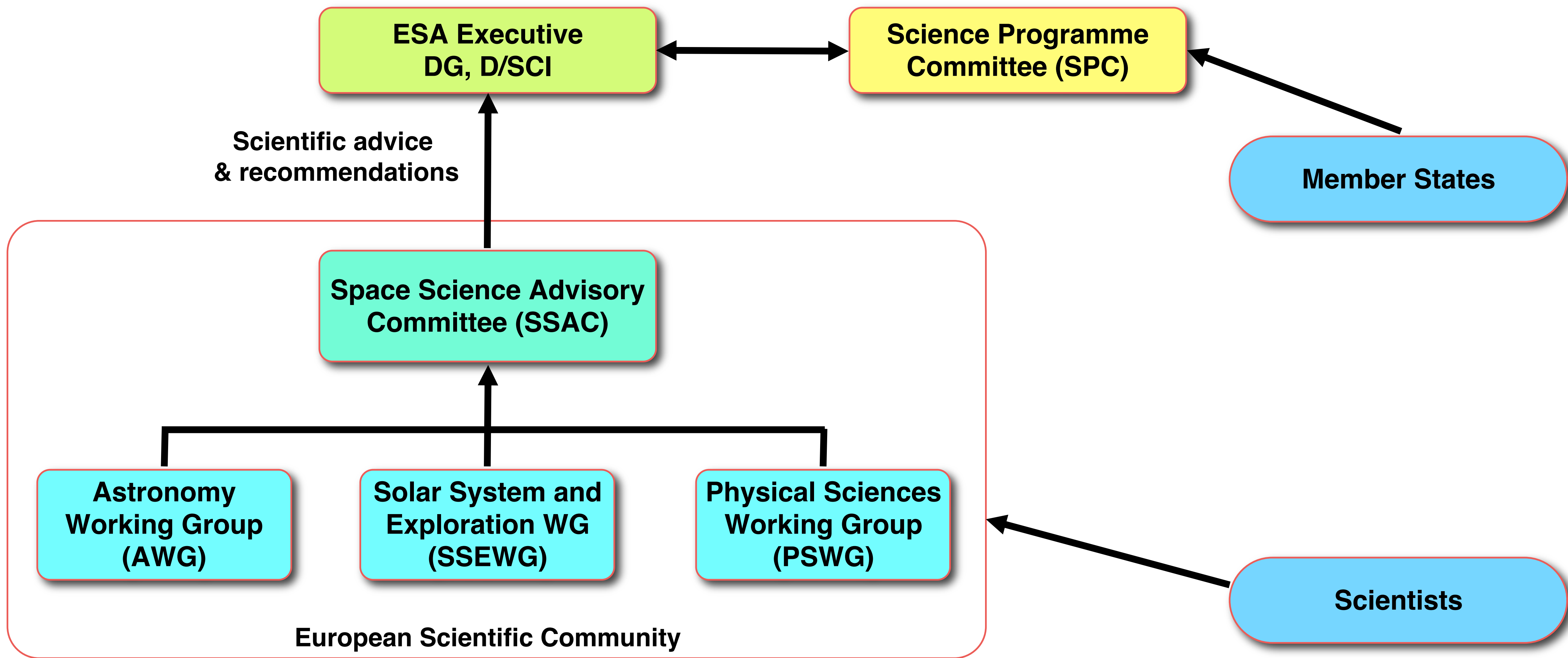




<https://sci.esa.int/web/cosmic-vision/publication-archive>

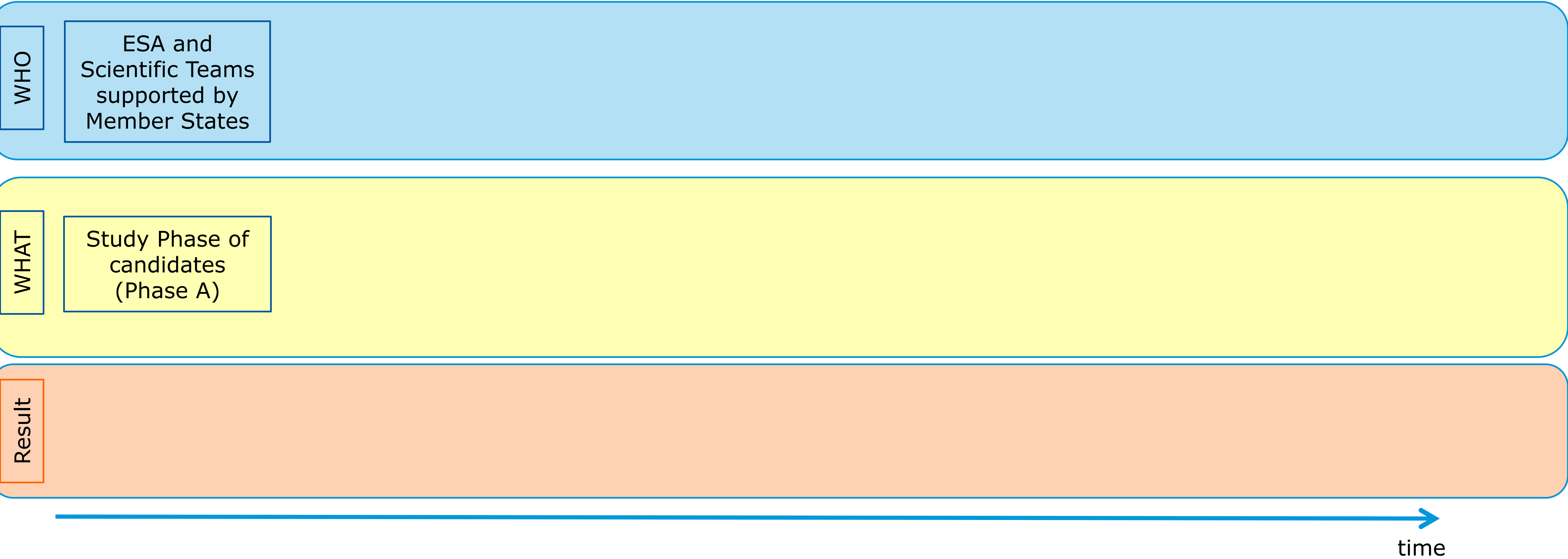


# Science Directorate Advisory Structure



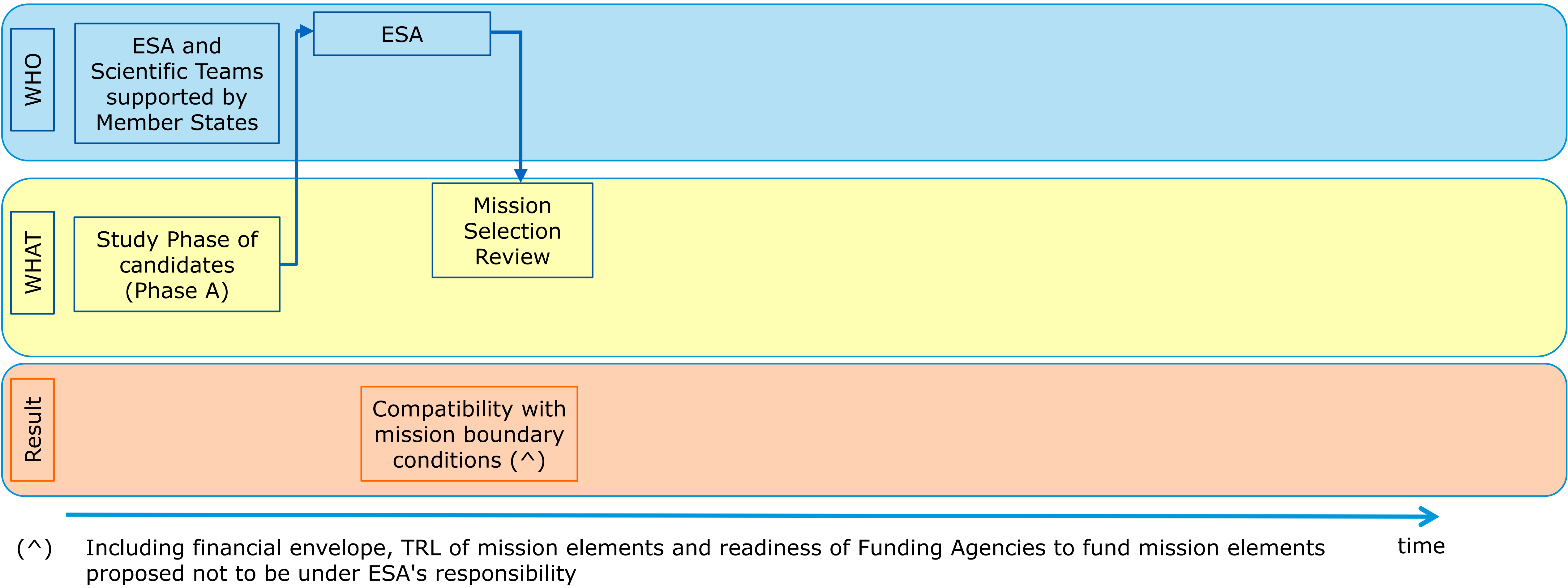


# M5 Mission – selection process



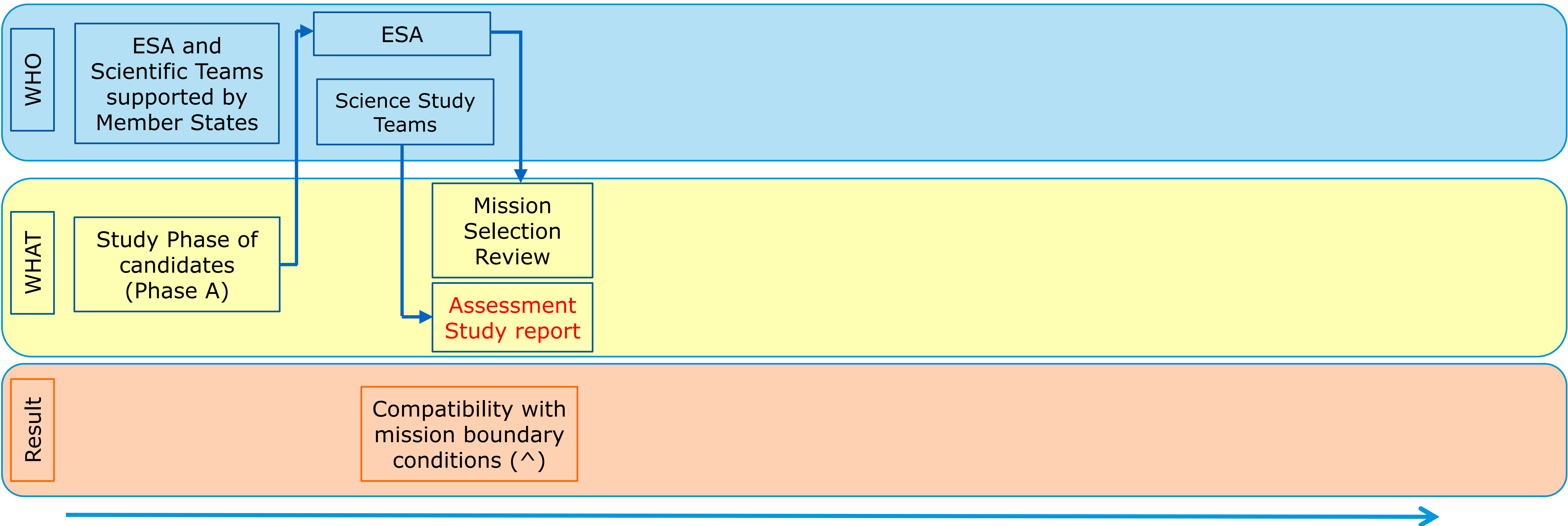


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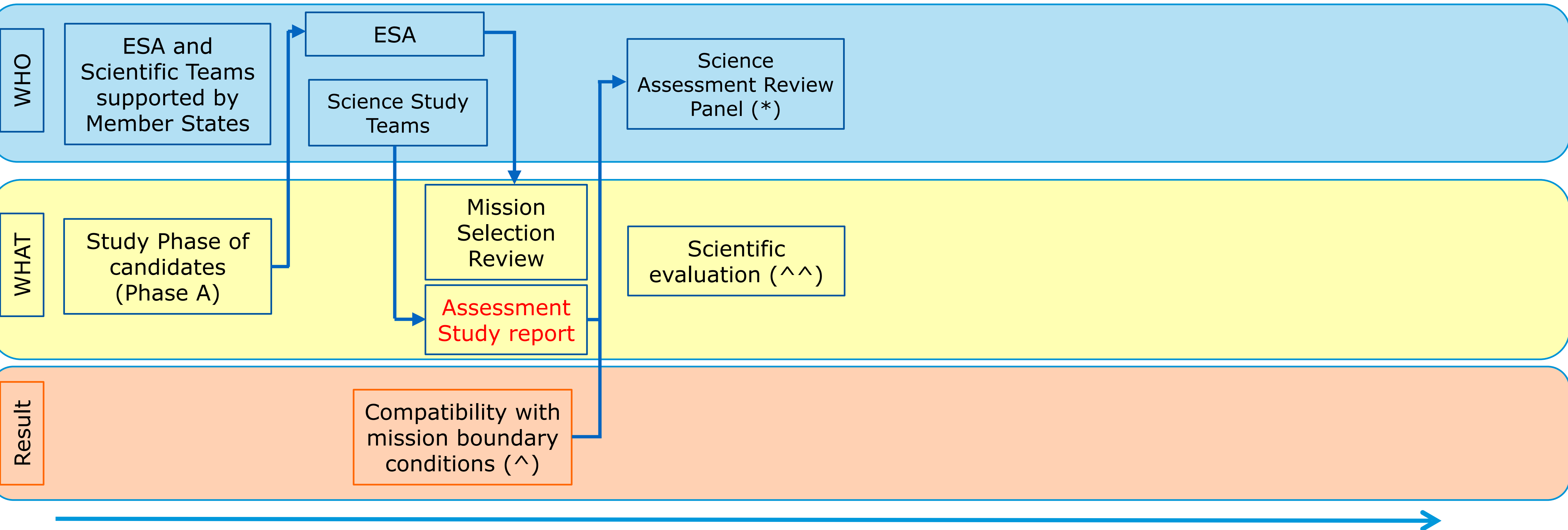
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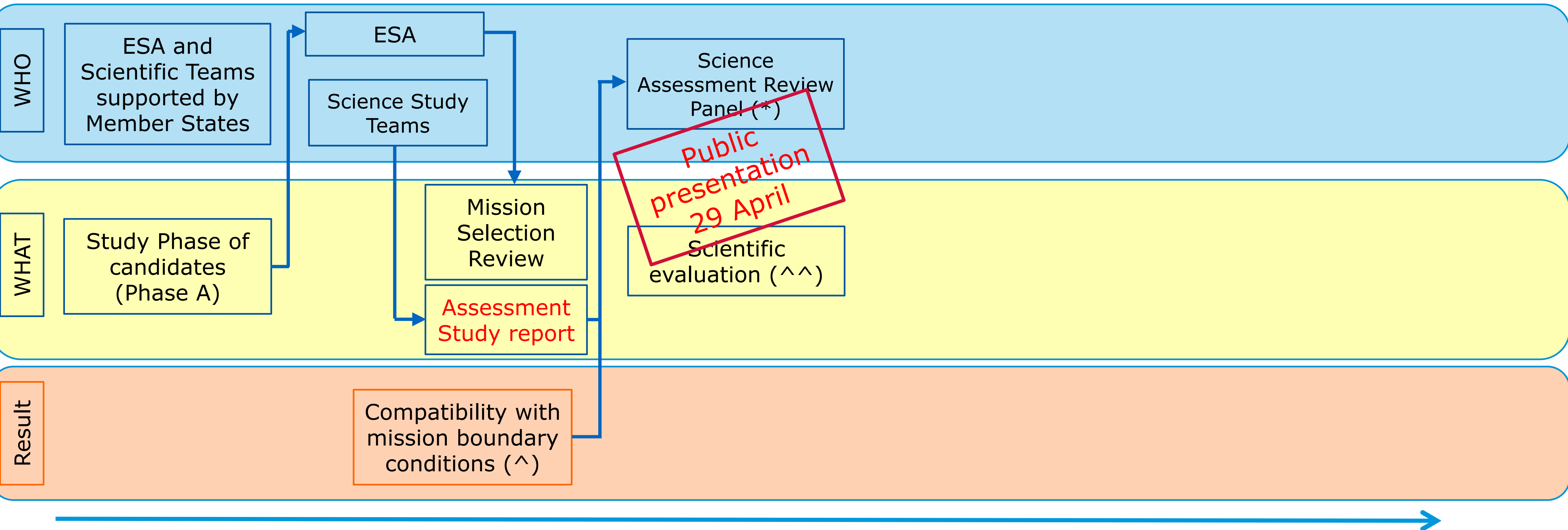
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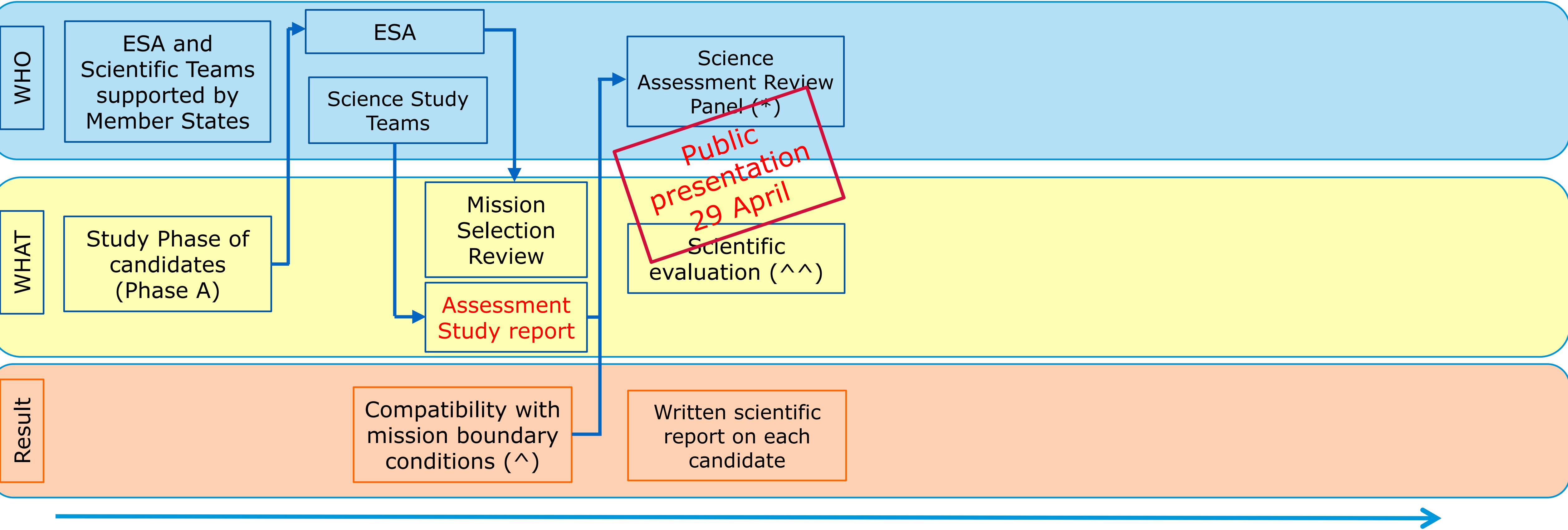


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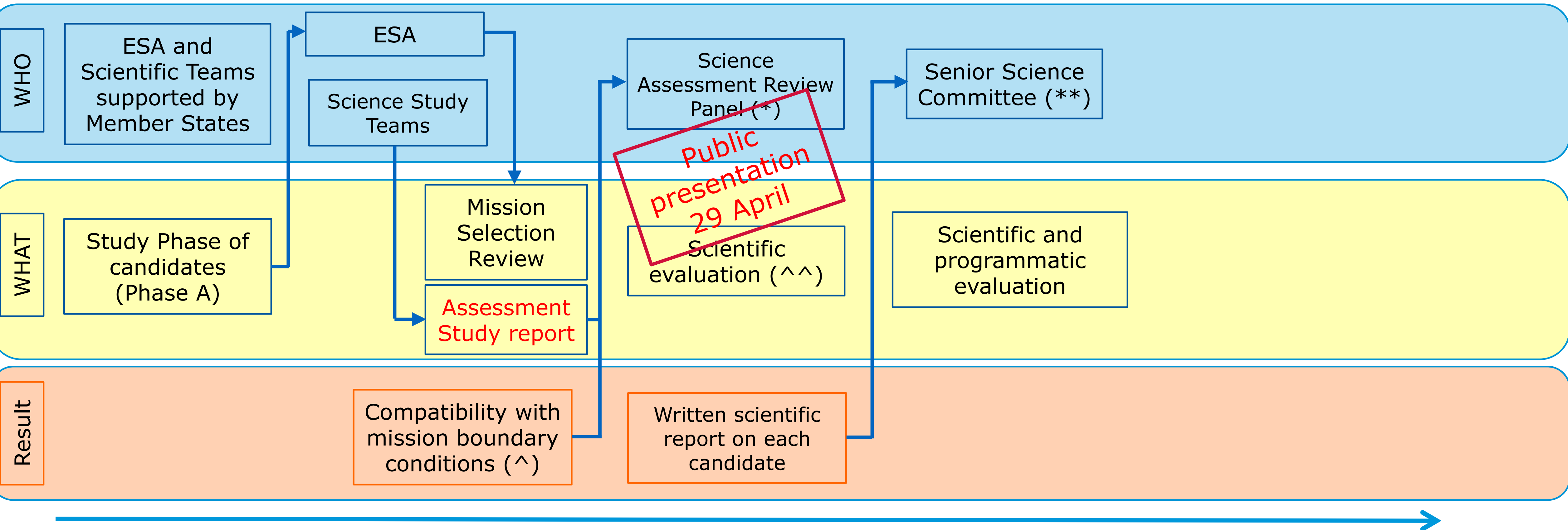
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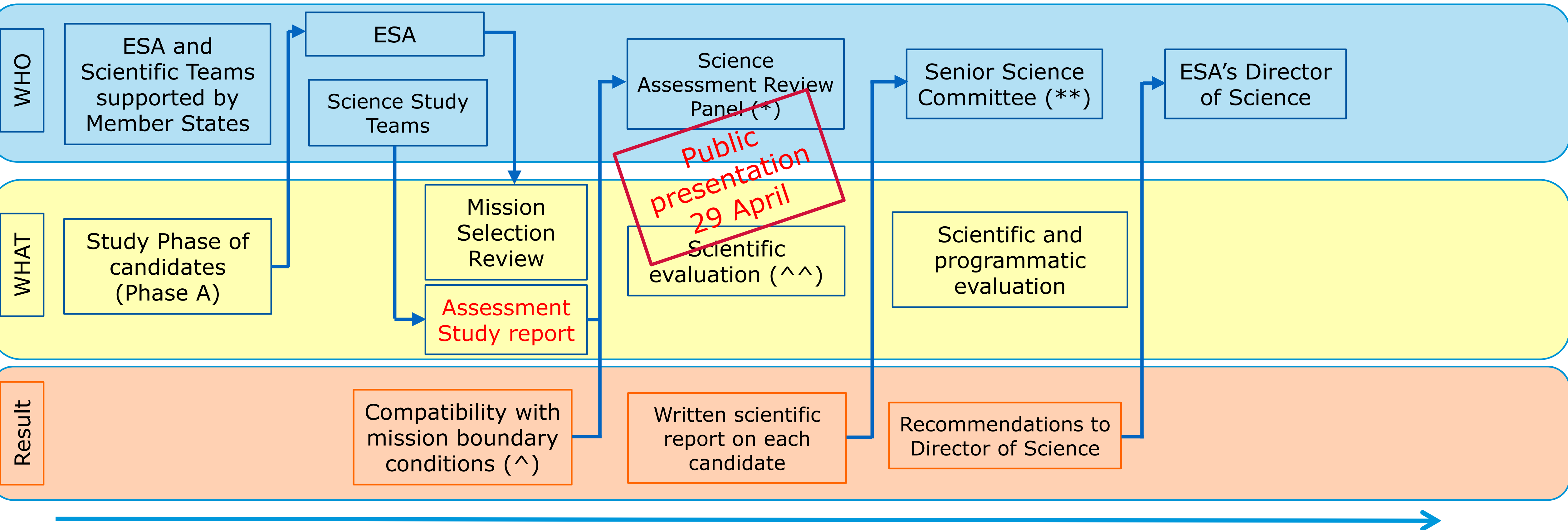


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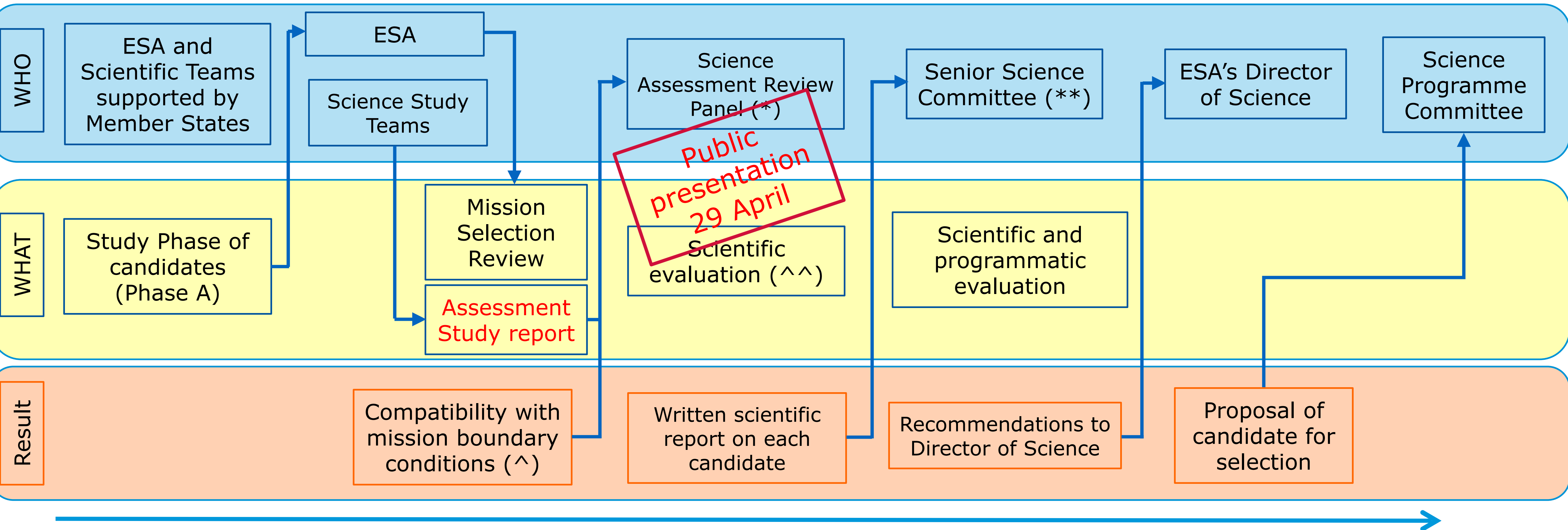
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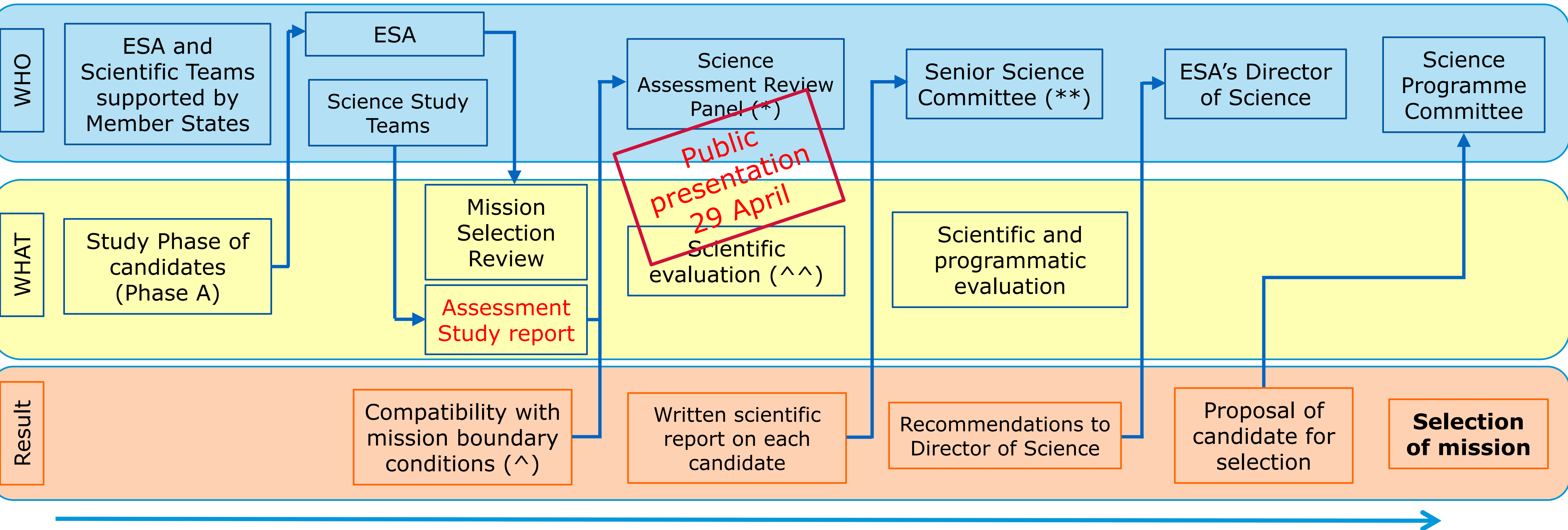


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🌐 Delivery of Assessment Study Reports	early-February 2021
🌐 Kick-off of Science Assessment Review Panel (SARP-M5)	15 February 2021
🌐 ESA MSR Board Meeting	19 April 2021
🌐 <b>M5 Public Presentations (virtual event)</b>	<b>29 April 2021</b>
🌐 SARP-M5 Q&A with M5 teams (virtual event)	4 May 2021
🌐 SARP-M5 report delivery	7 May 2021
- SARP only reviews the science, there is no ranking of the missions	
🌐 Kick-off Senior Science Committee (SSC-M5)	10 May 2021
🌐 SSC-M5 recommendation delivery	18 May 2021
- SSC take SARP and MSR input, and ranks missions	
🌐 M5 selection (by SPC)	9 June 2021



Good Luck!