

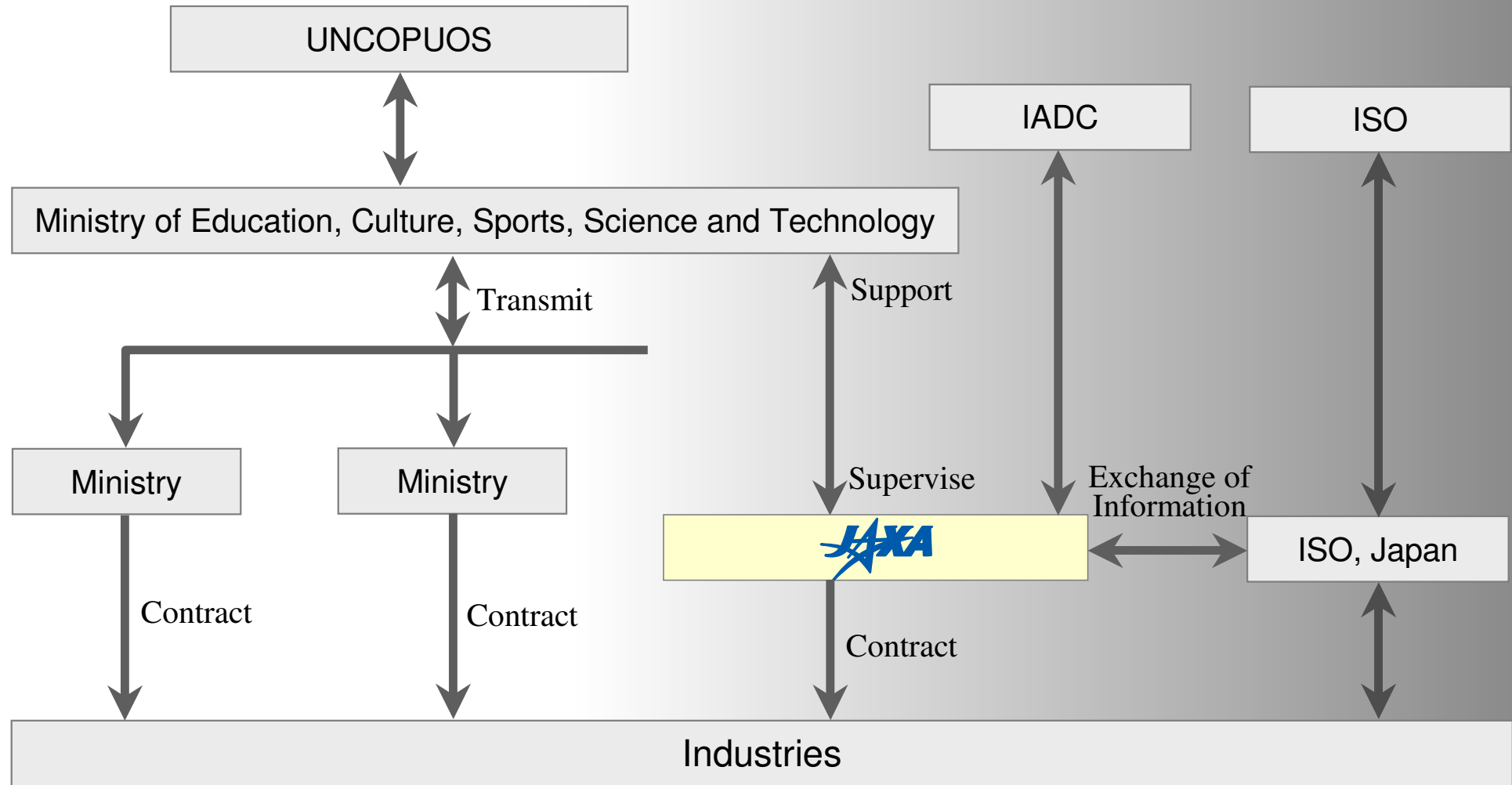
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Space Debris Mitigation Activities in Japan

▶▶▶ ST Subcommittee, 45th UNCOPUOS
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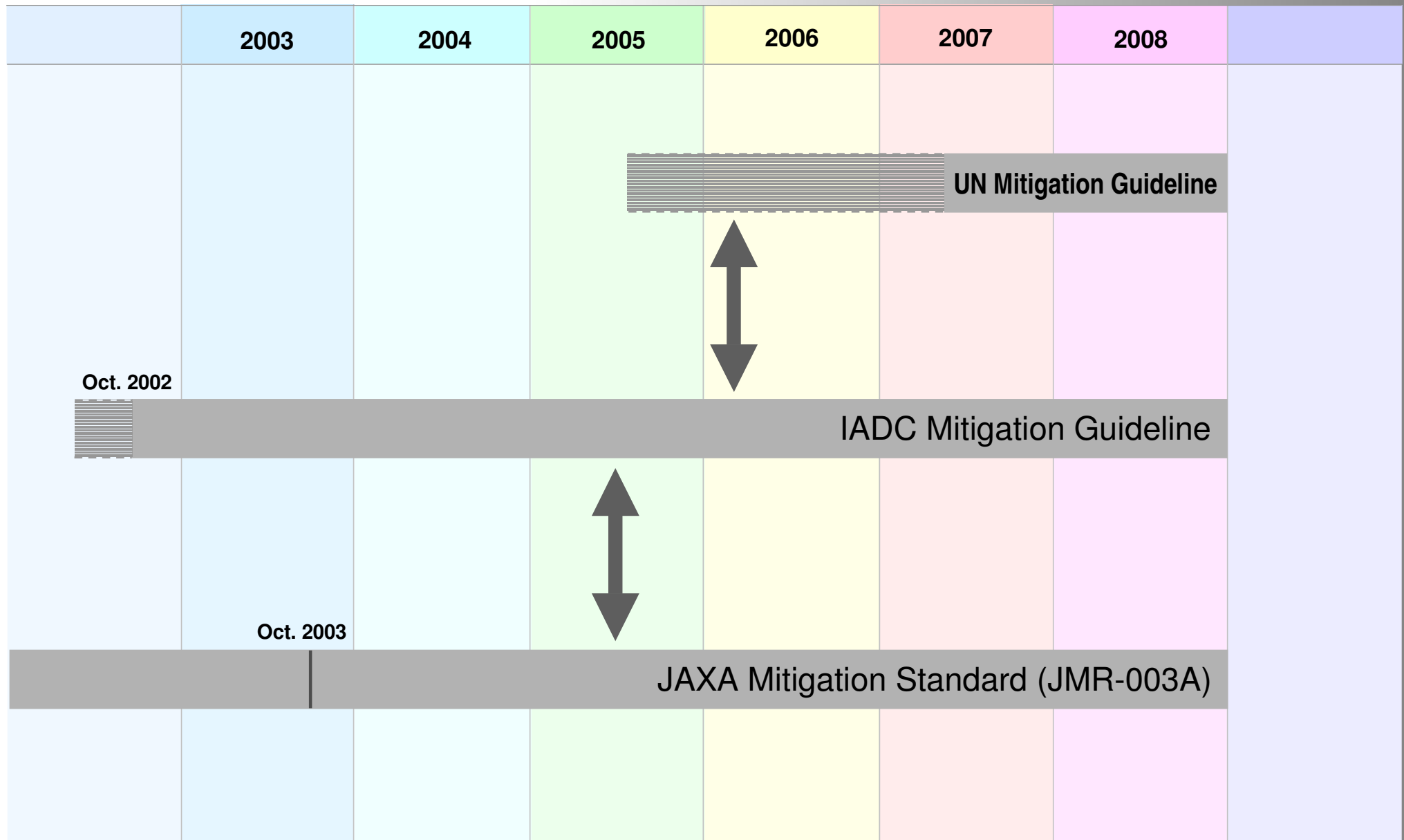
#001

System in Japan



JAXA (Japan Aerospace Exploration Agency) : Main Body of Space Activities in Japan

#002 Space Debris Mitigation Standard of JAXA (JMR-003A)



■ Principles

- (1) Preventing the on-orbit break-up of the space systems
- (2) Transferring a spacecraft that has completed its mission in GEO into higher orbit
- (3) Reducing the stay time of the orbital stage in the GTO
- (4) Minimizing the number of objects released in orbit during operation
- (5) Reducing the stay time of the space systems in LEO.
(≤ 25 years)
- (6) Avoidance of the on-orbit collision



■ Basic Requirements

The following activities should be included in the projects to minimize debris generation:

- (1) Considerations of the debris mitigation measures in studying the development plans of both space systems and related ground systems.
- (2) Efforts to minimize the generation of debris in the design and manufacturing phases.
- (3) Efforts to minimize the generation of debris during the launch and orbital injection of space systems.
- (4) Efforts to minimize the generation of debris during the orbital operation phase and the disposal phase in mission completion.
- (5) Efforts to minimize the generation of debris, even in the event of failures during the on-orbit operation phase.

Management System to reflect the above requirements has been established and improved.

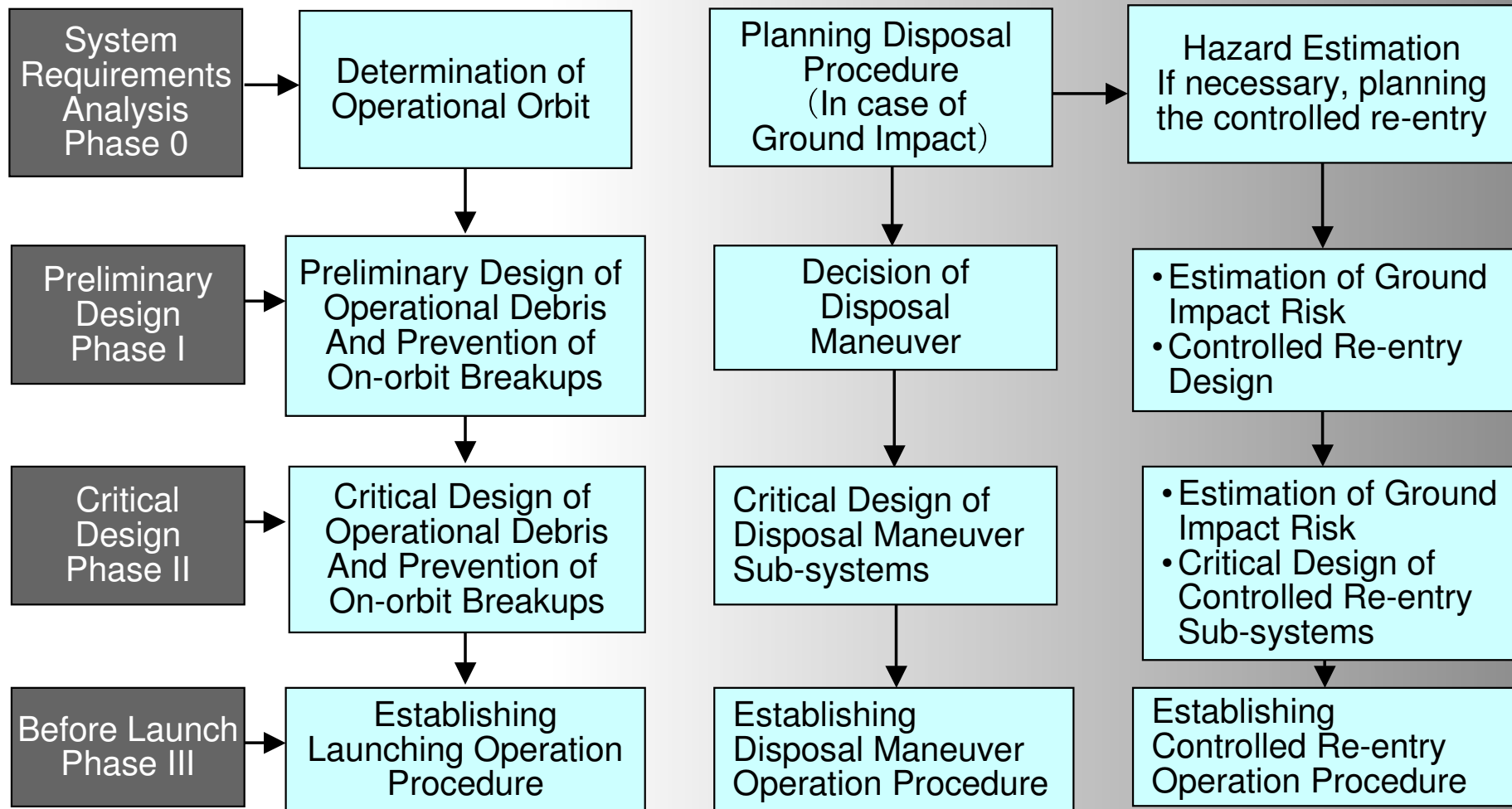


■ Space Debris Mitigation Management

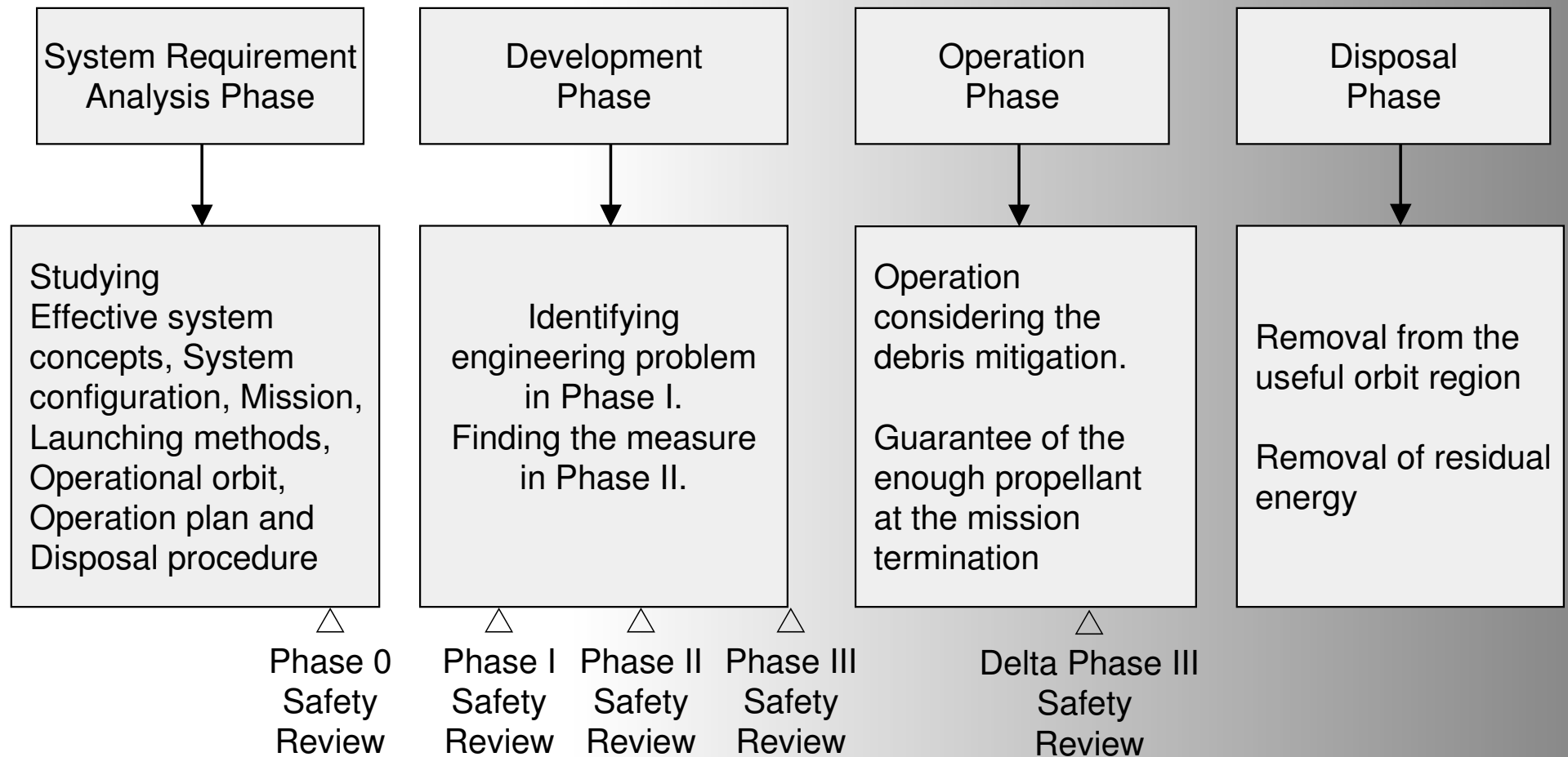
- (1) Project and contractors shall assign a responsible organization or individual that has responsibilities to study, plan, implement and review the effective measures to ensure space debris mitigation management.
- (2) Project should develop a feasible Debris Mitigation Plan after tailoring the requirements of this standard in coordination with the Safety and Mission Assurance Department.
- (3) The plan may be incorporated into the System Safety Program Plan. The plan should be offered to the System Safety Review Board for review.
- (4) Contractors should also prepare a Space Debris Mitigation Management Plan which complies with the Debris Mitigation Plan presented by JAXA. The plan should be submitted to JAXA for its approval.



■ Engineering Study in Each Phase



■ System Safety Review Board in Each Phase



1 Objective

Assessing the reentry risk of impact of survived objects at the atmospheric re-entry.

2 About ORSAT-J

ORSAT-J (Orbital Reentry Survivability Analysis Tool of Japan)
Modified from NASA-ORSAT ver4.0

Estimate the hazard caused by ground impact of survived objects at the atmospheric re-entry.

In case of Ground Impact, Calculate the following Parameters
Casualty Area, Impact Energy, Penetration Depth Limit

3 Improvement Results and Plan

Results

- Improvement of re-entry trajectory analysis
- Introducing the controlled re-entry analysis
- Addition of multi-object analysis
- Graphic data output
- Prediction of the heat transfer by radiation
- Interface Improvement

Future Plan

- Further Improvement of User Interface
- Characteristic data of CFRP
- Addition of destructive mode of the CFRP
- Addition of 3 dimensional analysis for Spheres



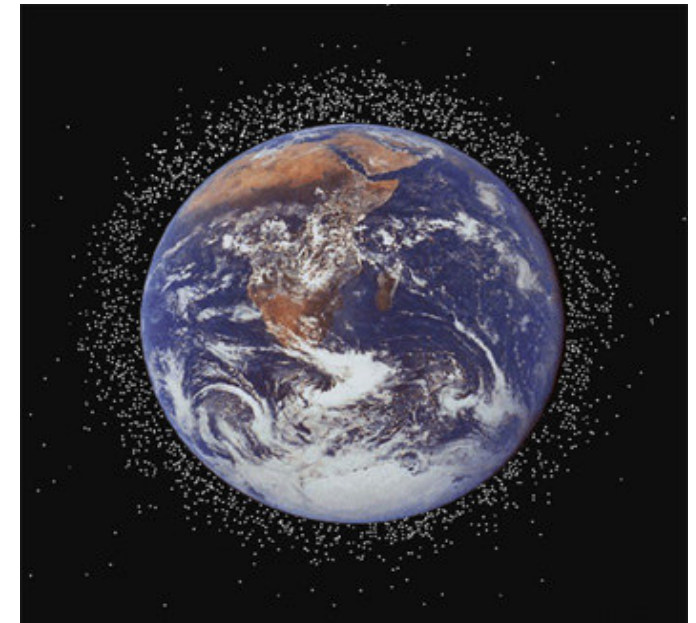
Delta II second stage propellant tank found in Texas, 1996

Electrodynamic Tether System

- Forced Reentry of the Drafting Space Systems
- BBM Phase
- Demonstration in Space is under Proposal
- Cooperation with overseas Agency

Debris Detector

- Determination of the Debris Size by the Mesh Type Detector
- Conceptual Design Phase



- JAXA is the Main Body of the Space Activities in Japan.
- Applying the Space Debris Mitigation Standard Compatible to UN Space Debris Mitigation Guideline, to its Projects
- Exchanging the Information with ISO
- Studying the Debris Mitigation System for the Future Application

