

Project Implementation

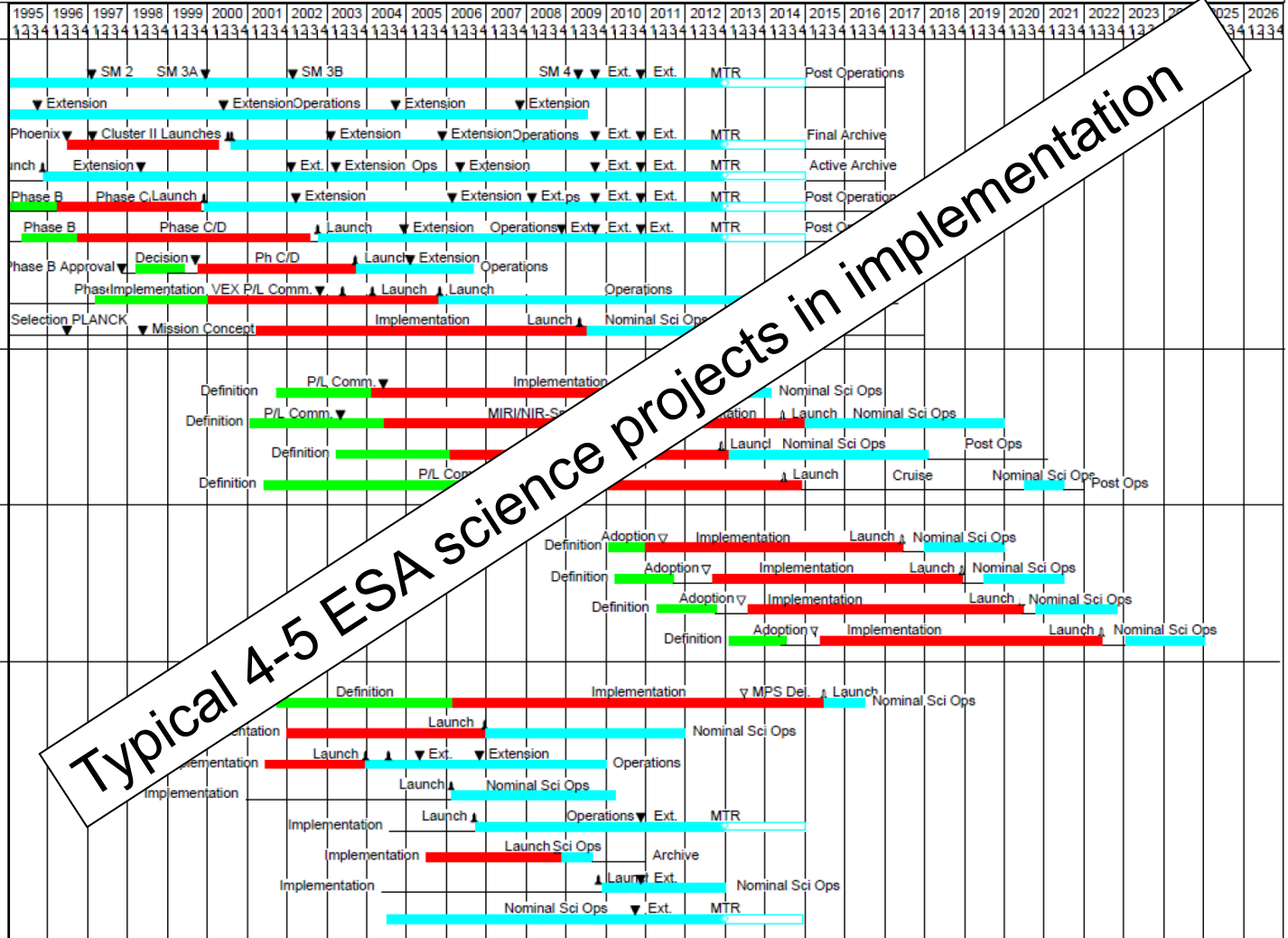
Elexir

Peter Jensen – ESA JWST Project Manager



COSMIC VISION

Status as of: 25 November 2010
Schedule by: SRE-M



Typical 4-5 ESA science projects in implementation

▽ Planne ▽ Complete

 Definition (Green)
 Implementation (Red)
 Operation (Cyan)

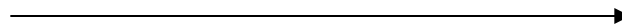
Project Implementation Phase

Assessment & Definition Phase



4-5 years
3-5 % cost

Implementation Phase



6-8 years
75-85 % cost

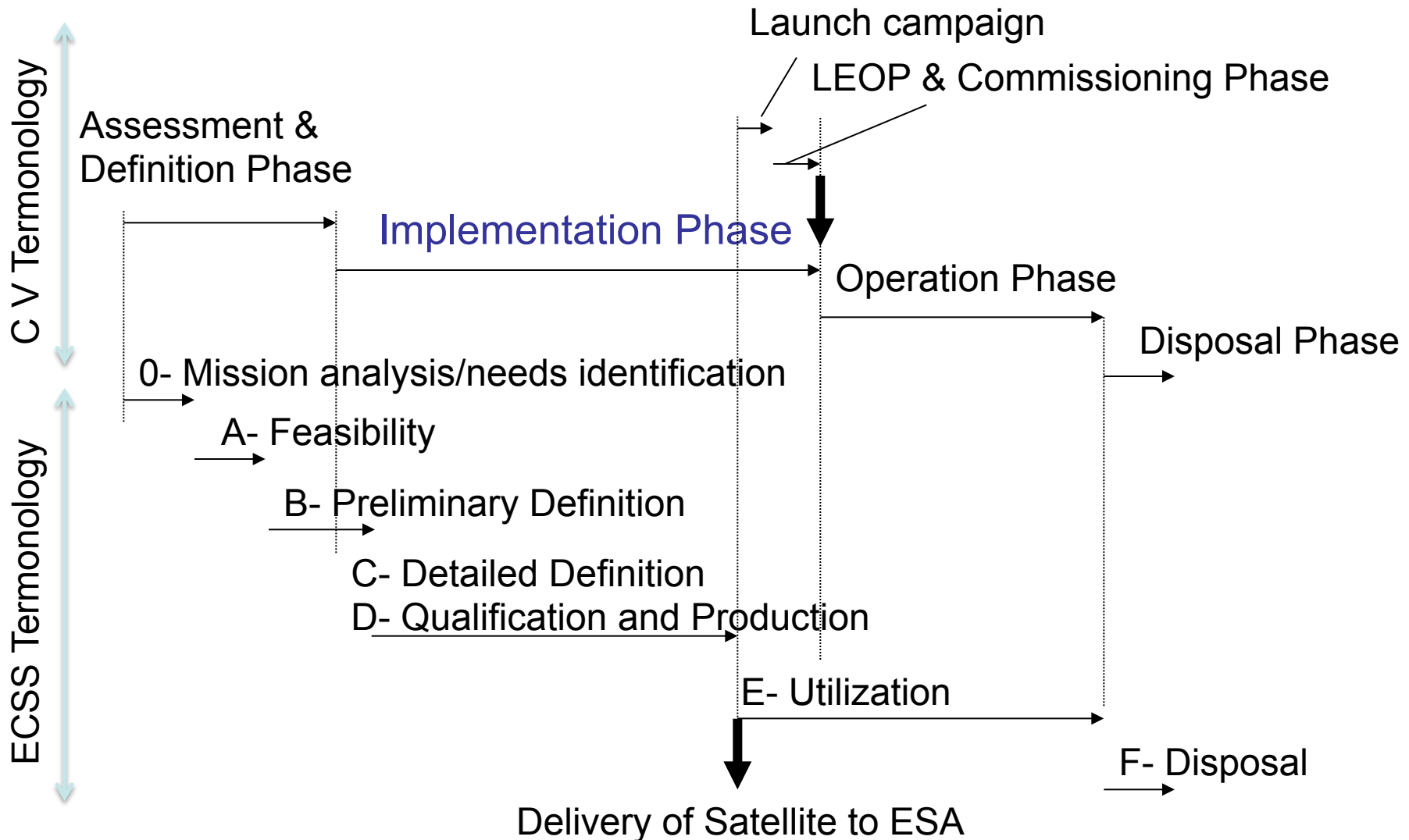
Operation Phase



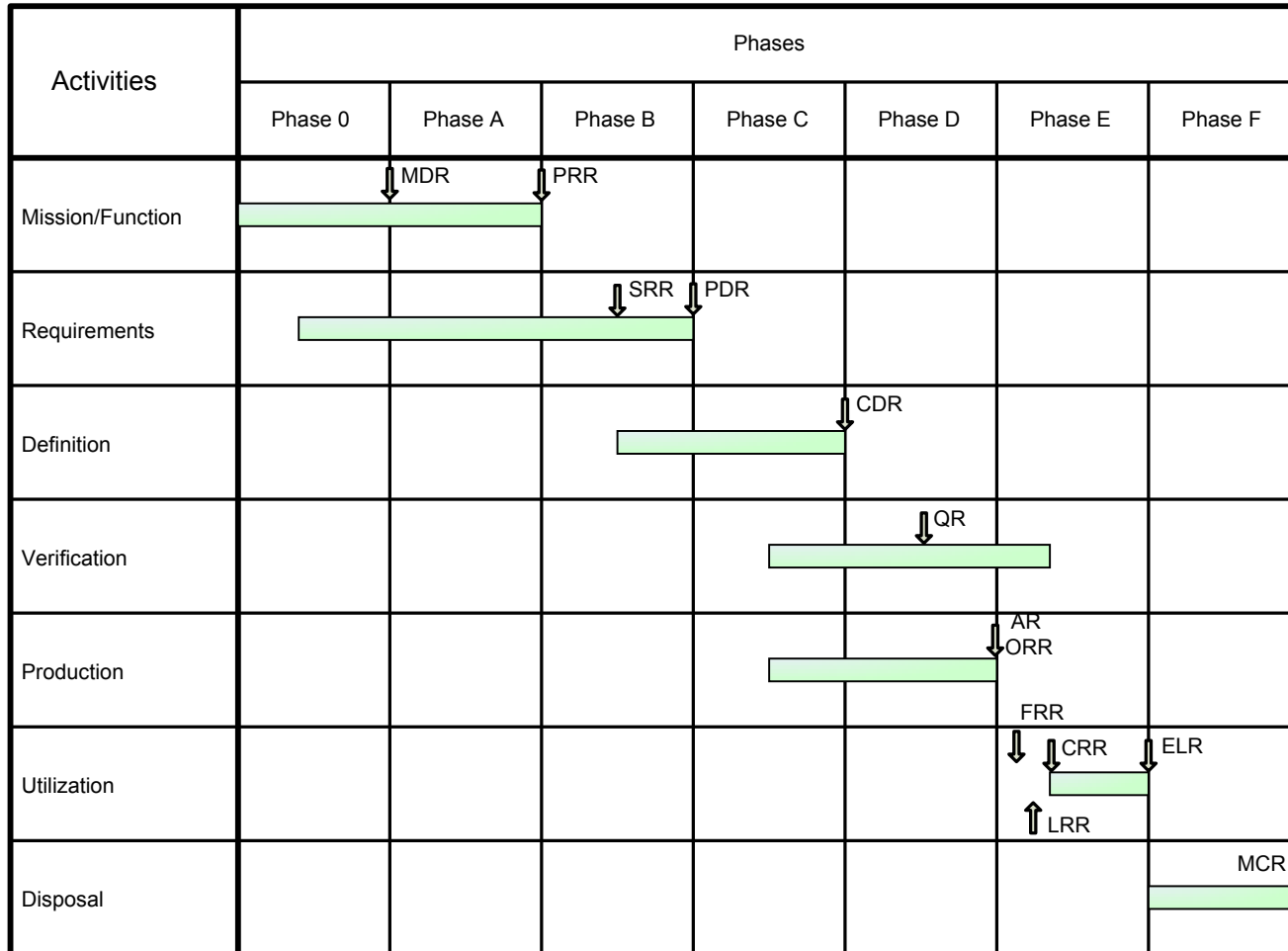
2-10 years
10-20 % cost

Typical duration and cost ratio of projects
Typical project lifecycle: 15-20 y

Project Implementation Phase - Terminology



Implementation – Project Life Cycle/Reviews

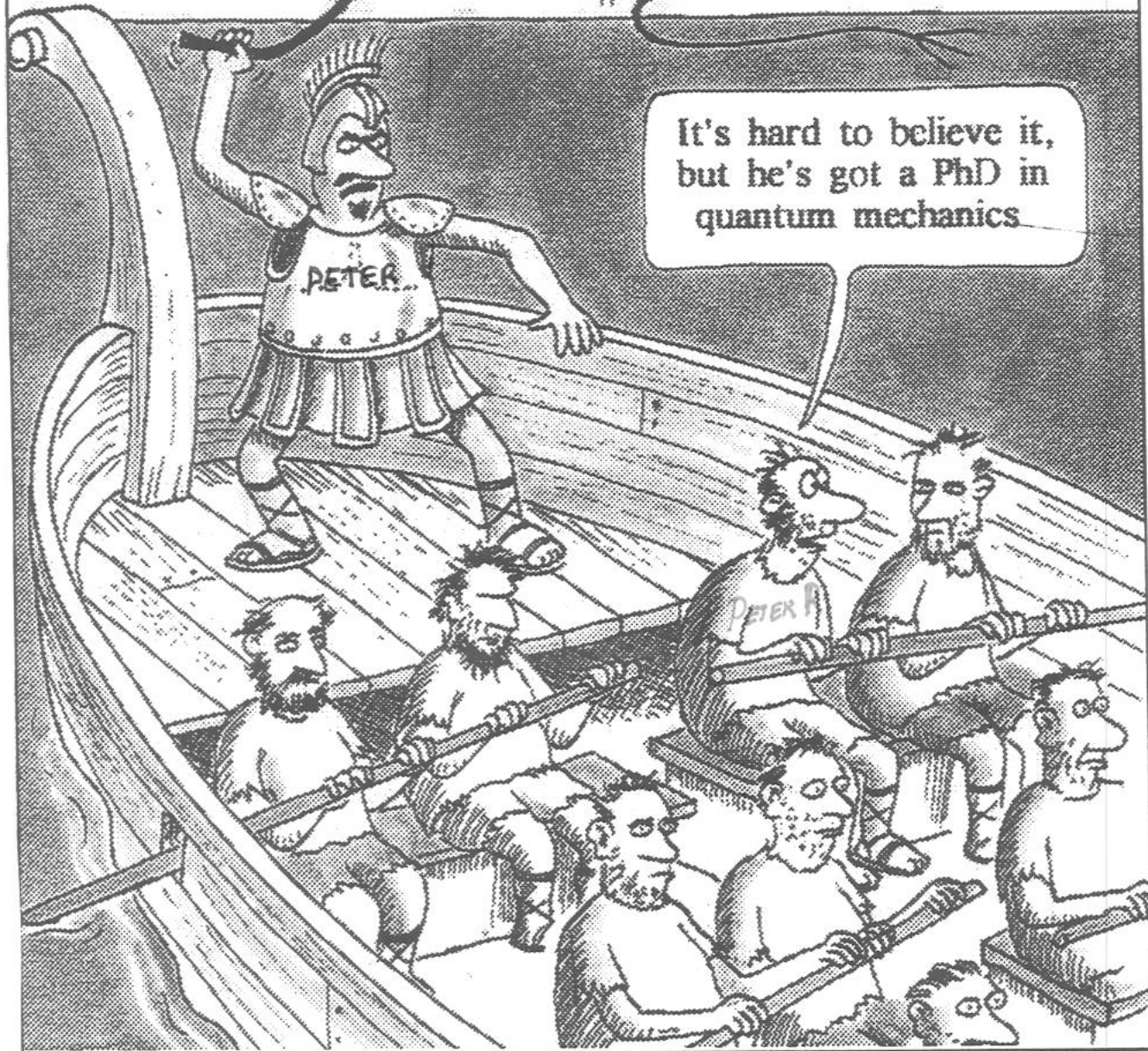


Implementation - Phase B Tasks

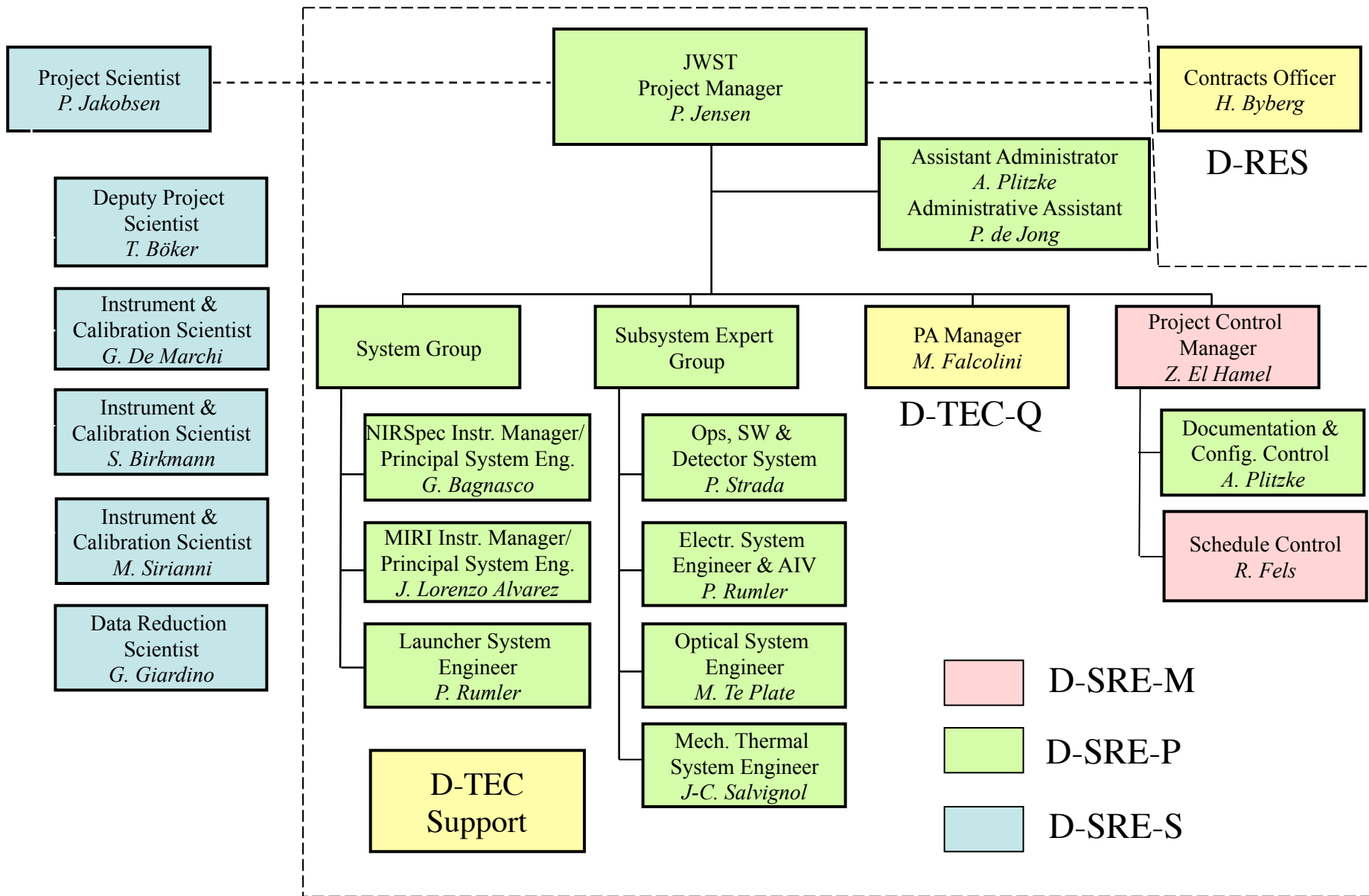
Project Manager perspective:

- Finalise project plan subject of ESA approval
 - cost, schedule, resources, risks, procurement approach
- Establish a project team and a well oiled project office, next slide
- Establish an overall Project Organisation & Structure, next slide
- Establish and formalise agreements with partners, instrument providers, industry:
 - MoU, MLA, ITT -> contracts with industry (one year typical duration)
- SPC and IPC approval
- Finalise technology development activities -> minimise risk

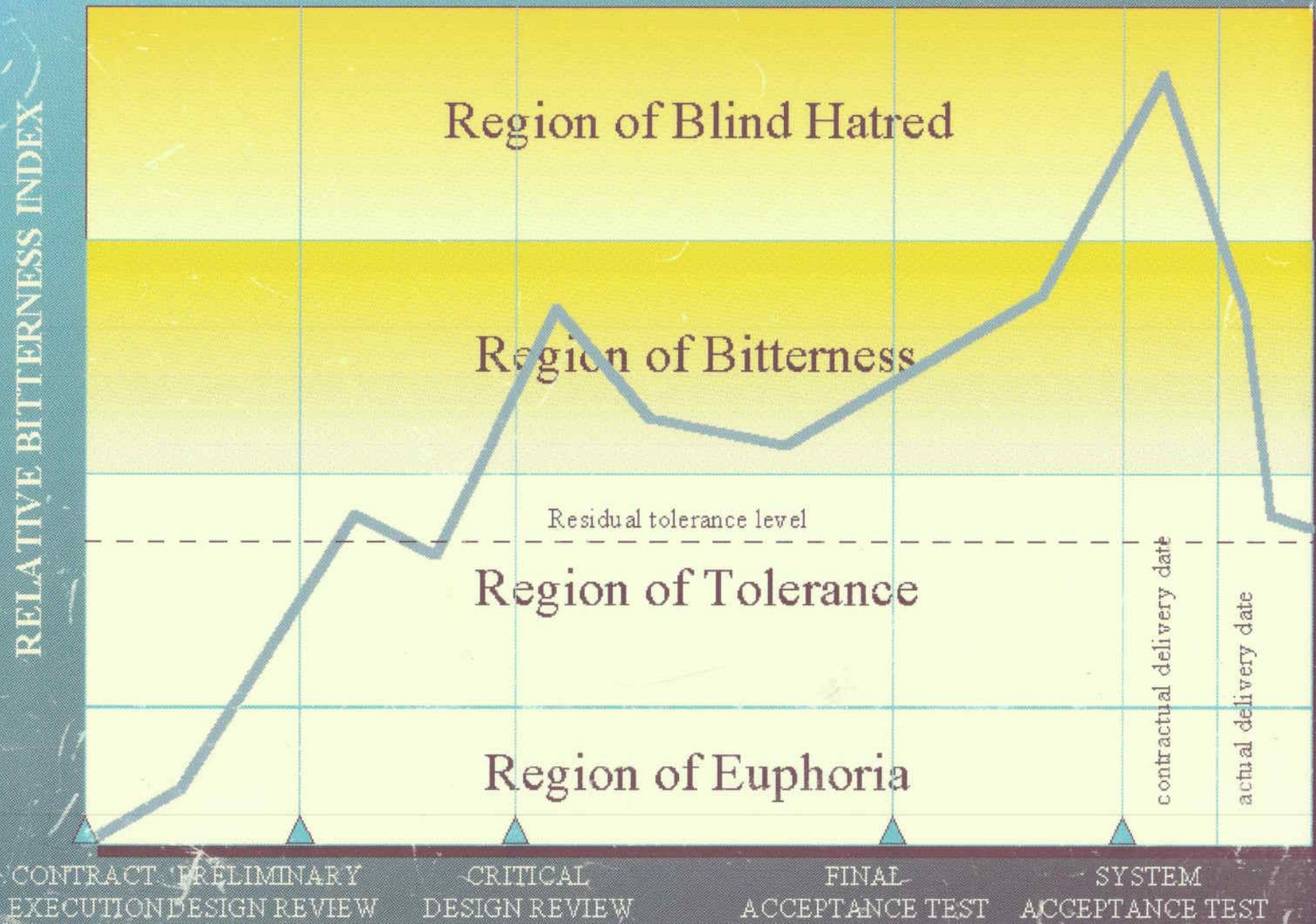
Role of the Project Manager



ESA JWST ORG CHART



SPACECRAFT PROJECT NORMAL BITTERNESS CURVE



RELATIVE BITTERNESS INDEX

Region of Blind Hatred

Region of Bitterness

Residual tolerance level

Region of Tolerance

Region of Euphoria

contractual delivery date

actual delivery date

CONTRACT EXECUTION

PRELIMINARY DESIGN REVIEW

CRITICAL DESIGN REVIEW

FINAL ACCEPTANCE TEST

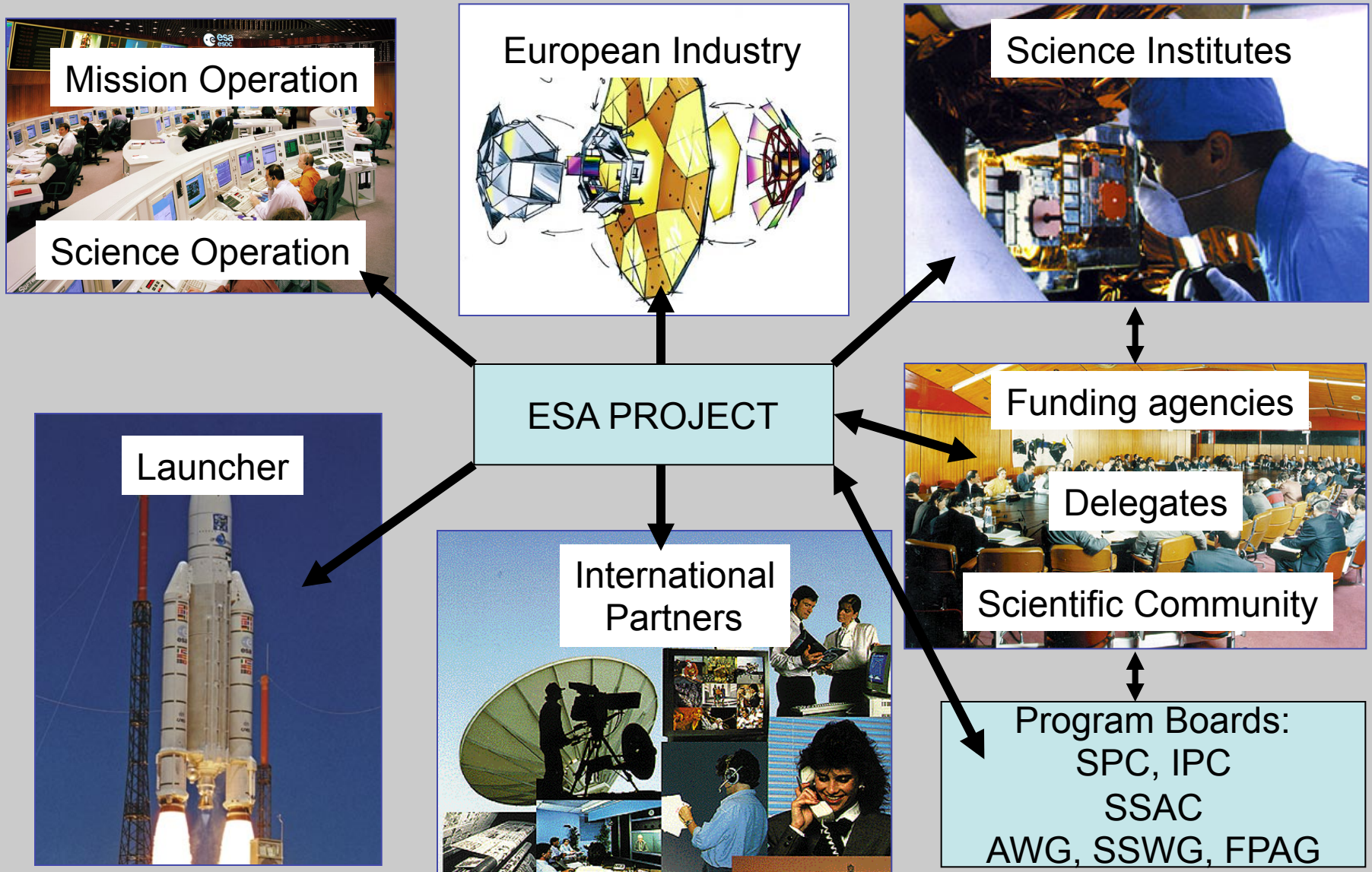
SYSTEM ACCEPTANCE TEST

Implementation - Phase B Tasks

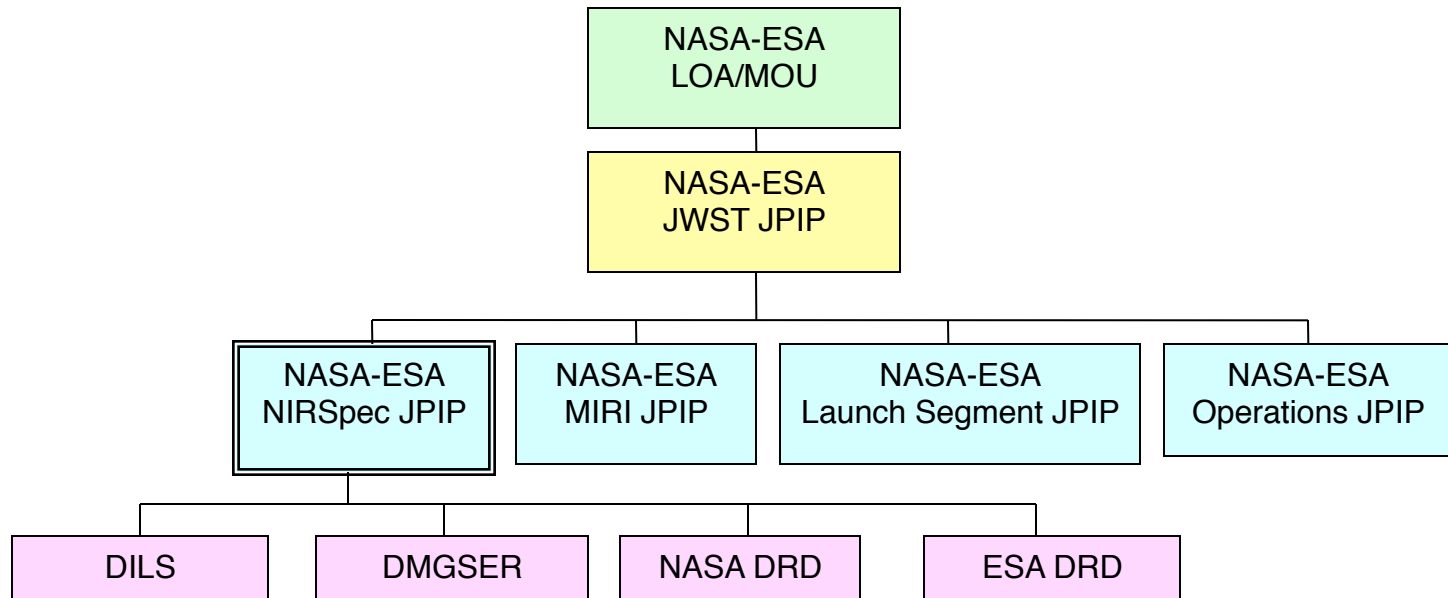
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ESA Project Project Organisation



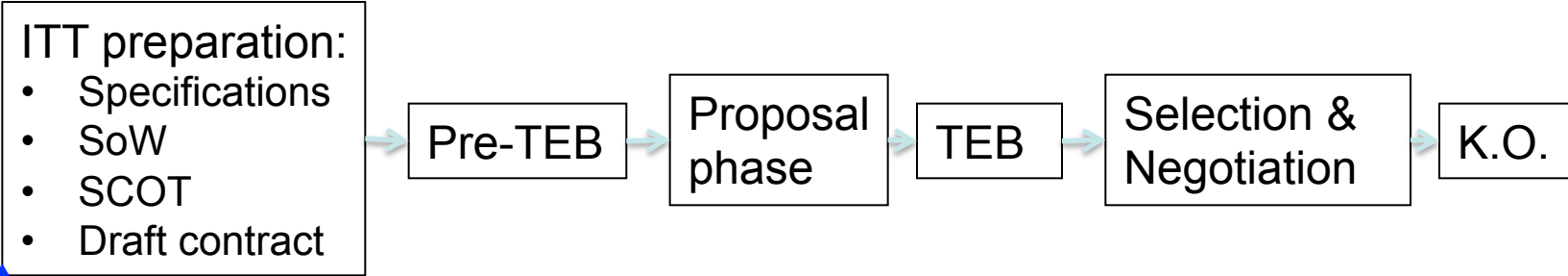
JWST ESA-NASA Programmatic Documents





MoU -	Memorandum of Understanding
JPIP -	Joint Project Implementation Plan
DILS -	Delivery Item List and Schedule
DMGSER -	Development Model & Ground Support Equip. Requirements
DRD -	Document Requirement Description

Prime Contractor Selection Process

Typical one year



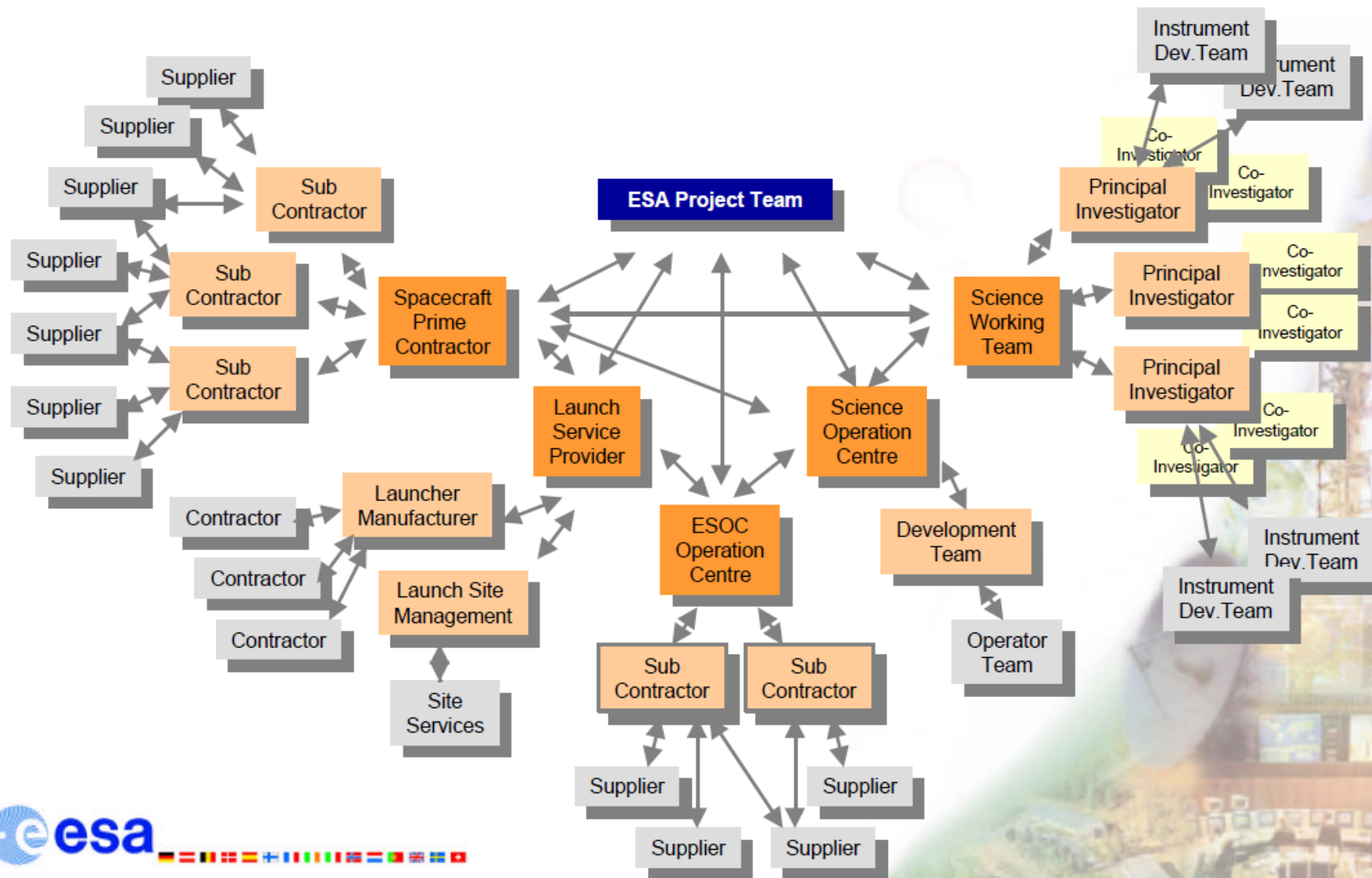
SPC approval 
IPC approval 

Allocate funding
Approve procurement and contract proposal

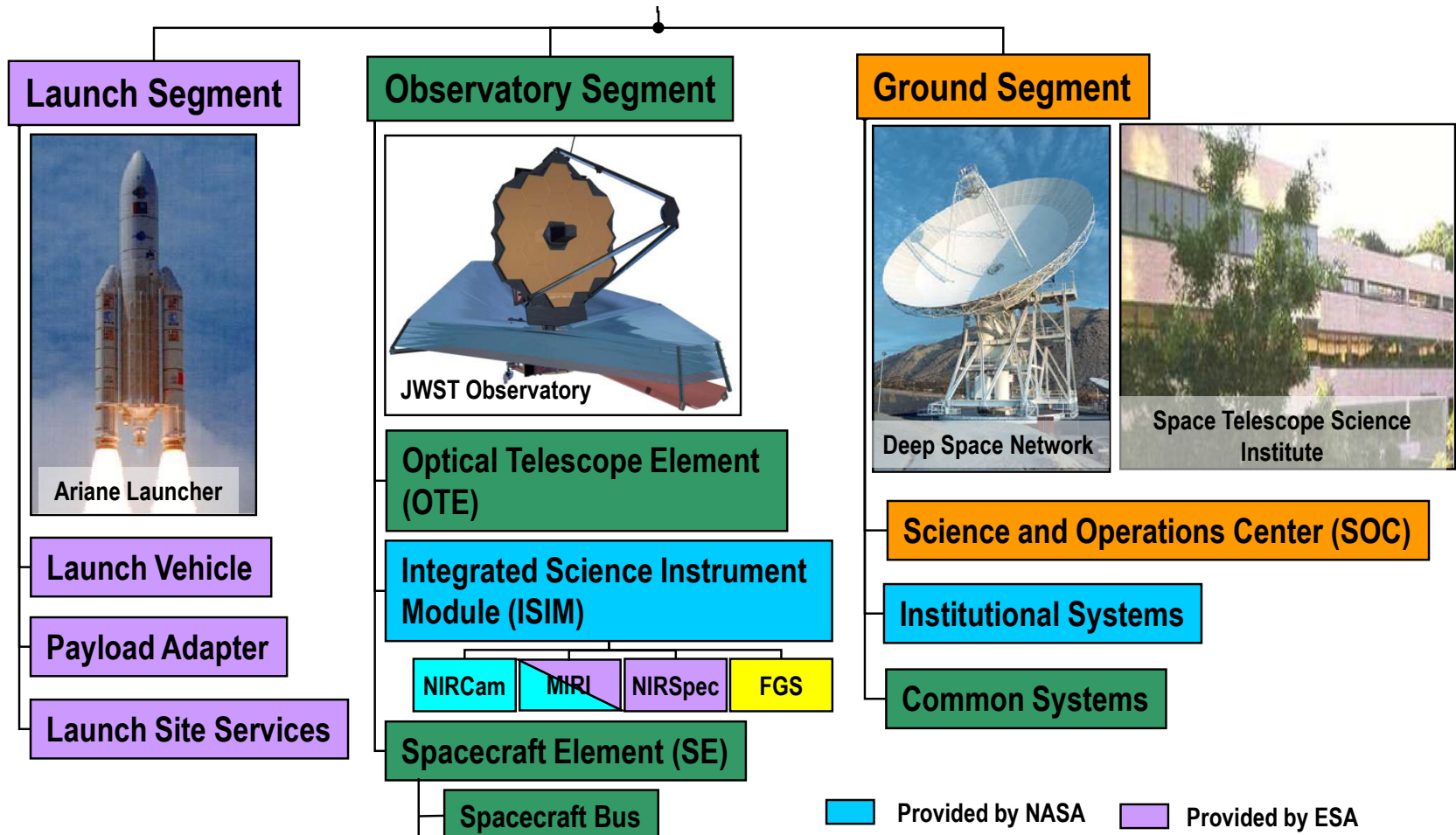
Industrial Phase B Tasks – Preliminary Definition

- Finalize the project management, engineering and product assurance plans.
- Establish the baseline master schedule.
- Elaborate the baseline cost at completion.
- Elaborate the preliminary organizational breakdown structure (OBS) – *next slide*.
- Confirm technical solution(s) for the system and operations concept(s) and their feasibility with respect to programmatic constraints.
- Conduct “trade-off” studies and select the preferred system concept, together with the preferred technical solution(s) for this concept.
- Establish a preliminary design definition for the selected system concept and retained technical solution(s).
- Determine the verification program including model philosophy.
- Identify and define external interfaces.
- Prepare the next level specification and related business agreement documents.
- Initiate pre-development work on critical technologies or system design areas when it is necessary to reduce the development risks.
- Initiate any long-lead item procurement required to meet project schedule needs.
- Prepare the space debris mitigation plan and the disposal plan.
- Conduct reliability and safety assessment.
- Finalize the product tree, the work breakdown structure and the specification tree.
- Update the risk assessment.

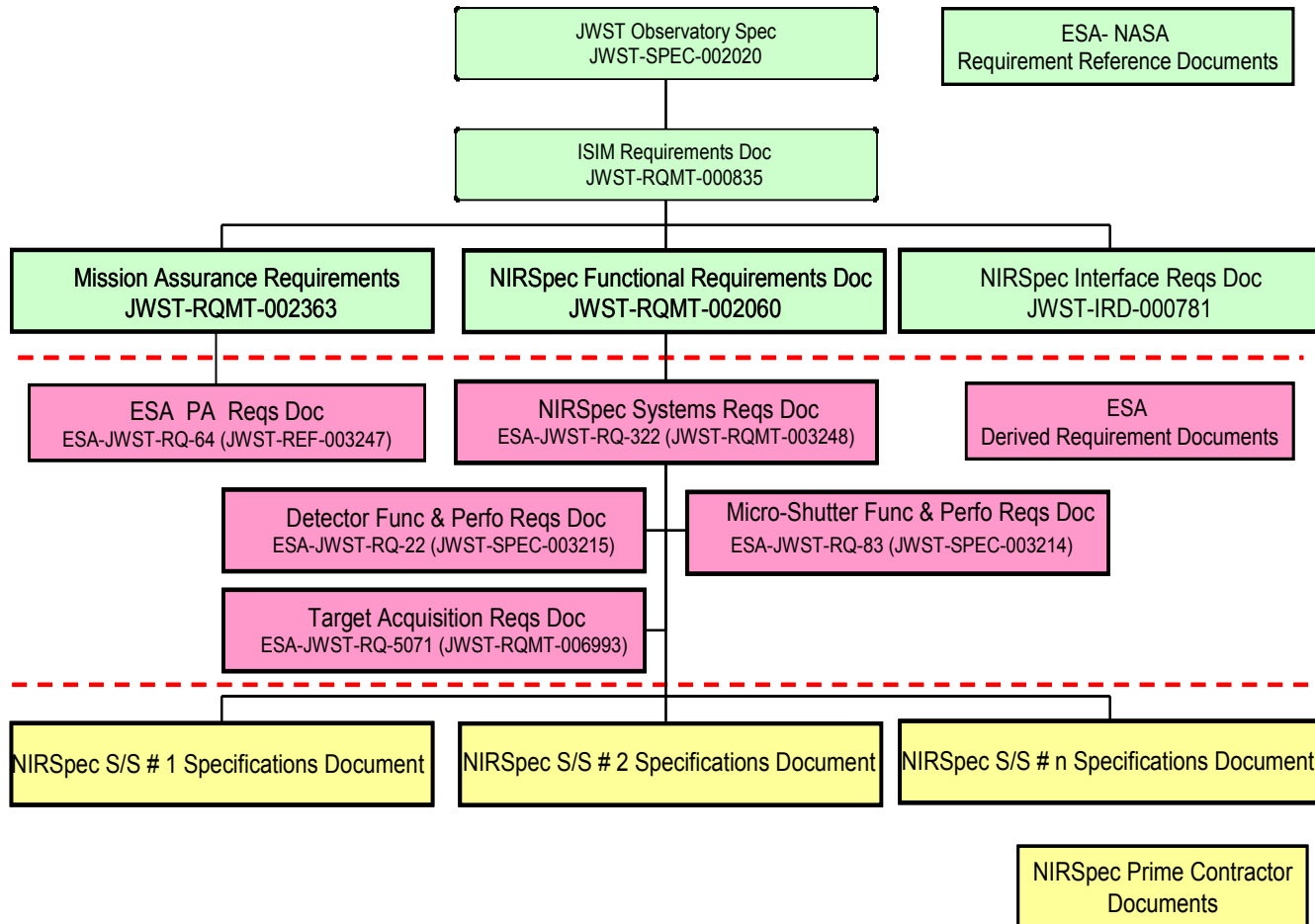
Complete Project Structure



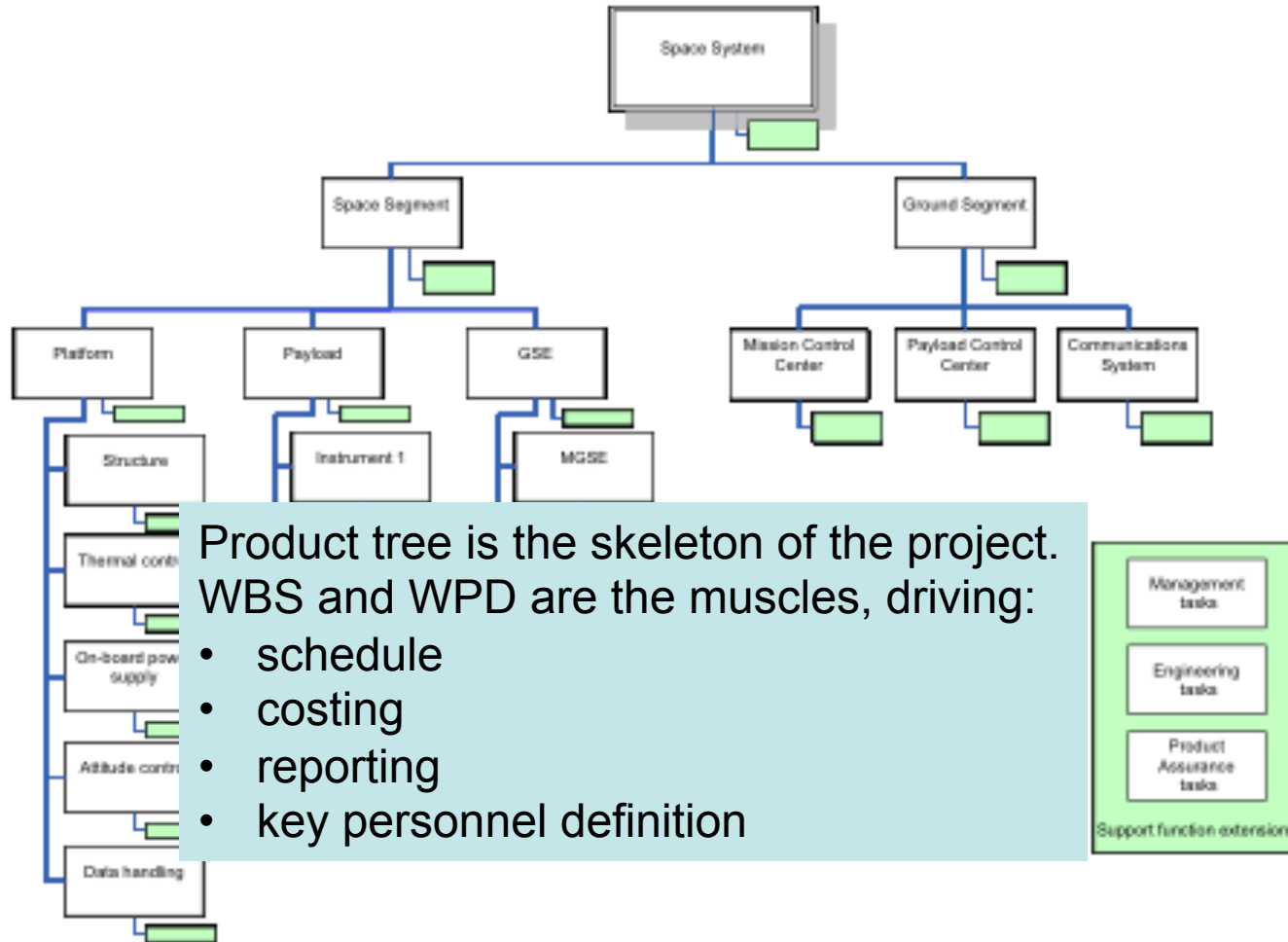
Top Level Product Tree - JWST



Requirement flow and Specification Tree



Work Breakdown Structure (WBS)



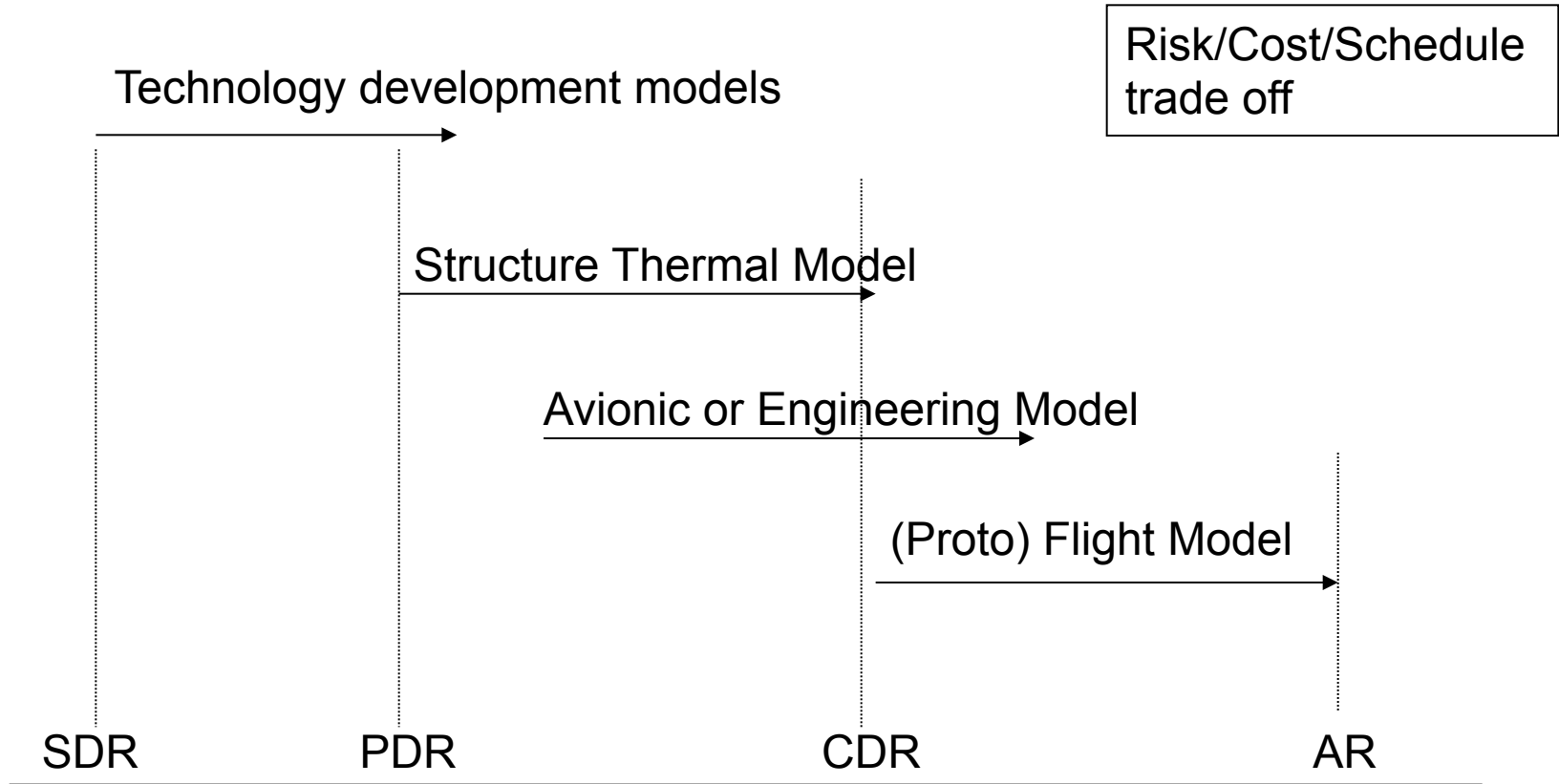
Work Package Description (WPD)

- » The WP description shall contain the following elements:
 - » project name and project phase;
 - » **WP title;**
 - » unique identification of each WP and issue number
 - » supplier or entity in charge of the WP performance;
 - » **WP manager's name and organization;**
 - » product to which the tasks of the WP are allocated (link to the product tree);
 - » description of the objectives of the WP;
 - » **description of the tasks;**
 - » list of the inputs necessary to achieve the tasks;
 - » interfaces or links with other tasks or WP's;
 - » list of constraints, requirements, standards, and regulations;
 - » **list of the expected outputs;**
 - » **list of deliverables;**
 - » location of delivery;
 - » **start event identification including date;**
 - » **end event identification including date;**
 - » excluded tasks.

Industrial Phase C Tasks – Detailed Definition

- Completion of the detailed design definition of the system at all levels in the customer-supplier chain -> **CDR.**
- Production, development testing and pre-qualification of selected critical elements and components -> **conclusion of technology development activities.**
- Production and development testing of engineering models, as required by the **selected model philosophy and verification approach.**
- Completion of assembly, integration and test planning for the system and its constituent parts.
- Detailed definition of internal and external interfaces.
- Issue of preliminary user manual.
- Update of the risk assessment.

Phase A/B/C Tasks – Model Philosophy



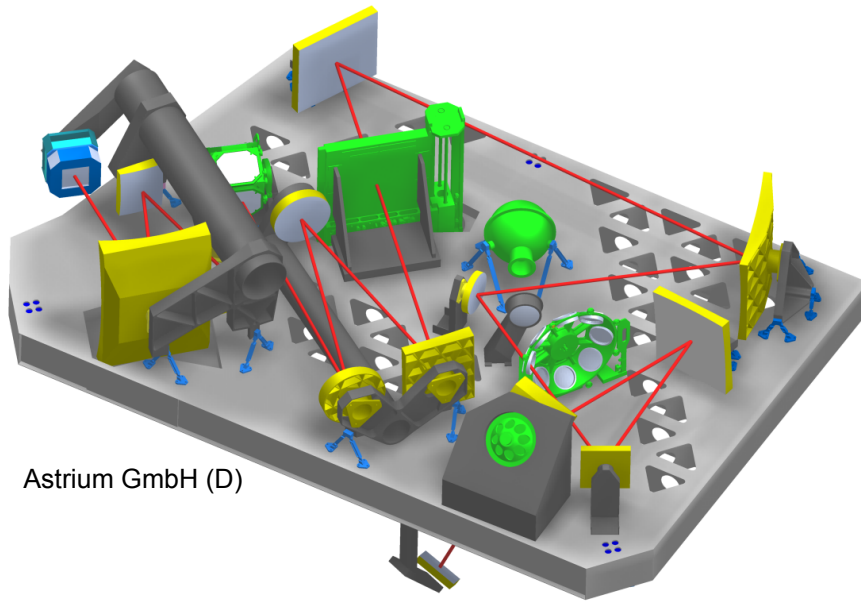
Industrial Phase D Tasks – Production/Qual/Accept

- Complete qualification testing and associated verification activities.
- Complete manufacturing, assembly and testing of flight hardware/software and associated ground support hardware/software.
- Complete the interoperability testing between the space and ground segment.
- Prepare acceptance data package.

Industrial Phase E Tasks - Utilisation

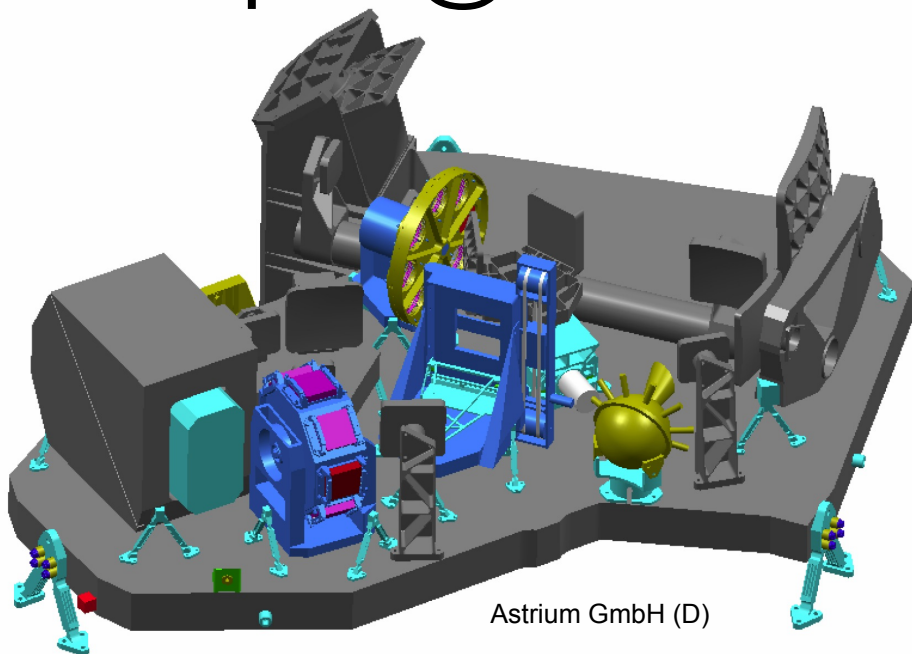
- Perform all activities at space and ground segment level in order to prepare the launch.
 - Conduct all launch and early orbital operations.
 - Perform on-orbit verification (including commissioning) activities.
-
- Perform all on-orbit operations in order to achieve the mission objectives.
 - Perform all ground segment activities in order to support the mission.
 - Perform all other ground support activities in order to support the mission.
 - Finalize the disposal plan.

NIRSpec @ end pre-definition study (Jun 2003)



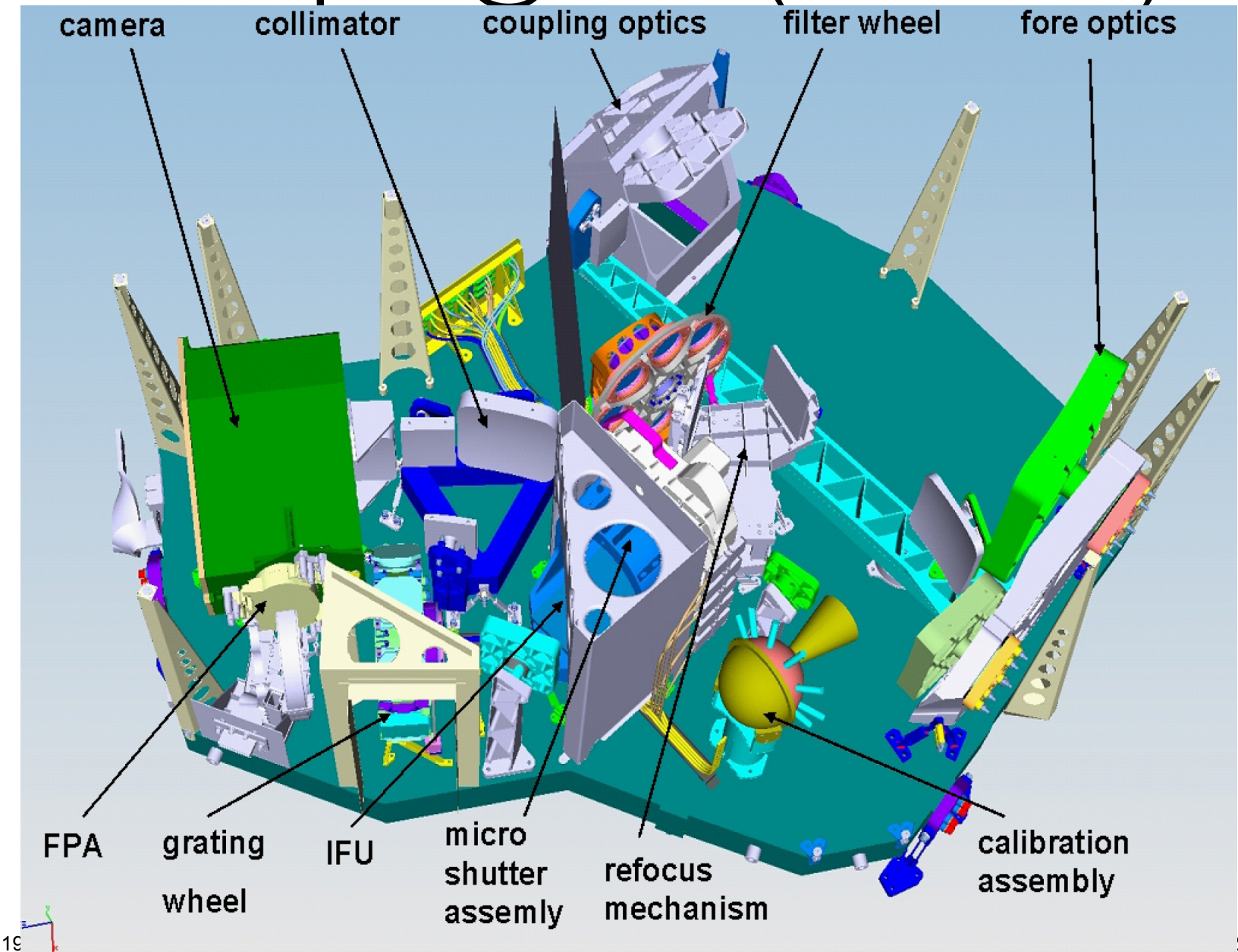
Astrium GmbH (D)

NIRSpec @ end definition phase (May 2004)

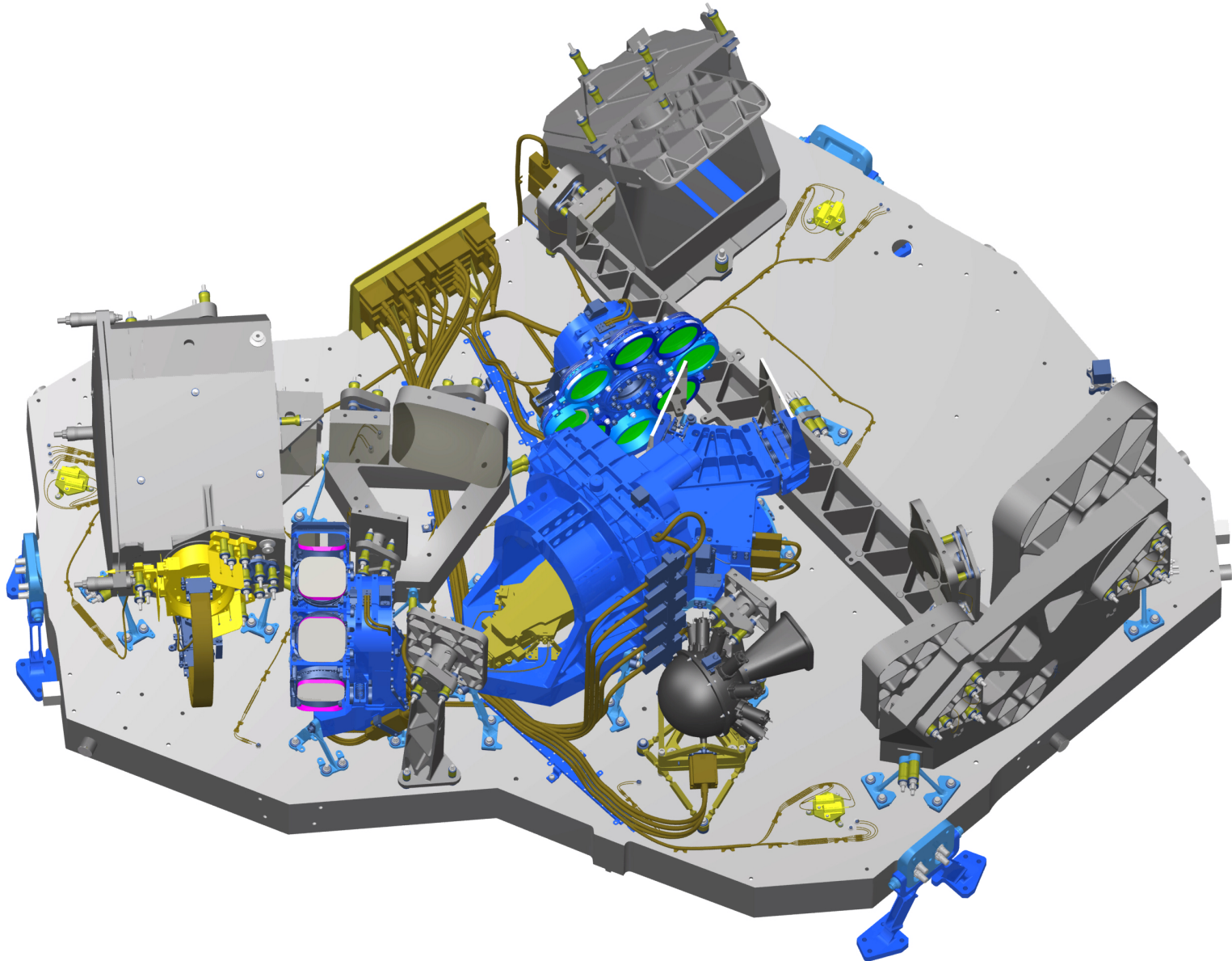


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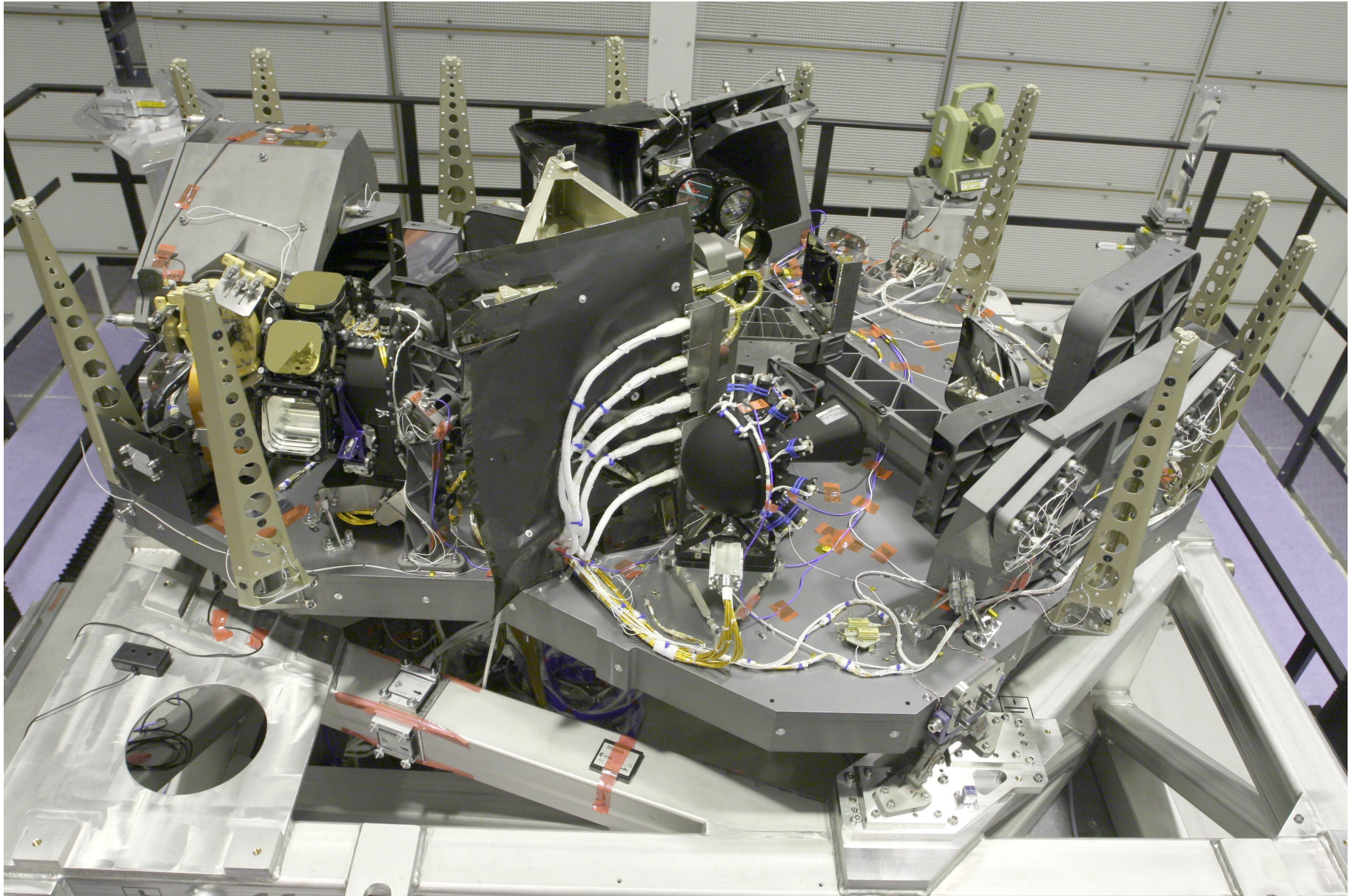
NIRSpec @ PDR (Nov 2005)



NIRSpec @ CDR (Sep 2008)

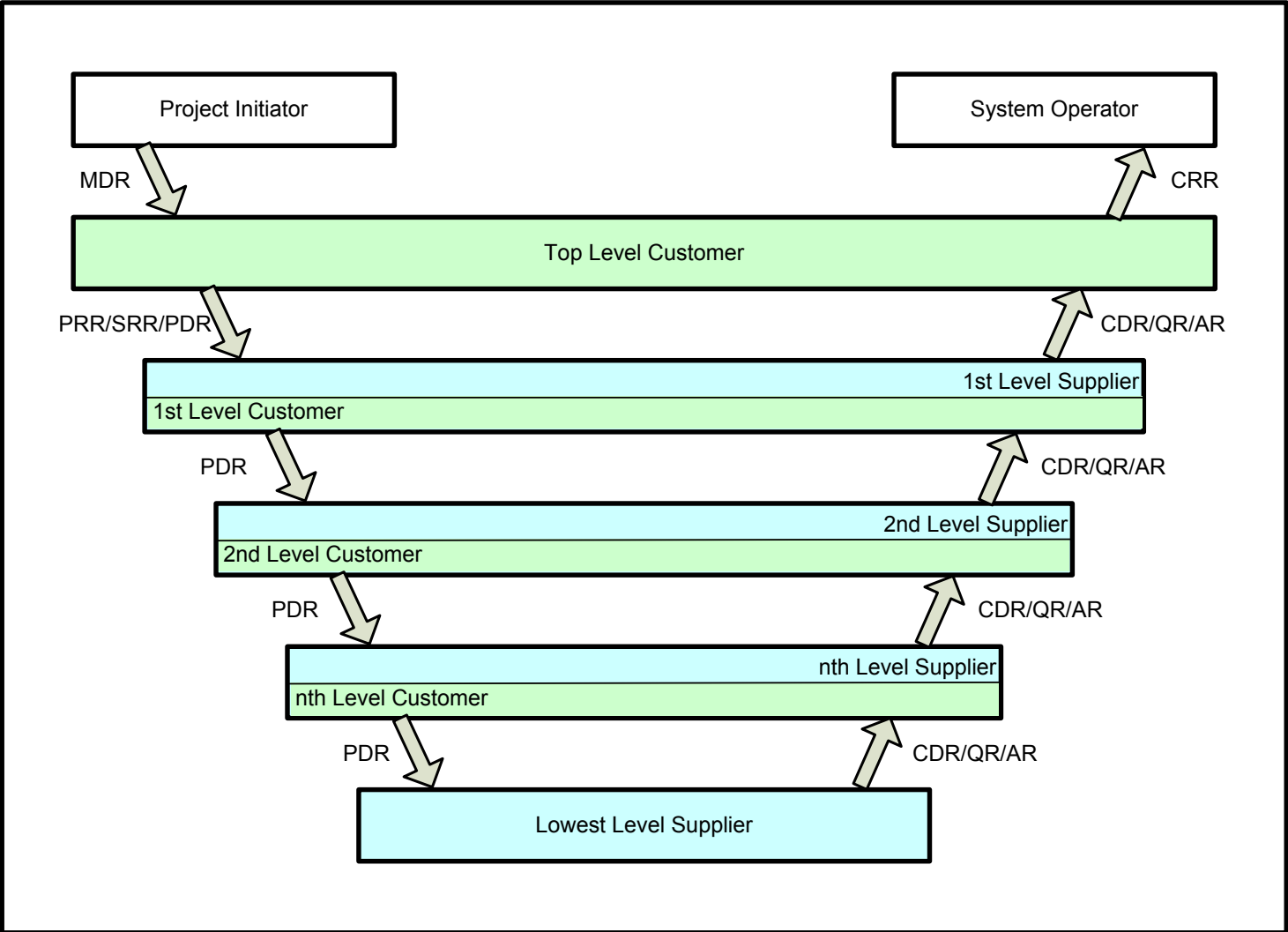


NIRSpec today



Back-up slides

Implementation – Project Review Cycle



Typical Project Reviews

Regular Reviews

- /// MRR- Mission Requirement Review
- /// MDR- Mission Definition Review
- /// PRR- Preliminary Requirement Review
- /// SRR- System Requirement Review
- /// PDR- Preliminary Design Review
- /// CDR- Critical Design Review
- /// QR- Qualification Review
- /// AR- Acceptance Review
- /// ORR- Operation Readiness Review
- /// FRR- Flight Readiness Review
- /// FAR- Flight Acceptance Review
- /// LRR- Launch Readiness Review
- /// FQR- Flight Qualification Review
- /// EOLR-End of Lifetime Review

Special Reviews

- /// Delivery Reviews
- /// MIP & KIP
- /// Parts Reviews
- /// Product Assurance Audits
- /// Financial Audits
- /// Technical Audits
- /// Software Audits

